JLR No.: 27915-000

November 15, 2018

Prepared for:

UNIVERSITY OF GUELPH
Design, Engineering & Construction
Physical Resources
Guelph, Ontario N1G 2W1

Prepared by:

J.L. RICHARDS & ASSOCIATES LIMITED
107-450 Speedvale Avenue West
Guelph, ON
N1H 7Y6
Tel: 519-763-0713
Fax: 519-763-9261

Technical Specifications Issued for Tender

University of Guelph
Building #046 Renovations
Project No. 504034

Volume 2 – Divisions 00 -14
Front End and Architectural Specifications

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

1.0 Project Title Refer to Bid Form

2.0 Owner

The University of Guelph
50 Stone Road East
Guelph, Ontario
N1G 2W1

Attention: Design, Engineering and Construction, Physical Resources, J.C. Hersey Building

Telephone: (519) 824-4120
Facsimile: (519) 837-0581

3.0 Consultants

3.1 Prime Consultant

J.L. Richards & Associates Limited
107-450 Speedvale Avenue West
Guelph, Ontario
N1H 7Y6

Attention: Theresa Ayre

Telephone: (519) 763-0713
Facsimile: (519) 763-9261

3.2 Communications, IT, & Security

FANCOM Communications Engineering
92 Lakeshore Road East, Unit 5
Mississauga, Ontario
L4G 4S2

Attention: Bill Weekes

Telephone: (905) 990-4845
Facsimile: (905) 990-4846

3.3 Commissioning Authority

WSP
582 Lancaster Street West
Kitchener, Ontario
N2K 1M3

Attention: David Braun

Telephone: (519) 743-8777

END OF DOCUMENT

END OF SECTION

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END OF SECTION

1. INVITATION

1.1 Offers, signed, executed, dated, and in compliance with the Instructions to Bidders will be received by the Owner through the MERX Electronic Bid submission (EBS) system from pre-qualified General Contractors only.

2. COMPLIANCE

2.1 The Bidder acknowledges that by submitting a compliant bid, it has accepted an offer by the Owner to enter into a "bid contract" for the evaluation of bids and the award of the Contract, if an award is made. The Bidder acknowledges that the terms of the "bid contract" are represented by the Bid Documents.

2.2 Failure to submit a bid which complies with the requirements of these Instructions to Bidders may cause a bid to be declared non-compliant and therefore not considered by the Owner.

2.3 The Owner reserves the right to waive any non-compliance and accept such a Bid, if, in the Owner's opinion, any such non-compliance does not give such Bidder an unfair advantage over the other Bidders.

3. BID DOCUMENTS

3.1 Definitions:

.1 Contract Documents: Defined in CCDC2-2008 Edition, Definitions, as amended.

.2 Bid Documents: Contract Documents supplemented with Instructions to Bidders, Bid Form, bid securities, and Supplementary Bid Forms as identified herein.

.3 Bid, Offer, or Bidding: Act of submitting an offer under signature.

.4 Bid Price: Monetary sum identified by the Bid Form.

3.2 The following documents form the basis of this bid process (the "Bid Documents"):

.1 Instructions to Bidders

.2 Bid Forms comprising the Base Bid Form, the List of Subcontractors and Contract Breakdown, the Supplementary Bid Form – Itemized and Alternative Prices, the Supplementary Bid Form – Unit Prices

.3 Agreement, Definitions and General Conditions of the CCDC 2 - 2008

.4 Supplementary Conditions

.5 Specifications (per table of contents)

.6 Drawings (per list of drawings)

.7 Addenda issued during bidding period

3.3 Check Bid Documents for completeness upon receipt. Inform Consultant/Owner immediately:

.1 Should any documents be missing or incomplete.

.2 Upon finding any discrepancies or omissions.

3.4 Complete sets of Bid Documents are only available through MERX. Copies will not be made available from Physical Resources, Hersey Building, University of Guelph (office of the Owner). Bid Documents will **not** be issued by e-mail, mail, or courier.

3.5 Pre-qualified general contractors and pre-qualified subcontractors may obtain complete sets of Bid Documents through MERX. All others shall refer to the General Contractor for information, or review the documents in the office of the Consultant or the Owner.

3.6 Bid Documents may be viewed at the office of the Owner. Bid documents may also be viewed at the offices of the:

.1 Grand Valley Construction Association
.2 Hamilton Construction Association
.3 London Construction Association
.4 Mississauga Construction Association

3.7 The Bid Documents are made available only for the purpose of submitting bids for the Project. Availability and/or use of the Bid Documents do not confer a license or grant for any other purpose.

3.8 Except as otherwise defined in these Instructions to Bidders; the defined terms in these Bid Documents are taken from the Contract. The term Contract is defined in the Agreement.

4. CONDITIONS OF THE PLACE OF THE WORK

4.1 The Place of the Work is located at Building 046, 50 College Avenue West, Guelph, ON N1G 4T6.

4.2 The following reports prepared or obtained with respect to the Place of the Work are available through the Consultant/Owner:

- Designated Substances Survey and Perchlorate Detection in Fume Hoods, OVC – Former VMI Building, prepared by LEX Scientific Inc., June 2018 (LEX Project No. 01180066).
- Letter Report: Spray-Applied Beam Insulation Inspection – Former VMI Building – Ontario Veterinary College, prepared by Lex Scientific Inc., August 30, 2018.
- Footing and Subgrade Inspection and Recommendations, prepared by Chung & Vander Doelen Engineering Ltd., July 7, 2018.
- University of Guelph Standard Operating Procedures (SOP):
  - IU.324 – Procedures for Getting Supplies In and Out of the Facility
  - IU.326 – Donning and Doffing of Personal Protective Equipment (PPE)
  - IU.329 – Personal Items in the Containment Zone
- EACO Mould Abatement Guidelines Edition 3 (2015)

4.3 Before submitting a bid, bidders are expected to investigate the Place of the Work to fully ascertain existing conditions, circumstances and limitations affecting the Work. No allowances will be made for additional costs and no claims will be entertained in connection with conditions which could reasonably have been ascertained by such investigation or other due diligence prior to submitting a bid. In submitting a bid, bidders warrant and certify that the Bidder has visited the site and ascertained site conditions.

4.4 *Conditions above acoustic tile ceilings*: conditions visible above existing suspended acoustic tile ceilings shall be considered exposed conditions for the purposes of making findings under the provisions of this Contract, and the bidder is solely responsible for ascertaining these conditions prior to bid submission.

4.5 *Additional information:* Partial drawings of the existing building are available for review at the office of the Owner. The Consultant/Owner does not represent or warranty that these drawings are complete or accurate and these drawings are made available for bidders' information only.

5. MANDATORY SITE MEETING

5.1 A mandatory site meeting for all pre-qualified general contractors and subcontractors has been scheduled for November 22 2018 at 10:00 a.m. at Place of Work. Attendees are requested to meet at the front entrance to Building 046. All bidders must attend and will be required to sign the "Site Meeting Log" to confirm their attendance.

5.2 Failure to attend shall result in disqualification of bidders and/or pre-qualified subcontractors for work of this Contract. Bids received from bidders who failed to attend the mandatory site meeting, as determined from the "Site Meeting Log", shall be returned unopened.

5.3 Representatives of the Consultant and/or the Owner will be in attendance and will conduct the bidders' briefing and tour.

5.4 Bidders and their sub-trades are required to be familiar with all matters discussed at this briefing and tour, and submission of bid shall be taken as warranty that the bidder and his trades are familiar with all site conditions and all matters discussed at the site briefing and tour.

6. PRE-QUALIFICATION

6.1 The following bidders have been pre-qualified:

.1 Only pre-qualified general contracting firms named below may submit a bid as General Contractor for this Contract:

Address	Contact Name	Contact Email	Contact Phone No.
Ira McDonald Construction Ltd.			
67 Frid Street, Unit 16 Hamilton, ON L8P 4M3	Wynn McDonald	infor@iramacdonald.com	(905) 297-4653
Matheson Constructors Limited			
205 Industrial Parkway N, Unit 5, Aurora, ON L4G 4C4	Allan Youmans	ayoumans@mathesonconstructors.com	(905) 669-7999
Melloul-Blamey Construction Inc.			
700 Rupert St, Unit A Waterloo, ON N2V 2B5	Michelle Voss	waterloo@melloul.com	(519) 886-8850 x226
Harbridge & Cross Limited			
350 Creditstone Road, Suite 202, Concord, ON L4K 3Z2	Sam Kumar	mail@harbridgeandcross.com	(416) 213-7165
Aquicon Construction Co. Ltd			
131 Delta Park Blvd, Brampton, ON L6T 5M8	Joe Gizzarelli	purchasing@aquicon.com	(905) 458-1313
MJ Dixon Construction Limited			
2600 Edenhurst Drive, Suite 200 Mississauga, ON L5A 3Z8	Paul Chiang	estimating@mjdixon.ca	(905) 270-7770

.2 Only pre-qualified firms named below may submit a bid to pre-qualified general contracting firms (named above) for mechanical work of this Contract.

Address	Contact Name	Contact Email	Contact Phone No.
Brenner Mechanical Inc.			
630 Superior Drive, Waterloo, ON N2V 2C6	Michael Brenner Paul Westman	pwestman@brenner.ca	(519) 746-0439
JMR Electric Ltd.			
301 Thames Rd East, Exeter, ON N0M 1S3	John Rasenberg	john.rasenberg@jmrelectric.ca	(519) 235-1516
Mattina Mechanical Limited			
211 Lanark Street, Hamilton, ON L8E 2Z9	Domenic Mattina	dmattina@mattina.ca	(905) 544-6380 x. 223
LJ Barton Mechanical			
1341 Osprey Dr, Ancaster, ON L9G 4V5	Jim Barton	jim@ljbarton.com	(905) 304-1976 x203
Velocity Mechanical Inc.			
176 Forfar Ave, Kitchener, ON N2B 3A1	Peter Linseman	peter@velocitymechanical.com	(519) 896-1119

.3 Only pre-qualified firms named below may submit a bid to pre-qualified general contracting firms (named above) for electrical work of this Contract.

Address	Contact Name	Contact Email	Contact Phone No.
P&S Electric			
6596 Gerrie Rd, Elora, ON N0B 1S0	Mark Parsons	pselectric@pselectricltd.com	(519) 265-6096
JMR Electric Ltd.			
301 Thames Rd E, Exeter, ON N0M 1S3	John Rasenberg	john.rasenberg@jmrelectric.ca	(519) 235-1516
CEC Services Limited (Aurora)			
16188 Bathurst St, King City, ON L7B 1K5	Kevin Beswick Dawna Van Loon	dvanloon@beswickgroup.com	(905) 713-3711

.4 Only pre-qualified firms named below may submit a bid to pre-qualified general contracting firms (named above) for roofing work of this Contract.

Address	Contact Name	Contact Email	Contact Phone No.
Aseal Roofing and Sheet Metal Limited			
244 Brockport Drive, Unit 9 Etobicoke, ON M9W 6X9	Paul Oliveira	Info@asealroofing.com	(416) 213-0558
Atlas Apex Roofing			
65 Disco Road Etobicoke, ON M9W 1M2	Brett Beetles	bbeetles@atlas-apex.com	(416) 421-6244
Conestoga Roofing & Sheet Metal Limited			
331 Sheldon Drive Cambridge, ON N1T 1B1	Mark Mollison	Info@conestogaroofing.com	(519) 623-7411
Dean Thackeray Roofing Limited			
199 Riverbend Drive Kitchener, ON N2B 2E8	Patrick Dean	Patrick.dtr@bellnet.ca	(519) 745-7386
Flynn Canada Ltd			
135 Fleming Drive Cambridge, ON N1T 2B8	Joseph Raposo Peter Novais	Joseph.Raposo@flynncompanies.com Peter.novais@flynncompanies.com	(519) 624-8797
Nedlaw Roofing Ltd			
232B Woolwich Street S Breslau, ON N0B 1M0	Randy Walden	Rwalden@nedlaw.ca	(519) 648-2218
Nortex Roofing			
66 Six Point Road Toronto, ON M8Z 2X2	Sandra Furtado	sandra@nortexroofing.com	(416) 236-6090
Semple Gooder Roofing Corporation			
1365 Martin Grove Road Toronto, ON M9W 4X7	Rosanne Capretta	rcapretta@semplegooder.com	(416) 743-5370
Trio Roofing			
5 West Drive Brampton, ON L6T 4T2	Paulo Vieira	paulo@trioroofing.ca	(905) 456-1688
Wm. Green Roofing			
45 Dawson Road Guelph, ON N1H 1B1	Scott Brookes	sbrookes@wmgreenroofing.ca	(519) 822-6414

.5 Only pre-qualified firms named below may submit a bid to pre-qualified general contracting firms (named above) for telecommunications cable (telephone or data) work of this Contract.

Address	Contact Name	Contact Email	Contact Phone No.
Demarcation Point			
1025 Hargrieve Road, Unit 5 London, ON N6E 1P7	Veljko Vincic	Veljko.vincic@demarclondon.com	(519) 963-2225
Roberts Onsite Inc.			
209 Manitou Drive Kitchener, ON N2C 1L4	Debbie Magnus	dmagnus@robertsonsite.ca	(519) 578-2230 x239
Vollmer Inc.			
3822 Sandwich Street Windsor, ON N9C 1C1	David Ducharme	dducharme@vollmer.ca	(519) 966-6100 x222

.6 Only pre-qualified firms named below may submit a bid to pre-qualified general contracting firms (named above) access control/security work of this Contract.

Address	Contact Name	Contact Email	Contact Phone No.
Pinder's Security Products			
25 Nihan Drive St. Catharines, Ontario, L2N 1L2	Brandon Pinder	brandon@pinders.com	(905) 934-6333
Clockwork Systems			
4605 Crysler Avenue, Units 1-2 Niagara Falls, Ontario L2E 3V6	Ryan Grealy / Kevin Grealy	N/A	(905) 650-0192
Johnson Controls			
40 Hempstead Drive, Unit 1, Hamilton, On L8W 2E7	Robert McLean	robert.2.mclean@jci.com	(905) 301-9890

.7 Only pre-qualified firms named below may submit a bid to pre-qualified general contracting firms (named above) for fire alarm testing and verifications work of this Contract.

Address	Contact Name	Contact Email	Contact Phone No.
Classic Fire Protection			
645 Gayray Drive North York, ON M9L 1P9	Chris Berwick	chrisberwick@classicfire.com	(416) 740-3000
Forest City Fire Protection Ltd.			
160 Adelaide St. S London, ON N5Z 3L1	Chris Reynolds	Creynolds.fcfp.ca	(519) 668-0010
Vipond Fire Protection			
6380 Vipond Dr. Mississauga, ON L5T 1A1	Dennis Weber	Dennis.weber@vipond.ca	(905) 564-7060

.8 Only pre-qualified firms named below may submit a bid to pre-qualified general contracting firms (named above) for fire suppression work of this Contract.

Address	Contact Name	Contact Email	Contact Phone No.
Classic Fire Protection			
645 Gayray Drive North York, ON M9L 1P9	Chris Berwick	chrisberwick@classicfire.com	(416) 740-3000
Forest City Fire Protection Ltd.			
160 Adelaide St. S London, ON N5Z 3L1	Chris Reynolds	Creynolds.fcfp.ca	(519) 668-0010
Spira Fire Protections Ltd.			
31 Hayes Ave Guelph, ON N1E 5V6	David Spira	david@spira.ca	(519) 823-1150 x222
Vipond Fire Protection			
6380 Vipond Dr. Mississauga, ON L5T 1A1	Dennis Weber	Dennis.weber@vipond.ca	(905) 564-7060

6.2 Bids received from bidders which have not been pre-qualified shall not be accepted and shall be returned unopened.

6.3 Bids received from bidders who fail to comply with 6.1.2, 6.1.3, 6.1.4, 6.1.5, and 6.2 shall be declared non-compliant.

7. BID AND PERFORMANCE SECURITY

7.1 Each bid shall be accompanied by bid security in the form of a bid bond in the amount of $1,125,000.00 naming the Owner as oblige and issued by a surety licensed to conduct surety and insurance business in Ontario. The bid security is for the benefit of the Owner and stands as security that the bidder, if awarded the Contract, shall deliver the performance security and evidence of insurance and other documents required by these Instructions to Bidders or by the Contract. The bid security shall remain valid for sixty (60) days from the date of submission. No other form of bid security is acceptable.

7.2 The bid security of the bidder whose bid is acceptable shall be retained by the Owner to compensate the Owner for damages it shall suffer should the successful bidder fail to execute the Contract and/or fail to provide the specified performance security and/or evidence of insurance and other documents required by these Instructions to Bidders or by the Contract.

7.3 The bid security of the bidder whose bid is accepted shall be returned after the delivery of the specified performance security and evidence of insurance and other documents required by these Instructions to Bidders of by the Contract, and after the execution of the Contract. The bid security of all other bidders shall be returned after the execution of the Contract or after the expiry of this bid process without an award of Contract or after the rejection of all bids.

7.4 Each bid shall be accompanied by an agreement to bond issued by the same surety company that provides the bid bond, undertaking to provide a fifty percent (50%) performance bond and a fifty percent (50%) labour and material payment bond, both to be delivered to the Owner if the bidder is awarded the Contract.

7.5 Bids not accompanied by the required bid security and the required agreement to bond *shall* be declared non-compliant.

7.6 Include the cost of all bonds in the bid price.

8. AMENDMENTS TO BID DOCUMENTS

8.1 Direct questions arising during the bidding period to Theresa Ayre, OAA, Architect, J.L. Richards & Associates Limited: email: jlr_uofgbuilding046@jlrichards.ca, telephone: (519) 763-0713. The Bid Coordinator is the sole contact for bidding on this Project. A bid may be disqualified where contact is made with any person other than the Bid Coordinator.

8.2 Neither the Owner nor the Consultant will be responsible for instructions, clarifications or amendments communicated orally. Instructions, clarifications or amendments which affect the Bid Documents may only be made by addendum.

8.3 If bidders find discrepancies, omissions, errors, departures from building by-laws, codes or good practice, and points considered to be ambiguous or conflicting, they shall bring them to the attention of the Bid Coordinator in writing, and not less than ten (10) Working Days before the bid closing date, so that the Consultant may, if the Consultant deems it necessary, issue instructions, clarifications or amendments by addendum to all bidders to whom bid documents have been issued prior to the bid closing date.

The Consultant shall issue such addenda at least seven (7) calendar days prior to bid closing. Any and all addenda will be available through MERX.

8.4 Product/system options:

.1 Where the Bid Documents stipulate a particular product, alternatives will be considered by the Consultant up to seven (7) working days prior to receipt of bids.

.2 In submission of alternatives to products specified, bidders shall include in their bid any changes required in the work to accommodate such alternatives. A later claim by the Contractor for an addition to the Contract Price because of changes in work necessitated by use of alternatives shall not be considered.

.3 Alternative products may be considered where indicated in the Contract Documents, if submitted for review during the tender period, , in accordance with the following:

.1 The submission shall provide sufficient information to enable the Consultant to determine acceptability of such products.

.2 Provide complete information on required revisions to other work to accommodate each alternative, the advantages and disadvantages of the proposed alternative, effect on schedule, and trades affected.

.3 Unless alternatives are submitted in this manner and subsequently accepted, provide products as specified.

.4 The Owner will not necessarily accept alternatives proposed by the Bidder.

.5 Accept full responsibility that a proposed alternative will not exceed dimensional requirements as indicated on the Drawings, that it is compatible in all ways with other specified work, that coordination and cost of installation is included in his price for the proposed alternative and that the Contractor will be responsible for additional engineering/design requirements.

8.5 Addenda issued during the bidding period shall become part of the Bid Documents and their receipt shall be acknowledged in the space provided on the Bid Form. Failure to acknowledge the addendum issued **will** result in the bid being declared as non-compliant. Addenda will be issued through MERX.

9. TAXES

9.1 Value Added Taxes shall not be included in the bid price. All other eligible taxes shall be included in the bid price. Any changes to taxes announced prior to the date of the issuance of these Bid Documents and scheduled to come into effect subsequent to it shall be taken into consideration in preparing the bid price.

9.2 All invoices or progress payments for work shall clearly show the amount of Value Added Tax applicable to the work completed.

10. BID COMPLETION

10.1 Fill in all blank spaces on the Bid Forms in ink, or typewritten, providing all information requested, and ensure that an authorized person or persons sign all forms where indicated. Failure to provide all requested information on the Bid Forms and failure to fill in all blank spaces may result in a bid being declared non-compliant.

10.2 Use only the Bid Forms issued as part of the Bid Documents for the Project. If any or all pages of the Bid Forms are amended by addendum, only the amended pages shall be used to submit a bid. Failure to comply with this paragraph may result in the bid being declared non-compliant.

10.3 Information provided by bidders on the Bid Forms may be amended prior bid closing, in accordance with the rules provided by MERX. Other modifications, erasures, additions, conditions, qualifications or un-initialled pre-closing amendments may result in the bid being declared non-compliant.

10.4 Bids including any supplementary bid forms that are not originals, are unsigned, improperly signed, un-initialled, conditional, or illegible, may be declared non-compliant.

10.5 **Bid Price**

.1 The Base Bid Form provides that the bid price shall be provided in numbers only.

.2 Where the Bid Forms require the Bidder to provide a breakdown of the bid price, the bid price shall govern in the case of conflict or ambiguity between the bid price and the sum of the breakdown of the bid price.

10.6 **Completion of the Work**

.1 Where required, state the date of completion of the Work on the Bid Form.

.2 The work of this contract shall be completed as quickly as possible and consideration may be given to time of completion when reviewing the submitted bids.

10.7 **Listing of Sub-contractors and Cost Breakdown**

.1 Where required by the Bid Documents, a Bidder shall submit a List of Sub-contractors and Cost Breakdown that the bidder proposes to perform an item of the “Work" called for by the Contract by completing and submitting the List of Sub-contractors and Cost Breakdown. Failure of the Bidder to list Sub-contractors and Cost Breakdown, where required, or the listing by a Bidder of more than one Sub-contractor and Cost Breakdown to perform or supply an item of work listed, may result in the bid being declared non-compliant.

.2 Should the bidder be awarded the Work, parties named, including bidder’s own forces, shall be used to perform the work for which they are named and shall not be changed without the Owner’s written consent.

.3 Where a bidder lists “own forces" in lieu of a Sub-contractor, the Bidder shall carry out such item of the “Work" with its own forces. Where "own forces" have been listed by a bidder, the Owner reserves the right to obtain information from the Bidder and from third parties respecting the qualifications and experience of the Bidder's "own forces" for such item of the “Work". If the Owner, acting reasonably, determines that the Bidder's "own forces" are not sufficiently qualified or sufficiently experienced to undertake such item of the “Work", it may declare the bid as non-compliant.

.4 Costs requested shall be for the specific trade or division of work. The cost should not include the bidder’s general cost or mark-up. The cost information is for confidential information and use by the Owner.

10.8 **Itemized, Separate and Alternative Prices**

.1 Where required by the Bid Documents, a Bidder shall submit Itemized, Separate and Alternative Prices.

.2 **Itemized Prices** for work, if any, shall be included in the bid price. The itemized price shall be based on the materials, equipment and systems specified. The itemized price shall include all labour, materials, equipment, overhead and profit and all other charges except as otherwise stipulated. No additional mark-ups will be permitted. Except as instructed otherwise in writing, bidders shall verify and include all code and municipal/provincial requirements associated with proposed Itemized Prices.

.3 **Separate Prices,** requested in the Tender Documents, shall not be included in the bid price. Consistent with their acceptance or rejection by the Owner, they will be carried in the Agreement as an amount separated from the Contract Amount or in a separate agreement. The separate price shall be based on the materials, equipment and systems specified. The separate price shall include all labour, materials, equipment, overhead and profit and all other charges except as otherwise stipulated. No additional mark-ups will be permitted. Except as instructed otherwise in writing, bidders shall verify and include all code and municipal/provincial requirements associated with proposed Separate Prices. Separate Prices shall be irrevocable for a period of sixty (60) days. The Owner reserves the right to accept or reject any or all separate prices submitted.

.4 **Alternative Prices** for work, if any, shall adjust the bid price based upon acceptance or rejection of the alternative. The alternative price shall be based on the materials, equipment and systems specified. The alternative price shall include all labour, materials, equipment, overhead and profit and all other charges except as otherwise stipulated. No additional mark-ups will be permitted. Except as instructed otherwise in writing, bidders shall verify and include all code and municipal/provincial requirements associated with proposed Alternative Prices. Alternative Prices shall be irrevocable for a period of sixty (60) days. The Owner reserves the right to accept or reject any or all alternative prices submitted.

10.9 **Unit Prices**

.1 Where required by the Bid Document, a bidder shall submit Unit Prices. The unit price shall be based on the materials, equipment and systems specified.

10.10 **Bid Signing**

.1 The Bid Form and any supplementary bid forms shall be signed by the bidder.

.2 Sole Proprietorship: Printed name and signature of sole proprietor. The signature include the name and signature of a witness to the proprietor’s signature.

.3 Partnership: Printed name and signature of one partner authorized to bind the partnership. Insert the word partner under signature. The signature shall include the name and signature of a witness to the partner’s signature.

.4 Limited Company: Printed name and signature of a signing officer authorized to bind the company in their normal signatures. Insert the officer's capacity in which the signing officer acts, under the signature. The signature shall include the name and signature of a witness to the signing officer’s signature.

10.11 **Eligibility of Bids**

.1 Bids that are improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, or irregularities of any kind may, at the sole discretion of the Owner, be declared non-compliant.

.2 Bids that fail to include security deposit, bonding or insurance requirements **shall** be declared non-compliant.

.3 Bids received after the time of bid close shall not be accepted and **shall** be declared non-compliant.

.4 Bids received from bidders who failed to attend a mandatory pre-bid site visit will be declared non-compliant.

.5 Unsigned bids **shall** be declared non-compliant.

11. BID SUBMISSION

11.1 Submit one (1) completed original version of the Bid Form and any required supplementary bid forms, accompanied by the bid bond and the agreement to bond, electronically to the University of Guelph through MERX EBS, the electronic tendering system used by the University.

11.2 Bids must be received before and not later than **3:00:00** P.M. local time on **December 14, 2018.** The term "local time" shall mean the time as measured by MERX EBS system.

11.3 Bids will be date and time stamped electronically by MERX EBS.

11.4 ***Late bids will not be accepted by MERX.***

11.5 Bids which are submitted by any other means will **not** be considered.

11.6 Bidders are solely responsible for ensuring that their bids are downloaded and submitted (2 steps) to MERX EBS prior to the date and time specified above.

11.7 Failure to submit any of the required supplementary bid forms will result in the bid being declared non-compliant.

11.8 File size shall not exceed 100 MB. File names shall not exceed more than 100 characters.

12. BID EXPIRY PERIOD

12.1 Bids including any supplementary bid information shall be irrevocable for a period of sixty (60) days from the date of submission, after which period the bid expires.

13. BID OPENING

13.1 Bids will be received electronically from MERX and reviewed in private.

14. REQUESTS FOR CLARIFICATION

14.1 The Consultant/Owner may contact any one or more bidders to request clarification without any obligation to contact other bidders. Such additional clarification shall be provided promptly by the Bidder to the Consultant/Owner.

14.2 The Consultant/Owner may solicit additional information after close of bids from any or all bidders to support bid evaluation.

14.3 The Owner reserves the right to request supplementary information from one or more bidders after close of bids, without affecting the validity of the bids submitted, as may be required to facilitate the Owner's decision to award a contract, if any.

14.4 Requests for information shall not be construed as acceptance of a bid.

15. PRESENTATION AND INTERVIEW

15.1 The Owner may require one or more bidders to prepare and make a presentation to the Owner's Selection / Evaluation Committee in order to assist the Owner in evaluating any compliant bids. Selected bidders shall also be interviewed by the Owner's Selection / Evaluation Committee.

15.2 The selection of bidders for a presentation and an interview will be based on the best (lowest) two or three compliant bids received.

15.3 The following matrix illustrates the criteria for evaluation of the presentation and interview:

Evaluation Score Sheet				
Criteria	**Weight**	**Score 1/5/10**	**Points**	**Justification/Comments**
Overall Presentation	1			
Project Understanding	5			
Schedule	5			
Risk Management	5			
Quality Control	5			

15.4 The selected bidders shall be notified in advance of the proposed presentation and interview and shall have two (2) days to prepare for the presentation and interview. Participants in the presentation and interview must include the bidder's key personnel - Project Manager and Site Superintendent. The presentation must include a complete review of the project scope and complexity and should include any issue or risks to achieving the final completion date as specified. The information provided by a bidder at the presentation and the interview shall bind the bidder and the successful bidder shall be held to the responses given.

Selected bidders shall be responsible for all travel and related costs involved in attendance for the presentation and an interview.

15.5 The scores from the presentation and interview will be combined with a score for the bid price to determine the successful bidder.

16. AWARD OF CONTRACT, EXECUTION OF THE CONTRACT, AND DOCUMENTS TO BE DELIVERED

16.1 Bidders shall not issue or make any statement or news release concerning their bid, the bid process, the Owner's evaluation of the bids, or the Owner's award or cancellation of the bid process without the express written consent of the Owner.

16.2 If the Owner decides to award the Contract to a bidder, it will issue a "Letter of Intent" to award a contract.

16.3 Prior to commencing the "Work", the Contractor shall deliver to the Owner:

.1 Certified true copies of the insurance policies required by the Bid Documents.

.2 A current Clearance Certificate issued by the Workplace Safety and Insurance Board.

.3 A signed AODA Supplier Compliance Form.

16.4 The Owner may not necessarily award the contract to the lowest bidder or to any bidder. The Owner reserves the right to waive any non-compliant bid and accept such a Bid, if, in the Owner's opinion, any such non-compliance does not give such Bidder an unfair advantage over the other bidders. The Owner reserves the right to accept or reject any or all bids, and to award the contract to the Bidder whose bid, in the Owner's sole and absolute discretion, is considered to be in the best interests of the Owner.

16.5 If the Owner does not receive any bid satisfactory to the Owner, in its sole and absolute discretion, the Owner reserves the right to re-bid the Work, or negotiate a contract for the whole or any part of the Work with any one or more persons, including one or more of the bidders.

16.6 The Owner takes no responsibility for the accuracy of the information supplied during the bid period unless provided in writing, and takes no responsibility for any bidder lacking information.

16.7 The award of a contract will be posted on MERX. No other notification of award to the unsuccessful bidders will be made.

17. LIMIT OF LIABILITY

17.1 The liability of the bidder to the Owner for loss and damage arising out of the Bidder's breach of the "bid contract" shall be limited to the lesser of the actual loss suffered by the Owner and the sum of **Twenty Thousand Dollars *($ 20,000)*.**

17.2 The liability of the Owner to any bidder for loss and damage arising in tort or for the breach by the Owner of the "bid contract" shall be limited to the lesser of the sum of **Twenty Thousand Dollars ($ 20,000*)*** and the reasonable cost to the Bidder of preparing its bid.

18. CONFLICT OF INTEREST

18.1 The Bidder agrees to be bound by the following requirements:

1. That no person either natural or body corporate, other than the Bidder, has or will have any interest or share in this bid or in the proposed Agreement.
2. That there is no collusion or arrangement between the Bidder and any other bidder (s) in connection with this Project.
3. That the Bidder has no knowledge of the contents of other bids and has made no comparison of figures, agreements, arrangements, expressed or implied, with any other party in connection with the making of the bid.

4. Neither the Bidder nor members of his/her immediate family or any employee of the Bidder shall have any direct or indirect interest in any other entity that provides goods or services to the Project. Bidder shall immediately disclose any potential conflict of interest should it arise before, during or after this bid and/or any award of contract.
5. Neither the Bidder nor members of his/her immediate family or any employee of the Bidder shall offer or receive any reimbursement from or to any employee of The University, from or to any vendor, consultant or contractor employed by The University except as token gifts in accordance with University policy governing this matter.

19. DISPUTES

19.1 In the event of a dispute arising 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 the bid of any bidder was submitted on time or whether a bid is compliant, the Owner may refer the dispute to a confidential binding arbitration pursuant to the *Arbitration Act, 1991,* as amended, before a single arbitrator with knowledge of procurement/bidding law. In the event that the Owner refers the dispute to arbitration, the bidder agrees that it is bound to arbitrate such dispute with the Owner. Unless the Owner shall refer such dispute to binding arbitration, there shall be no arbitration of such dispute.

19.2 In the event the Owner refers a dispute to binding arbitration, the Owner may give notice of the dispute to one or more of the other bidders who submitted bids, whether or not they may be compliant, each of whom shall be a party to and shall be entitled to participate in the binding arbitration, and each of whom shall be bound by the arbitrator's award, whether or not they participated in the binding arbitration.

19.3 In the event the Owner refers a dispute to binding 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 a binding arbitration hearing which shall last no longer than two days, subject to the discretion of the arbitrator to increase such time. The parties further agree that there shall be no appeal from the arbitrator's award.

19.4 This Article is not intended to form part of any "bid contract" that may come into being between a bidder and any prospective Subcontractor or Supplier of that bidder.

20. DEBRIEFING

20.1 Each Bidder who submits a bid in response to this request for bids is entitled to a debriefing process.

20.2 In the event a Bidder wishes to obtain information on their bid relative to this call for bids, the Bidder must make such a request, in writing, to the Owner within sixty (60) days after award is made.

20.3 The debriefing process will occur only after the award of a contract for the work.

20.4 The debriefing process with a bidder will not address any issues, questions or concerns regarding the bid of any other bidder, including the bid of the successful Bidder.

21. ACCESSIBILITY FOR ONTARIANS WITH DISABILITIES ACT (AODA)

21.1 The University is committed to fostering, creating and maintaining an accessible environment for all individuals under the Accessibility for Ontarians with Disabilities Act (AODA).

21.2 Each Proponent agrees to:

(a) Comply with the accessibility standards established under the AODA by the Ontario Government and adhere to the University's policies and procedures in regards to accessibility as well as to ensure all of its subcontractors similarly do the same.

(b) Ensure that training on the requirements of the accessibility standards are provided to those of its employees who will be working with the public (students, staff, faculty, visitors or other third parties) at, or on behalf of, the University and who participate in developing the proponent's policies, practices or procedures.

(c) Keep records of such training.

(d) Provide such records when required by the University.

21.3 For proponent(s) who will be working with the public (students, staff, faculty, visitors or other third parties) at, or on behalf of, the University, the University will require the successful proponent(s), upon Notice of Award, to provide to the University with a signed AODA Supplier Compliance Form prior to commencing any work for the University.

The AODA Supplier Compliance Form is available at:
https://www.uoguelph.ca/finance/sites/uoguelph.ca.finance/files/FF020.0503%20AODA%20Supplier%**20Compliance**%20Form.pdf

22. HUMAN RIGHTS AND SEXUAL AND GENDER HARASSMENT POLICIES

22.1 Proponents agree to be governed by the provisions of the Ontario Human Rights Code. In furtherance of the commitment, the Proponents agree to comply with the provisions of the University's Human Rights Policy and Procedures. The Proponents also agree to comply with any successor policies and procedures to the document that the Owner's Board of Governors may approve. Proponents shall refer to www.uoguelph.ca/hre/hr.shtml for more information.

END OF DOCUMENT

PART ONE - GENERAL

1.1 Reports

.1 The following material *bound herein (or in a separate volume of the Contract Documents) is included for information* or *is available from the Owner/Consultant:*

.1 Designated Substances Survey and Perchlorate Detection in Fume Hoods, OVC – Former VMI Building, prepared by LEX Scientific Inc., June 2018 (LEX Project No. 01180066).

.2 Letter Report: Spray-Applied Beam Insulation Inspection – Former VMI Building – Ontario Veterinary College, prepared by Lex Scientific Inc., August 30, 2018.

.3 Footing and Subgrade Inspection and Recommendations, prepared by Chung & Vander Doelen Engineering Ltd., July 7, 2018.

.4 University of Guelph Standard Operating Procedures (SOP):

.1 IU.324 – Procedures for Getting Supplies In and Out of the Facility

.2 IU.326 – Donning and Doffing of Personal Protective Equipment (PPE)

.3 IU.329 – Personal Items in the Containment Zone

.5 EACO Mould Abatement Guidelines Edition 3 (2015).

.2 The above material cannot, by its nature, reveal all conditions that may exist at the Place of the Work. Should conditions be found to vary substantially from the above, advise the Consultant accordingly and request direction.

END OF DOCUMENT

Physical Resources
Design, Engineering & Construction
Tel (519) 824-4120
Fax (519) 837-0581

J.C. Hersey Building
University of Guelph
Guelph, Ont. N1G 2W1

BID FORM

Project No.: 504034

Project (*Work*): Building #046 Renovations

Bid Issue Authorized By_____ Manager, Design, Engineering & Construction

Bid Closing: Date: **December 14, 2018** Time: before and not later than 3:00 PM (as determined by MERX)

A mandatory site briefing at which all pre-qualified General Contract and pre-qualified subcontract bidders who wish to submit bids are required to attend is scheduled for: November 22, 2018*, convening at 10:00 a.m. at Building #046, 50 College Avenue West, Guelph, ON, N1G 4T6.*

Name of Bidder _____

Address _____

_____

Telephone _____ **Fax** _____

BID PRICE

I / We, the undersigned, having examined the Bid Documents (drawings and specifications) identified in Specification Section 00 01 15 List of Drawings for the above project, and having received, carefully examined and incorporated Addenda up to and including number_____, all as prepared by *J.L. Richards & Associates Limited* hereinafter referred to as the *Consultant* and having visited and examined the *Place of the Work*, and having examined all conditions, circumstances and limitations affecting the Work, offer to enter into a Contract with the Owner to perform the Work required by these Documents for the above project for the stipulated sum *Bid Price* of:

$_____ ***[Note: insert amount in numbers only]***

Bid Price is <u>not</u> to include Value Added Tax.

H.S.T./G.S.T. Registration # _____

BID SECURITY

Attached to this bid is a bid bond issued by _____ in the amount of

$ _____ . ***[Note: insert amount in numbers only]***

AGEEEMENT TO BOND

Attached to this bid is a separate agreement to bond issued by _____

undertaking to provide the bonds as required by the Bid Documents.

DECLARATIONS

I / We, the undersigned declare that:

.1 *Work will be commenced immediately upon award of Contract and shall achieve Substantial Performance by* ***April 30, 2020***

.2 There is no conflict of interest in submitting this Bid and that no person either natural or body corporate, other than the bidder, has or will have any interest or share in this bid or in the proposed Agreement;

.3 There is no collusion or arrangement between the bidder and any other bidder (s) in connection with this Project;

.4 The bidder has no knowledge of the contents of other bids and has made no comparison of figures, agreements, arrangements, expressed or implied, with any other party in connection with the making of the bid;

.5 This Bid is open to acceptance and irrevocable for a period of sixty (60) days.

.6 This agreement supersedes all prior negotiations, representations, or agreements, either written or oral, relating in any manner to the *Work*.

.7 The *Contract Documents* consist of this Bid Form; Specification Sections, dated ***November 15, 2018*****,** and Drawings, all as listed in attached specification *Section 00 01 15 List of Drawings* and including the Definitions and General Conditions of CCDC 2-2008 Stipulated Price Contract, and Addenda issued. For the purposes of the Definitions and General Conditions of CCDC 2-2008, the *Owner* is the University of Guelph and the *Consultant* is *J.L. Richards & Associates Limited.*

.8 The bidder will comply with the Owner's policies related to Human rights and Sexual and Gender Harassment and Accessibility for Ontarians with Disabilities.

.9 The following Forms are attached to the Bid:

Bid Bond

Agreement to Bond

Section 00 43 01 – List of Sub-contractors and Cost Breakdown

Section 00 43 03 – Unit Prices

Section 00 43 05 – Itemized, Separate and Alternative Prices

SIGNATURES:

Signed and submitted by:

_____
Company Name

Note: Affix Corporate seal as required

Seal:

_____
Printed Name and Title of Authorized Signing Officer

_____
Signature of Authorized Signing Officer

_____
Printed Name and Title of Witness

_____
Signature of Witness

Dated this _____ day of_____, 2018.

Email Address _____ Telephone_____

END OF DOCUMENT

Project No.: 504034

Project Name: Building #046 Renovations

NAME OF BIDDER: _____

I/We, the undersigned, propose to employ the following Sub-contractors and/or Suppliers to perform an item of the Work called for by the Contract. I/We confirm that all have been investigated to confirm their reliability and competency to carry out such work in accordance with the Contract Documents.

I/We acknowledge that the Instructions to Bidders require that we list only one Sub-contractor and/or Supplier for each item of the Work described in this List of Subcontractors. I/We further acknowledge that where we have entered "own forces" to perform an item of the Work, we are experienced in the work to be performed and it is our intention to use "own forces" for that purpose.

After bid submission, no substitution for a Sub-contractor, Supplier or "own forces" will be permitted except as provided in the Contract.

I/We the undersigned understand that if this Supplementary Bid Form is not completed, our Bid may be declared as “non-compliant”.

ITEM OF WORK	SUBCONTRACTOR	COST
Mechanical		$
Electrical		$
Roofing		$
Telecommunications		$
Electronic Access/Security		$
Fire Alarm Testing		$
Fire Suppression		$

This List of Sub-contractors and Cost Breakdown is an integral part of these Bid Documents.

DATE: _____

SIGNATURE: _____

NAME AND TITLE: _____

END OF DOCUMENT

Project No.: 504034

Project Name: Building #046 Renovations

NAME OF BIDDER _____

I/We the undersigned offer the following unit prices for the work or for additional work listed here. All unit prices, unless specifically indicated, are for complete work, in place, supplied and installed in accordance with applicable Contract requirements and include all overhead and profit mark-up.

I/We the undersigned agree that the credits for deleted work shall be no less than eighty percent (80%) of the unit prices listed hereunder.

I/We the undersigned agree that the Owner shall have the right to negotiate the cost of additional work instead of using the unit prices listed hereunder.

I/We the undersigned understand that if this Supplementary Bid Form is not completed, our Bid may be declared as "non-compliant".

Prices listed hereunder do not include any Value Added Taxes but include all other eligible taxes.

ITEM OF WORK UNIT	**COST/UNIT**
• Construction Manager	/hour
• Project Coordinator	/hour
• Project Superintendent	/hour
• Site Labour (General Contractor's Own Forces)	/hour
• Site Labour (Mechanical Sub-contractor)	/hour
• Site Labour (Electrical Sub-contractor)	/hour
• Construction Manager (After-hours)	/hour
• Project Coordinator (After-hours)	/hour
• Project Superintendent (After-hours)	/hour
• Site Labour (General Contractor's Own Forces) (After-hours)	/hour
• Site Labour (Mechanical Sub-contractor) (After-hours)	/hour
• Site Labour (Electrical Sub-contractor) (After-hours)	/hour
• Removal and disposal of asbestos containing floor tile and mastic	/sq.m.
• Removal and disposal of an additional asbestos containing parged pipe fitting	/fitting

- Removal and disposal of an additional PCB ballast /ballast
- Removal and disposal of an additional mercury containing light tube /tube
- Removal and disposal of asbestos containing sprayed applied fireproofing /sq.m.
- Repair and/ repoint existing brick /sq.m.

This list of Unit Prices is an integral part of these Bid Documents.

DATE: _____

SIGNATURE: _____

NAME AND TITLE: _____

END OF DOCUMENT

Project No.: 504034

Project Name: Building #046 Renovations

NAME OF BIDDER _____

I/We the undersigned offer the Itemized Prices, Separate Prices and Alternative Prices described below.

I/We the undersigned understand that if this Supplementary Bid Form is not completed, our Bid may be declared as "non-compliant".

I/We agree that:

1. All prices submitted take into consideration and allow for changes and adjustments in other work as may be necessary to provide a finished and functional result, unless specifically indicated otherwise.

2. "**Itemized Prices**" are for work included in the bid price and are provided for information purposes only. They will not be used to adjust the scope of the work or the bid price.

3. "**Alternative Prices**" are amounts stipulated by bidders for solicited alternatives which can be stated as additions, deductions or no change to the bid price.

4. Without limiting its rights under the Instructions to Bidders, the Owner reserves the right to accept or reject any of the Alternative Prices. Acceptance of Alternative Prices is subject to the earlier acceptance of the bid or the bid expiry date.

5. "**Separate Prices**" are amounts stipulated by the Bidders for solicited additional work. Separate prices shall not be included in the Stipulated Price. Consistent with their acceptance or rejection by the Owner, they will be carried in the Agreement as an amount separated from the Contract Amount or in a separate agreement.

6. Prices listed hereunder do not include Value Added Tax but include all other eligible taxes.

7. These amounts shall be irrevocable for the Bid Expiry Period provided in the Instructions to Bidders.

ITEMIZED PRICES

1. *Not applicable*

SEPARATE PRICES

1. Separate price for the testing, abatement, demolition and removal of all piping and equipment associated with the receiving/holding tanks in the Sewage Room. *$* _____

2. Separate price for supply and install of millwork MW123b. *$* _____

3. Separate price for the replacement of existing panels LP-U, LP-R, LP-T, LP-P as indicated on electrical drawings.

$ _____

ALTERNATIVE PRICES

1. *(Not Applicable.)* *$* _____

This List of Itemized, Separate and Alternative Prices is an integral part of the Bid Documents.

DATE: _____

SIGNATURE: _____

NAME AND TITLE: _____

END OF DOCUMENT

1.0 Performance Bond, Labour and Materials Payment Bond

.1 Provide to the Owner a Performance Bond in the value of 50% of the original Contract Price plus Value Added Tax, and a Labour and Materials Payment Bond in the value of 50% of the original Contract Price plus Value Added Tax.

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

1. GENERAL

1.1 The Standard Construction Document for Stipulated Price Contract, CCDC 2 – 2008, English version, consisting of the Agreement Between *Owner* and *Contractor,* Definitions, and General Conditions of the Stipulated Price Contract, Parts 1 to 12 inclusive, governing same is hereby made part of these *Contract Documents,* as amended by Section 00 73 01 Supplementary Conditions and with the following amendments, additions and modifications:

2. SUPPLEMENTARY CONDITIONS

Refer to Section 00 73 01 Supplementary Conditions for amendments to the General Conditions of CCDC 2 - 2008.

3. REVISIONS TO ARTICLES OF CCDC 2 - 2008

3.1 ARTICLE A-5 PAYMENT

3.1.1 Into the blanks in Article 5.1, insert the following words, in their respective locations:

"ten" and "10".

3.1.2 Delete paragraph 5.1.2 in its entirety and substitute the following:

"5.1.2 Upon Substantial Performance of the Work as certified by the Consultant, and after all Lien Rights regarding the work performed before the date certified to be the date of Substantial Performance have expired, pay to the Contractor the unpaid balance of Holdback monies then due, together with such Value Added Taxes as may be applicable to such payment, and".

3.1.3 Delete paragraph 5.1.3 in its entirety and substitute the following:

"5.1.3 Upon receipt of the Consultant's final certificate for payment, and after all Lien Rights for finishing work have expired, pay to the Contractor the unpaid balance of the Contract Price then due together with such Value Added Taxes as may be applicable to such payment."

3.1.4 Delete sentences (1) and (2) found in Article 5.3, paragraph .1 and replace with the following:

(1) 1% per annum above the prime rate for the first 90 days.
(2) 2% per annum above the prime rate after the first 90 days.

3.1.5 Into the blank in Article 5.3, paragraph .1, insert the following words":

"Royal Bank of Canada".

3.2 ARTICLE A-6 RECEIPT AND ADDRESSES FOR NOTICES IN WRITING

3.2.1 Delete Article A-6.1 and substitute new article 6.1 as follows:

6.1 Notices in Writing between the parties or between them and the Consultant shall be considered to have been received by the addressee on the date of receipt if delivered by hand or by commercial courier or if sent during normal business hours by fax and addressed as set out below. Such Notices in Writing will be deemed to be received by the addressee on the next business day if sent by fax after normal business hours or if sent by overnight commercial courier. Such Notices in Writing will be deemed to be received by the addressee on the fifth Working Day following the date of mailing, if sent by pre-paid registered post, when addressed as set out below. An address for a party may be changed by Notice in Writing to the other party setting out the new address in accordance with this Article.

3.3 DEFINITIONS

3.3.1 Add the following new definitions:

27. Make Good
"Make Good" means to restore new or existing work after being damaged, cut or patched or rejected by the *Consultant*. Use materials identical to the original materials, with new visible surfaces matching the appearance and the expected performance of the original surfaces in all details, with no apparent junctions between the new and existing surfaces.

28. Mark-up
Markup means the *Contractor's* or the *Subcontractor's* (in the case of work being done by the *Subcontractor*) add for profit and overhead costs as related to the General Conditions and the Sections of Divisions 0 and 1 of the *Specifications* including costs of extension of contract time, office overhead, field supervision, layouts, co-ordination, travelling expenses and any other direct or indirect costs.

29. Submittals
Submittals are documents or items required by the *Contract Documents* to be provided by the *Contractor,* such as:
- *Shop Drawings,* samples, models, mock-ups to indicate details or characteristics, before the portion of the *Work* that they represent can be incorporated into the *Work;* and
- Record drawings and manuals to provide instructions to the operation and maintenance of the *Work.*

30. Toxic and Hazardous Substances
Toxic and Hazardous Substances shall mean designated substances as defined by applicable statutory and regulatory requirements.

END OF SECTION

1. GENERAL

1.1 The Standard Construction Document for Stipulated Price Contract, CCDC 2 – 2008, English version, consisting of the Agreement Between *Owner* and *Contractor,* Definitions, and General Conditions of the Stipulated Price Contract, Parts 1 to 12 inclusive, governing same is hereby made part of these *Contract Documents,* as amended by the amendments, additions and modifications which follow.

1.2 These Supplementary Conditions shall be read together with and will govern over the General Conditions of CCDC 2 – 2008.

1.3 Where a General Condition or paragraph of the General Conditions of the Stipulated Price Contract is deleted by these Supplementary Conditions, the numbering of the remaining General Conditions or paragraphs shall remain unchanged, and the numbering of the deleted item will be retained, unused.

2. GC 1.1 CONTRACT DOCUMENTS

2.1 Add to the end of subparagraph 1.1.2.2:

"except where the *Consultant* shall be indemnified as a third party beneficiary as provided in subparagraphs 9.2.7.4, 9.5.3.4 and in 12.1.3."

2.2.1 Add new sentence to the end of paragraph 1.1.6 as follows:

The *Specifications* are divided into divisions and sections for convenience but shall be read as a whole and neither such division nor anything else contained in the *Contract Documents* will be construed to place responsibility on the *Consultant* to settle disputes among the *Subcontractors* and *Suppliers* in respect to such divisions. The *Contractor* is solely responsible for the coordination of *Subcontractors*. The *Contractor* is solely responsible for the division and definition of work between *Contractor* and *Subcontractors* and for any jurisdictional matters arising therefrom.

2.3 Add new subparagraph 1.1.7.5 as follows:

1.1.7.5 in case of discrepancies, noted materials and annotations shall take precedence over graphic indications in the *Contract Documents.*

2.4 Delete paragraph 1. 1.8 in its entirety and substitute new paragraph 1. 1.8 as follows:

1.1.8 "The *Owner* shall provide the *Contractor,* without charge, one (1) electronic copy on compact disc of the *Contract Documents,* exclusive of those required by jurisdictional authorities and the executed *Contract Documents*. Reproduction of the CD or printing from the CD will be at the *Contractor*'s expense."

2.5 Add new paragraph 1.1.11 as follows:

1.1.11 Wherever the words "approved", "as directed", "submit", "make good", "reviewed", or similar wording or phrases appear throughout the *Contract Documents*, they shall be understood unless otherwise provided, to mean materials or items referred to shall be "as approved by the *Consultant*", "as directed by the *Consultant*", "make good to the *Consultant*'s satisfaction", "submit to the *Consultant*", or "reviewed by the *Consultant*".

3. GC 2.2 ROLE OF THE CONSULTANT

3.1 Add new sentence to the end of paragraph 2.2.2 as follows:

"Such reviews, or lack thereof, shall not give rise to any claims by the *Contractor* in connection with construction safety at the *Place of the Work*, responsibility for which belongs exclusively to the *Contractor*."

3.2 Revise in paragraph 2.2.14 as follows:

Delete the comma after the word "submittals" and add the words "which are provided" before the words "in accordance".

4. GC 2.4 DEFECTIVE WORK

4.1 Add new subparagraphs 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 any defective work which, in the sole discretion of the *Owner,* adversely affects the day to day operation of the *Owner*.

4.2 Add the new words to the beginning of paragraph 2.4.3 as follows:

"Except for defective work or work not performed that may lead to dangerous circumstances and subject the workers to potential or actual health and safety hazards, if in the opinion ……."

4.3 Add new paragraph 2.4.4 as follows:

2.4.4 Defective work or work not performed that may lead to dangerous circumstances and subject workers to potential and actual health and safety hazards shall be immediately corrected, completed and otherwise made safe.

5. GC 3.1 CONTROL OF THE WORK

5.1 Add new paragraph 3.1.3 as follows:

3.1.3 Prior to commencing individual procurement, fabrication and construction activities, the *Contractor* shall verify, at the *Place of the Work,* all relevant measurements and levels necessary for proper and complete fabrication, assembly and installation of the *Work* and shall further carefully compare such field measurements and conditions with the requirements of the *Contract Documents.* Where dimensions are not included or exact locations are not apparent, the *Contractor* shall immediately obtain written instructions notify the *Consultant* in writing and obtain written instructions from the *Consultant* before proceeding with any part of the affected work.

6. GC 3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS

6.1 Delete subparagraph 3.2.2.1 in its entirety.

6.2 Delete subparagraph 3.2.2.2 in its entirety.

6.3 Add new subparagraph 3.2.3.4 as follows:

3.2.3.4 Subject to **GC 9.4 CONSTRUCTION SAFETY,** for the *Owner's* own forces and for other contractors, assume overall responsibility for compliance with all aspects of the applicable health and safety legislation in the *Place of the Work,* including all of the responsibilities of the constructor under the Occupational Health and Safety Act.

7. GC 3.4 DOCUMENT REVIEW

7.1 Delete paragraph 3.4.1 in its entirety and substitute new paragraph 3.4. 1 as follows:

3.4.1 The *Contractor* shall review the *Contract Documents* and shall report promptly to the *Consultant* any error, inconsistency or omission the *Contractor* may discover. Such review by the *Contractor* shall comply with the standard of care described in paragraph 3.14.1 of the *Contract.* Except for its obligation to make such review and report the result, the *Contractor* does not assume any responsibility to the *Owner* or to the *Consultant* for the accuracy of the *Contract Documents.* The *Contractor* shall not be liable for damage or costs resulting from such errors, inconsistencies, or omissions in the *Contract Documents,* which the *Contractor* could not reasonably have discovered. If the *Contractor* does discover any error, inconsistency or omission in the *Contract Documents,* the *Contractor* shall not proceed with the work affected until the *Contractor* has received corrected or missing information from the *Consultant.*

7.2 Add new paragraph 3.4.2 as follows:

3.4.2 If the *Contractor* finds discrepancies in and/or omissions from the *Contract Documents* or has any doubt as to the meaning or intent of any part thereof, the *Contractor* must immediately notify the *Consultant,* who will provide written instructions or explanations. Neither the *Owner* nor the *Consultant* will be responsible for oral instructions.

8. GC 3.5 CONSTRUCTION SCHEDULE

8.1 Delete paragraph 3.5.1 in its entirety and substitute new paragraph 3.5.1 as follows:

3.5.1 The *Contractor* shall,

3.5.1.1 Subject to building permit availability, commence *Work* immediately upon award of *Contract* and provide sufficient expertise and resources to ensure the steady progress of the *Work* including overtime work, if required, to perform the *Work* within the *Contract Time* and in accordance with the approved construction schedule.

3.5.1.2 Prior to submitting the first application for payment, submit to the *Owner* and the *Consultant* for their review and acceptance a construction schedule indicating the critical path for the *Project* demonstrating that the *Work* will be performed in conformity with the *Contract Time* and in accordance with the *Contract Documents.* The *Contractor* shall provide the schedule information required by this paragraph in both electronic format and hard copy. Once accepted by the *Owner* and the *Consultant,* the construction schedule submitted by the *Contractor* shall become the baseline construction schedule.

3.5.1.3 Provide the expertise and resources, such resources including manpower and equipment, as are necessary to maintain progress under the accepted baseline construction schedule referred to in paragraph 3.5.1.2 or any successor or revised schedule accepted by the *Owner* pursuant to GC3.5;

3.5.1.4 Monitor the progress of the *Work* on a weekly basis relative to the construction schedule reviewed and accepted pursuant to paragraph 3.5.1.2, or any successor or revised schedule accepted by the *Owner* pursuant to GC 3.5, update the schedule on a monthly basis, submit the updated schedule with each application for a progress payment and advise the *Consultant* and the *Owner* in writing of any variation from the baseline or slippage in the schedule; and

3.5.1.5 If, after applying the expertise and resources required under paragraph 3.5.1.3, the *Contractor* forms the opinion that the slippage in schedule reported in paragraph 3.5.1.4 cannot be recovered by the *Contractor,* it shall, in the same notice provided under paragraph 3.5.1.4, indicate to the *Consultant* and the *Owner* if the *Contractor* intends to apply for an extension of *Contract Time* as provided in PART 6 - CHANGES IN THE WORK.

8.2 Add new paragraph 3.5.2 as follows:

3.5.2 If at any time it should appear to the *Owner* or the *Consultant* that the actual progress of the *Work* is behind schedule or is likely to become behind schedule, based on critical path methodology, or if the *Contractor* has given notice of such to the *Owner* or the *Consultant* pursuant to 3.5.1.3, the *Contractor* shall take appropriate steps to cause the actual progress of the *Work* to conform to the schedule and shall produce and present to the *Owner* and the *Consultant* a recovery plan demonstrating how the *Contractor* will achieve the recovery of the schedule. If the *Contractor* intends to apply for a change in the *Contract Price* in relation to a schedule recovery plan, the *Contractor* shall proceed with PART 6 – CHANGES IN THE WORK.

9. GC 3.6 SUPERVISION

9.1 Delete paragraph 3.6.1 in its entirety and substitute new paragraph 3.6.1 as follows:

3.6.1 The *Contractor* shall provide all necessary supervision and appoint competent representatives who shall be in attendance at the *Place of the Work* while work is being performed. Should the *Contractor*'s Supervisor or Project Manager prove for valid reasons to be unacceptable to the *Owner*, the *Owner* shall give written notice to the *Contractor* who shall within 7 days of receipt of same provide a suitable replacement acceptable to the *Owner*. The appointed representatives shall not be changed except for valid reasons, and upon the *Contractor* obtaining the *Owner's* written consent, which consent will not be unreasonably withheld.

9.2 Add new paragraph 3.6.3 as follows:

3.6.3 The *Owner* may, at any time during the course of the *Work,* request the replacement of the appointed representative(s), where the grounds for the request involve conduct which jeopardizes the safety of the *Owner's* operations. Immediately upon receipt of the request, the *Contractor* shall make arrangements to appoint an acceptable replacement.

10. GC 3.7 SUBCONTRACTORS AND SUPPLIERS

10.1 Delete paragraph 3.7.2 in its entirety and substitute new paragraph 3.7.2 as follows:

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

10.2 Add new paragraph as follows:

3.7.7 Where provided in the *Contract*, the *Owner* may assign to the *Contractor*, and the *Contractor* agrees to accept, any contract procured by the *Owner* for work or services required on the *Project* that has been pre-bid or pre-negotiated by the *Owner*.

11. GC 3.8 LABOUR AND PRODUCTS

11.1 Add new sentence to the end of paragraph 3.8.2 as follows:

"The *Contractor* represents and warrants that the *Products* provided for in accordance with the *Contract* are not subject to any conditional sales contract and are not subject to any security rights obtained by any third party which may subject any of the *Products* to seizure and/or removal from the *Place of the Work*."

11.2 Add new sentence to the end of paragraph 3.8.3 as follows:

"The foreperson of each trade engaged on the *Work* must be able to speak and understand the English language sufficiently well to comprehend and carry out all instructions issued and to work in complete coordination with other trades."

11.3 Add new paragraph 3.8.4 as follows:

3.8.4 The *Contractor* is responsible for the safe on-site storage of *Products* and their protection (including *Products* supplied by the *Owner* and other contractors to be installed under the *Contract)* in such ways as to avoid dangerous conditions or contamination to the *Products* or other persons or property and in locations at the *Place of the Work* to the satisfaction of the *Owner* and the *Consultant.* The *Owner* shall provide all relevant information on the *Products* to be supplied by the *Owner.*

12. GC 3.9 DOCUMENTS AT THE SITE

12.1 Delete paragraph 3.9.1 in its entirety and substitute new paragraph 3.9.1 as follows:

3.9.1 The *Contractor* shall keep one copy of the current *Contract Documents, Supplemental Instructions,* Contemplated *Change Orders, Change Orders, Change Directives,* reviewed *Shop Drawings, Submittals,* approved construction schedule, as-built drawings, reports and records of meetings at the *Place of the Work,* in good order and available to the *Owner* and *Consultant.*

13. GC 3.10 SHOP DRAWINGS

13.1.1 Add the words "AND OTHER SUBMITTALS " to the Title after SHOP DRAWINGS.

13.2 Add "and *Submittals"* after the words *"Shop Drawings"* in clauses 3.10.2, 3.10.4, 3.10.5, 3.10.7, 3.10.8, 3.10.8.2, 3.10.9, 3.10.10, and 3.10.11.

13.3 Delete paragraph 3.10.3 in its entirety and substitute new paragraph 3.10.3 as follows:

3.10.3 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* and any other *Submittals.*

13.4 Add new sentence to the end of paragraph 3.10.6 as follows:

"Where the *Consultant*'s shop drawing review stamp is affixed to any one page, drawing or sheet in a submission for a *Product* or process, it shall be deemed to apply to all pages, drawings or sheets in the submission for the *Product* or process."

13.5 Delete subparagraph 3.10.8.1 in its entirety and substitute new subparagraph 3.10.8.1 as follows:

3.10.8.1 The *Contractor* has determined and correlated all of the required field measurements with the *Shop Drawings* and any *Submittals* and field construction conditions, *Product* requirements, catalogue numbers and similar data, or will do so if not possible at the time of the review, and

13.6 Delete paragraph 3.10.12 in its entirety and substitute new paragraph 3.10.12 as follows:

3.10.12 The *Consultant* will review and return *Shop Drawings* and *Submittals* in accordance with the schedule agreed upon in 3.10.3, or, in the absence of such schedule, with reasonable promptness. If, for any reason, the *Consultant* cannot process them within the agreed-upon schedule or with reasonable promptness, the *Consultant* shall notify the *Contractor* and they shall meet to review and arrive at an acceptable revised schedule for processing. The *Contractor* shall update the *Shop Drawings* and *Submittals* Schedule to correspond to changes in the construction schedule. Changes in the *Contract Price* or *Contract Time* may be made only as otherwise provided in the *Contract.*

13.7 Add new paragraphs 3.10.13, 3.10.14, 3.10.15, 3.10.16, 3.10.17 and 3.10.18 as follows:

3.10.13 *Contractor* shall secure, from all his Subcontractors and material suppliers, uniform size *Shop Drawings* of all items, as listed in their respective trade specifications, showing construction materials, etc., or as required, and upon which representative trade bids have been based.

3.10.14 *Shop Drawings* shall define divisions of responsibility between Trades, and all items shown on *Shop Drawings* shall be supplied as part of the *Contract* unless it is specifically approved that certain items are not part of the *Contract*.

3.10.15 *Shop Drawings* shall be laid out with same orientation as *Contract Documents*.

3.10.16 Submit digital copy of Shop Drawings. Provide a 75 x 180 mm blank space for the Consultant's use. Upon receipt of these copies, the Consultant will review, mark corrections or changes, and digitally return to the Contractor. Shop drawings shall be corrected and resubmitted for the Consultant's further review and further revision if necessary. Shop drawings will be digitally returned to Contractor for reproduction. For Divisions, 3, 5, 10, 15 and 16, submit two additional copies. All fixture cuts, equipment brochures and printed descriptive literature shall be digitally submitted on letter size paper. Provide eight copies of all such material.

3.10.17 Upon completion of review by *Consultant*, *Shop Drawings* and other *Submittal*s will be returned to the *Contractor* for reproduction and issuance to all concerned. Retain one complete set of all reviewed *Shop Drawings* and other *Submittals* for *Owner* which shall, on completion of the work, be issued to the *Owner* in an approved form.

3.10.18 Any fabrication work done before receiving final reviewed *Shop Drawings* and other *Submittals* shall be at the *Contractor*'s and his Subcontractor's and/or supplier's risk."

14. GC 3.11 USE OF THE WORK

14.1 Add new sentence to the end of paragraph 3.11.2 as follows:

The Contractor shall undertake the implementation of procedures and practices to review, at least on a weekly basis, the proposed loading of any part of the *Work* to ensure that the proposed weight or force of the load will not endanger the safety of the *Work* or the Workers.

14.2 Add new paragraph 3.11.3 as follows:

3.11.3 The *Owner* shall have the right to use and occupy the *Place of the Work*, including but not limited to the building and site in accordance with other provisions of the *Contract Documents*. Such use and occupation shall not be considered acceptance of the *Work*, nor shall such use and occupation in any way relieve the *Contractor* from his responsibility to complete the *Contract*. Such use shall not be considered an act or omission by the *Owner* causing delay in GC 6.5 Delays, and the *Contractor* is responsible for coordinating the *Work* to suit such use and occupancy, as may be further required in the *Contract Documents*."

15. GC 3.12 CUTTING AND REMEDIAL WORK

15.1 Add new sentence to the end of paragraph 3.12.4 as follows:

The *Contractor* and the specialist shall review all proposed procedures for cutting and remedial work with the *Consultant* prior to undertaking the cutting.

16. GC 3.13 CLEANUP

16.1 Add new paragraph 3.13.4 as follows:

3.13.4 The *Contractor* shall undertake the implementation of a schedule of procedures and practices to ensure that the *Place of the Work* is kept in a safe, tidy and clean condition.

17. GC 3.14 PERFORMANCE BY CONTRACTOR

Add new General Condition 3.14 as follows:

3.14.1 In performing its services and obligations under the *Contract,* the *Contractor* shall exercise a standard of care, skill and diligence that would normally be provided by an experienced and prudent contractor supplying similar services for similar projects. The *Contractor* acknowledges and agrees that throughout the *Contract,* the *Contractor's* obligations, duties and responsibilities shall be interpreted in accordance with this standard. The *Contractor* shall exercise the same standard of due care and diligence in respect of any *Products,* personnel, or procedures which it may recommend to the *Owner.*

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

.1 The personnel it assigns to the *Project* are appropriately experienced.

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

.3 There are no pending, threatened or anticipated claims that would have a material effect on the financial ability of the *Contractor* to perform its work under the *Contract.*

18. GC 3.15 RIGHT OF ENTRY

Add new General Condition 3.15 as follows:

3.15.1 The *Owner* shall have the right to enter or occupy the *Work in* whole or in part for the purpose of placing fittings and equipment or for other uses before *Substantial Performance of the Work, if,* in the opinion of the *Consultant* and *Contractor,* such entry or occupation does not prevent or substantially interfere with the *Contractor* in completion of the *Contract* within the *Contract Time.* Such entry or occupation shall not be considered as acceptance of the *Work* or in any way relieve the *Contractor* from responsibility to complete the *Contract."*

19. GC 4.1 CASH ALLOWANCES

19.1 Delete the last sentence in paragraph 4.1.4 in its entirety and substitute a new sentence as follows:

Where costs under a cash allowance exceed the amount of the allowance, unexpended amounts from other cash allowances shall be reallocated at the *Consultant's* direction to cover the shortfall.

19.2 Delete paragraph 4.1.5 in its entirety and substitute new paragraph 4.1.5 as follows:

4.1.5 The unexpended total cash allowance amount shall be deducted from the *Contract Price* by *Change Order.*

19.3 Delete paragraph 4.1.7 in its entirety and substitute new paragraph 4.1.7:

4.1.7 At the commencement of the work, the *Contractor* shall prepare for the review and acceptance of the *Owner* and the *Consultant*, a schedule indicating the times, within the construction schedule referred to in GC 3.5, that items called for under cash allowances and items that are specified to be *Owner* purchased and *Contractor* installed or hooked up are required at the site to avoid delaying the progress of the *Work*.

19.4 Add new paragraph 4.1.8 as follows:

4.1.8 The *Owner* or the *Contractor* shall call for competitive bids for portions of the *Work, to* be paid for from cash allowances.

20. GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

20.1 Revise the heading, **"GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER"** to read, **"GC 5.1 FINANCING INFORMATION REQUIRED".**

20.2 Delete paragraph 5. 1.1 in its entirety and substitute new paragraph 5.1.1 as follows:

5.1.1 The *Owner* and *Contractor* shall provide each other with timely *Notice in Writing* of any material change in their financial ability to fulfill their respective obligations under the *Contract.*

20.3 Delete paragraph 5.1.2 in its entirety.

21. GC 5.2 APPLICATIONS FOR PROGRESS PAYMENT

21.1 Add to the end of paragraph 5.2.1 the following new sentence:

"subject to such limitations and conditions as may be otherwise indicated."

21.2 Add to the end of paragraph 5.2.7 the following new sentence:

"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 13.1 OWNERSHIP OF MATERIALS."

21.3 Add new paragraphs 5.2.8, 5.2.9, 5.2.10 and 5.2.11 as follow:

5.2.8 The *Contractor* shall submit, with each application for progress payment after the first, a Statutory Declaration, on an original form of CCDC Document 9A-2001, stating that payments in connection with the *Work,* as noted in the Statutory Declaration, have been made to the end of the period immediately preceding that covered by the current application.

5.2.9 The *Contractor* shall submit Workplace Safety & Insurance Board Clearance Certificate, with each application for progress payment.

5.2.10 The *Contractor* shall prepare and maintain current as-built *Drawings* which shall consist of the *Drawings* and *Specifications* revised by the *Contractor* during the *Work,* showing changes to the *Drawings* and *Specifications,* which current as-built *Drawings* shall be maintained by the *Contractor* and made available to the *Consultant* for review with each application for progress payment. The *Consultant* reserves the right to retain a reasonable amount for the value of the as-built *Drawings* not presented for review.

5.2.11 AS required by paragraph 3.5.1.4, the *Contractor* shall prepare and submit, with each application for progress payment, an updated construction schedule.

22. GC 5.3 PROGRESS PAYMENT

22.1 Delete from the first line of subparagraph 5.3.1.2, the words, "calendar days" and substitute the following words:

"Working Days".

22.2 Delete subparagraph 5.3.1.3 in its entirety and substitute new subparagraph 5.3.1.3 as follows:

5.3.1.3 The *Owner* shall make payment to the *Contractor* on account as provided in Article A-5 of the Agreement – PAYMENT no later than 15 *Working Days* after the date of a certificate of payment issued by the *Consultant,* or where no Certificate for Payment is issued not later than 14 *Working Days* after the *Owner* deems the invoice acceptable.

22.3 Add new paragraph 5.3.2 as follows:

Notwithstanding any provisions in the *Contract Documents* to the contrary, the *Owner* shall be entitled to deduct from any payment to the *Contractor* an amount equal to the value, as determined by the *Consultant* in the first instance, of any claim, deficiency in the *Work*, or other significant risk that the *Owner* faces due to the failure of the *Contractor* to perform any material obligations under the *Contract*."

23. GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK

23.1 Delete paragraph 5.4.3 in its entirety and substitute new paragraph 5.4.3 as follow:

5.4.3 Immediately following the issuance of the certificate of *Substantial Performance of the Work,* the *Contractor, in* consultation with the *Consultant,* shall establish reasonable dates for finishing the *Work* and correcting deficient work.

23.2 Add new paragraph 5.4.4, 5.4.5, 5.4.6 and 5.4.7 as follows:

5.4.4 The *Contractor* shall publish, in a construction trade newspaper in the area of the location of the *Work,* a copy of the Certificate of *Substantial Performance of the Work* within seven (7) days of receiving a copy of the Certificate signed by the *Consultant,* and the *Contractor* shall provide suitable evidence of the publication to the *Consultant* and *Owner.* If the *Contractor* fails to publish such notice, the *Owner* shall be at liberty to publish and back charge the *Contractor* its reasonable costs for doing so.

5.4.5 Prior to submitting its application for *Substantial Performance of the Work,* the *Contractor* shall submit to the *Consultant* all:

.1 Guarantees
.2 Warranties
.3 Certificates
.4 Testing and balancing reports
.5 Distribution system diagrams
.6 Spare parts
.7 Maintenance manuals

and other materials or documentation required to be submitted under the *Contract,* together with written proof acceptable to the *Owner* and the *Consultant* that the *Work* has been performed in conformance with the requirements of municipal, government and utilities authorities having jurisdiction.

5.4.6 Where the *Contractor* is unable to deliver the documents and materials described in paragraph 5.4.5, then, provided that none of the missing documents and materials interferes, in a material way, with the use and occupancy of the *Work,* failure to deliver shall not be grounds for the *Consultant* to refuse to certify *Substantial Performance of the Work.* Any documents or materials not delivered in accordance with paragraph 5.4.5 shall be delivered as provided in GC 5.7, paragraph 5.7.1.

5.4.7 Notwithstanding paragraph 5.4.1, and with the prior consent of the *Owner*, and as may be described in the *Contract Documents*, the *Contractor* may elect to waive application for a Certificate of Substantial Performance and proceed to Completion of Contract as defined in applicable lien legislation.

24. GC 5.5 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF THE WORK

24.1 Add new subparagraphs 5.5.1.3, 5.5.1.4 and 5.5.1.5 as follow:

5.5.1.3 submit a declaration that no written notices of lien have been received by it.

5.5.1.4 submit a Statutory Declaration CCDC 9A-2001.

5.5.1.5 submit Workplace Safety & Insurance Board Clearance Certificate.

24.2 Delete from line 1 of paragraph 5.5.2, the words, "the statement" and substitute the following words:

"the documents".

24.3 Delete paragraph 5.5.3 in its entirety.

25. GC 5.6 PROGRESSIVE RELEASE OF HOLDBACK

25.1 Delete Article GC 5.6 in its entirety.

26. GC 5.7 FINAL PAYMENT

26.1 Delete paragraph 5.7.1 in its entirety and substitute new paragraph 5.7. 1 as follows:

5.7.1 When the *Contractor* considers that the *Work* is completed, the *Contractor* shall submit an application for final payment within 60 days of the Completion of the Contract within the meaning of the Construction Lien Act (Ontario). Failure to submit the invoice within the specified time frame voids *Owner's* obligation to pay invoice The *Contractor's* application for final payment shall be accompanied by any documents or materials not yet delivered pursuant to paragraph 5.4.5 together with complete as-built *Drawings*. Should the *Contractor* fail to deliver any of the foregoing documents, the *Owner* shall be at liberty to withhold from amounts otherwise payable to the *Contractor,* the sum of $ ***Fifty-Thousand*** Dollars ($50.000.00) as security for the obligation of the *Contractor* to deliver the undelivered documents.

26.2 Delete from the first line of paragraph 5.7.2 the words, "calendar days" and substitute the following words:

"Working Days".

26.3 Delete from the second line of paragraph 5.7.4 the words, "calendar days" and substitute the following words:

"Working Days".

26.4 Add new paragraph 5.7.5 as follows:

5.7.5 As additional requirements for release of finishing construction lien holdback, the *Contractor* shall submit the following documentation:

.1 *Contractor's* written request for release of holdback, including a declaration that no written notices of lien have been received by it.

.2 *Contractor's* Statutory Declaration CCDC 9A-2001.

.3 *Contractor's* Workplace Safety & Insurance Board Clearance Certificate.

5.7.6 The release of the remaining Holdback monies shall become due and payable on the day following the expiration of the statutory limitation period stipulated in the lien legislation applicable to the *Place of the Work* providing that the *Owner* may retain out of such Holdback monies any sums required by law to satisfy any liens against the *Work* or monetary claims against the *Contractor* and enforceable against the *Owner*, and providing that the *Contractor* has submitted to the *Owner* a sworn statement that all accounts for labour, subcontracts, products, construction machinery and equipment and other indebtedness which may have been incurred by the *Contractor* in the performance of the *Work*, and for which the *Owner* might in any way be held responsible, have been paid in full, except Holdback monies properly retained.

27. GC 5.8 WITHHOLDING OF PAYMENT

27.1 Add new paragraphs 5.8.2, 5.8.3 and 5.8.4 as follows:

5.8.2 The *Owner* may retain from any amounts otherwise payable to the *Contractor* under this *Contract* an amount sufficient to satisfy any claims made by third parties arising out of the *Contractor*'s performance of the *Work*, or of the performance of others for whom the *Contractor* is responsible in law, including, without limiting the foregoing, amounts sufficient to satisfy court judgments or arbitration awards.

5.8.3 The *Owner* may retain from any amounts otherwise payable to the *Contractor* under this *Contract* an amount sufficient to satisfy bona fide claims of the *Owner*, including, without limiting the foregoing, the amount of any additional costs incurred by the *Owner* arising from the *Contractor's* failure to perform its contractual obligations under the *Contract*.

5.8.4 The withholding or retention of funds by the *Owner* under this GC 5.8 - WITHHOLDING OF PAYMENT shall not constitute grounds under GC 7.2 - CONTRACTOR'S RIGHT TO THE STOP WORK OR TERMINATE THE CONTRACT for declaring the *Owner* in default, but shall be subject to the provisions of the lien legislation applicable to the *Place of the Work*."

28. GC 5.10 CONSTRUCTION LIENS

28.1 Add new General Condition 5.10 as follows:

5.10.1 Provided the *Owner* is not in default of its payment obligations under the *Contract* and notwithstanding anything else in this PART 5 PAYMENT, in the event a claim for lien is registered against the *Project* lands, or the *Owner* receives any written notice of lien, the *Owner* shall be entitled to withhold any payment otherwise due to the *Contractor* until such time as such claims have been dealt with as provided below.

5.10.2 In the event that a written notice of a lien from the performance of the Work is received by the Owner, the Contractor shall, within 10 calendar days, at its sole expense, arrange for the withdrawal or other disposal of the written notice of a lien pursuant to the Construction Act (Ontario).

5.10.3 If a construction lien arising from the performance of the *Work* is registered against the *Project* lands, the *Contractor* shall, within 10 calendar days, at its expense, vacate or discharge the lien from title to the *Project* lands. If the lien is merely vacated, the *Contractor* shall, if requested, undertake the *Owner*'s defense of any subsequent action commenced in respect of the lien at the *Contractor*'s expense.

5.10.4 If the *Contractor* fails or refuses to vacate or discharge a construction lien or written notice of lien within the time prescribed above, the *Owner* shall, at its option, be entitled to take all steps necessary to vacate and/or discharge the lien, and all costs incurred by the *Owner* in doing so (including, without limitation, legal fees on a solicitor and his own client basis and any payment which may ultimately be made out of or pursuant to security posted to vacate the lien) shall be for the account of the *Contractor*, and the *Owner* may deduct such amounts from the amounts otherwise due or owing to the *Contractor*.

5.10.5 Without limiting any of the foregoing, the *Contractor* shall satisfy all judgments and pay all costs resulting from any construction liens or any actions brought in connection with any liens, or in connection with any other claim or lawsuit brought against the *Owner* by any person that provided services or materials to the *Project* lands which constituted part of the *Work*, and the *Contractor* shall indemnify the *Owner* for any and all costs (including, without limitation, legal fees on a solicitor and client basis) the *Owner* may incur in connection with such claims or actions.

5.10.6 This GC 5.10 – CONSTRUCTION LIENS does not apply to construction liens claimed by the *Contractor*."

29. GC 6.1 OWNER'S RIGHT TO MAKE CHANGES

29.1 Add the following sentences to the end of paragraph 6.1.2:

This requirement is of the essence and it is the express intention of the parties that any claims by the *Contractor* for a change in the *Contract Price* and/or *Contract Time* shall be barred unless there has been strict compliance with PART 6 CHANGES IN THE WORK. No course of conduct or dealing between the parties, no express or implied acceptance of alterations or additions to the *Work* and no claims that the *Owner* has been unjustly enriched by any alteration or addition to the *Work*, whether in fact there is any such unjust enrichment or not, shall be the basis of a claim for additional payment under this *Contract* or a claim for any extension of the *Contract Time*.

29.2 Add new paragraph 6.1.3 as follows:

6.1.3 The *Contractor* shall perform the work for any and all changes to the standards prescribed in the *Contract* including quality of workmanship in a safe manner.

30. GC 6.3 CHANGE DIRECTIVE

30.1 Delete 6.3.7.1(1) and replace it with the following:

(1) carrying out the work, including necessary supervisory services;

30.2 Delete paragraph 6.3.7.1(2) and replace it with the following:

(2) intentionally left blank.

30.3 Amend paragraph 6.3.7.1(3) so that, as amended, it reads:

(3) engaged in the preparation of *Shop Drawings,* fabrication drawings, coordination drawings and project record drawings: or...

30.4 Amend paragraph 6.3.7.1(4) so that, as amended, it reads:

(4) including all professional and clerical staff engaged in processing changes in the Work.

30.5 Add the following sentences to the end of paragraph 6.3.7:

6.3.7.18 other factors as may be specified;

6.3.7.19 The procedures of evaluation including applicable overhead and profit mark-up provisions shall be as described under 6.2 CHANGE ORDER and the specifications."

31. GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

31.1 Add new subparagraph 6.4.5 as follows:

6.4.5 The *Contractor* confirms that, prior to bidding the *Project,* it carefully investigated the *Place of the Work* and applied to that investigation the degree of care and skill described in paragraph 3.14.1, given the amount of time provided between the issue of the bid documents and the actual closing of bids, the degree of access provided to the *Contractor* prior to submission of bid, and the sufficiency and completeness of the information provided by the *Owner.* The *Contractor* is not entitled to compensation or to an extension of the *Contract Time* for conditions which could reasonably have been ascertained by the *Contractor* by such careful investigation undertaken prior t) the submission of the bid.

32. GC 6.5 DELAYS

32.1 Delete the period at the end of paragraph 6.5.1, and substitute the following words:

, but excluding any consequential, indirect or special damages.

32.2 Delete the period at the end of paragraph 6.5.2, and substitute the following words:

, but excluding any consequential, indirect or special damages.

32.3 Add new paragraphs 6.5.6. and 6.5.7 as follows:

6.5.6 If the *Contractor* is delayed in the performance of the *Work* by an act or omission of the *Contractor* or anyone employed or engaged by the *Contractor* directly or indirectly, or by any cause within the *Contractor's* control, then the *Contract Time* may be extended for such reasonable time as the *Consultant* may decide in consultation with the *Owner*. As a condition to the *Owner's* agreement to extend the contract time, the *Owner* shall be reimbursed by the *Contractor* for all reasonable costs incurred by the *Owner* as the result of such delay, including all services required by the *Owner* from the *Consultant* as a result of such delay by the *Contractor* and, in particular, the cost of the *Consultant's* services during the period between the date of *Substantial Performance of the Work* stated in Article A-1 herein as the same may be extended through the provisions of these General Conditions and any later, actual date of *Substantial Performance of the Work* achieved by the *Contractor.*

6.5.7. The *Contractor* shall be responsible for the care, maintenance and protection of the *Work*, in the event of a suspension or delay in the performance of the *Work*, regardless of the reason for such suspension of delay. In the event the delay or suspension was not the fault of the *Contractor*, the *Contractor* shall be reimbursed by the *Owner* for reasonable costs incurred by the *Contractor* as the result of such care, maintenance and protection of the *Work.*

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

33.1 Add to the end of paragraph 7.1.1, the following new words:

without affecting in any respect the liability of the *Contractor* in respect of earlier defaults.

33.2 Add to paragraph 7.1.2, after the word "properly", the following new words:

or fails or neglects to maintain the latest approved schedule provided pursuant to GC3.5

33.3 Delete the words "to a substantial degree" from paragraph 7.1.2.

33.4 Add to paragraph 7.1.3.1 after the word "commences" the words :

and is diligently proceeding with.

33.5 Delete in paragraph 7.1.3.2 the words "provides the *Owner* with an acceptable schedule for such correction, and" and insert the words "provides a schedule acceptable to the *Owner* for such correction, and".

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

34.1 Delete subparagraph 7.2.3.1 in its entirety.

34.2 Delete subparagraph 7.2.3.3 in its entirety and substitute new subparagraph 7.2.3.3 as follows:

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, except where the *Owner* has a bona fide claim for set off, or

34.3 Delete from line 2 of subparagraph 7.2.3.4, the words, "OF THE OWNER".

34.4 Add new subparagraph 7.2.3.5 as follows:

The foregoing default shall not apply to the proper withholding of payment as provided for under the *Contract*, including the *Contractor*'s failure to promptly pay previously valid claims or because of registration or notice of liens against the *Owner*'s property, until such claims and liens are discharged. The foregoing default shall not apply to the withholding of funds for setoff under GC 5.8.2.

34.5 Delete from the second line of paragraph 7.2.4 the words, "5 *Working Days*" and substitute the following words:

*"*15 *Working Days".*

34.6 Add new paragraph 7.2.6 as follows:

7.2.6 If the *Contractor* terminates the *Contract* under the conditions described in this GC 7.2, the *Contractor* shall be entitled to be paid for all work performed to the date of termination. The *Contractor* shall also be entitled to recover the direct costs associated with termination, including the costs of demobilization, losses sustained on *Products* and construction machinery and equipment but in no event shall the Contractor be entitled to receive nor shall the Owner be required to pay, indirect, special or consequential damages including, without limitation, loss of overhead and profit, as a result of the termination.

35. GC 8.1 AUTHORITY OF THE CONSULTANT

35.1 Add in the first line of paragraph 8.1.3, the word “written” before the word “instructions”.

35.2 Delete last sentence of 8.1.3 and substitute the following sentence:

If it is subsequently determined that such instructions were at variance with the *Contract Documents,* the *Owner* shall pay the *Contractor* costs incurred by the *Contractor* in carrying out such instructions which the *Contractor* was required to do beyond the requirements of the *Contract Documents,* including costs resulting from interruption of the *Work.*

36. GC 8.2 NEGOTIATION, MEDIATION AND ARBITRATION

36.1 Delete from the sixth line of paragraph 8.2.2 the words, "10 *Working Days*" and substitute the following words:

*"*15 *Working Days".*

36.2 Delete from the first line of paragraph 8.2.4 the words, "10 *Working Days*" and substitute the following words:

*"*15 *Working Days".*

36.3 Add new paragraphs 8.2.9, 8.2.10, 8.2.11, 8.2.12, 8.2.13, 8.2.14, 8.215 and 8.2.16 as follow:

8.2.9 Within 5 *Working Days* of receipt of the notice of arbitration by the responding party under paragraph 8.2.6, the *Owner* and the *Contractor* shall give the *Consultant* a written notice containing:

.1 A copy of the notice of arbitration.

.2 A copy of supplementary conditions 8.2.9 to 8.2.16 of the *Contract.*

.3 Any claims or issues which the *Contractor* or the *Owner,* as the case may be, wishes to raise in relation to the *Consultant* arising out of the issues in dispute in the arbitration.

8.2.10 The *Owner* and the *Contractor* agree that the *Consultant* may elect, within ten *Working Days* of receipt of the notice under paragraph 8.2.9, to become a full party to the arbitration under paragraph 8.2.6 if the *Consultant:*

.1 Has a vested or contingent financial interest in the outcome of the arbitration.

.2 Gives the notice of election to the *Owner* and the *Contractor* before the arbitrator is appointed.

.3 Agrees to be a party to the arbitration within the meaning of the rules referred to in paragraph 8.2.6.

.4 Agrees to be bound by the arbitrate award made in the arbitration.

8.2.11 If the *Consultant* is not given the written notice required under paragraph 8.2.10, both the *Owner* and the *Contractor* are estopped from pursuing an action, counter claim or other proceeding or making an application against the *Consultant* arising out of the issues in dispute in the arbitration between the *Owner* and the *Contractor* under paragraph 8.2.6."

8.2.12 If an election is made under paragraph 8.2.10, the Consultant may participate in the appointment of the arbitrator and notwithstanding the rules referred to in paragraph 8.2.6, the time period for reaching agreement on the appointment of the arbitrator shall begin to run from the date the Owner receives a copy of the notice of arbitration.

8.2.13 The arbitrator in the arbitration in which the *Consultant* has elected under paragraph 8.2. 10 to become a full party may:

.1 On application of the *Owner* or the *Contractor,* determine whether the *Consultant* has satisfied the requirements of paragraph 8.2.10.

.2 Make any procedural order considered necessary to facilitate the addition of the *Consultant* as a party to the arbitration.

8.2.14 The provisions of paragraph 8.2.9 shall apply mutatis mutandis to written notice to be given by the *Consultant* to any sub-consultant.

8.2.15 In the event of notice of arbitration given by a *Consultant* to a sub-consultant, the sub-consultant is not entitled to any election with respect to the proceeding as outlined in 8.2.10, and is deemed to be bound by the arbitration proceeding.

8.2.16 The cost of arbitration shall be apportioned against the parties hereto or against any one of them as the arbitrator may decide, as outlined in the latest edition of the Rules for Mediation of CCDC 2 Construction Disputes, except that those costs shall not include counsel fees for any of the parities to the arbitration. Counsel fees shall be paid by each party.

37. GC 8.3 RETENTION OF RIGHTS

37.1 Add new paragraph 8.3.3 as follows:

8.3.3 If the *Owner* gives the notice in writing described in paragraph 8.2.6 to have a dispute resolved by arbitration, the *Contractor* agrees that this paragraph 8.3.3 shall be construed as a formal consent to the stay of any lien proceedings until an award is rendered in the arbitration or such dispute is otherwise resolved between the parties. In no event shall the *Contractor* be deprived of its right to enforce its lien against the *Project* should the *Owner* fail to satisfy any arbitral award against it in full on the dispute in respect of which the lien proceedings were commenced. Nothing in this paragraph 8.3.3 shall prevent the *Contractor* from taking the steps required by the *Construction Lien Act* to preserve and/or perfect a lien to which it may be entitled.

38. GC 9.1 PROTECTION OF WORK AND PROPERTY

38.1 Delete subparagraph 9.1.1.1 in its entirety and substitute new subparagraph as follows:

9.1.1.1 errors in the *Contract Documents* which the *Contractor* could not have discovered applying the standard of care described in paragraph 3.14,1;

38.2 Delete paragraph 9.1.2 in its entirety and substitute the following new paragraph 9.1.2 as follows:

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 by applying to inspection of the *Place of the Work* the degree of care and skill described in paragraph 3.14.1.

38.3 Add new paragraph 9.1.5 as follows:

9.1.5 The *Contractor* shall neither undertake to repair and/or replace any damage whatsoever to the work of other contractors, or to adjoining property, nor acknowledge the same was caused or occasioned by the *Contractor,* without first consulting the *Owner* and receiving written instructions as to the course of action to be followed from either the *Owner* or the *Consultant.* However, where there is danger to life or public safety, the *Contractor* shall take such emergency action as it deems necessary to remove the danger.

39. GC 9.2 TOXIC AND HAZARDOUS SUBSTANCES

39.1 Add to paragraph 9.2.6 after the word "responsible", the following new words:

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,

39.2 Add “and the Consultant” after “Contractor” in subparagraph 9.2.7.4.

39.3 Add to paragraph 9.2.8 after the word "responsible", the following new words:

or that 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,

40. GC 9.4 CONSTRUCTION SAFETY

40.1 Delete paragraph 9.4.1 in its entirety and substitute new paragraph 9.4.1 as follows:

9.4.1 The *Contractor* shall be the "constructor" within the meaning of OHSA and shall be solely responsible for construction safety at the *Place of the Work* and for compliance with the rules, regulations and practices required by the applicable construction health and safety legislation and shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the *Work.*

40.2 Add new paragraphs 9.4.2, 9.4.3 and 9.4.4 as follow:

9.4.2 Prior to the commencement of the *Work,* the *Contractor* shall submit to the Owner:

.1 a current WSIB clearance certificate;

.2 copies of the *Contractor's* insurance policies having application to the *Project* or certificates of insurance, at the option of the *Owner;*

.3 documentation of the *Contractor's* in-house safety-related programs; and

.4 a copy of the Notice of Project filed with the Ministry of Labour naming itself as "constructor" under OHSA.

9.4.3 The *Contractor* shall indemnify and save harmless the *Owner,* its agents, officers, directors, employees, consultants, successors and assigns from and against the consequences of any and all safety infractions committed by the *Contractor* under OHSA, including the payment of legal fees and disbursements on a full indemnity basis. Such indemnity shall apply to the extent to which the *Owner* is not covered by insurance, provided that the indemnity contained in this paragraph shall be limited to costs and damages resulting directly from such infractions and shall not extend to any consequential, indirect or special damages.

9.4.4 The *Owner* undertakes to include in its contracts with other contractors and/or in its instructions to its own forces the requirement that the other contractor or own forces, as the case may be, will comply with directions and instructions from the *Contractor* with respect to occupational health and safety and related matters. The text of such instruction is attached to these Supplementary Conditions.

41. GC 9.5 MOULD

41.1 Delete paragraph 9.5.3.3 in its entirety and substitute new paragraph 9.5.3.3 as follows:

9.5.3.3 extend the *Contract Time* for such reasonable time as the *Consultant* may recommend in consultation with the *Contractor*. in the opinion of the *Consultant,* the *Contractor* has been delayed in performing the *Work* and / or has incurred additional costs under paragraph 9.5.1.2, the *Owner* shall reimburse the *Contractor* for reasonable costs incurred as a result of the delay and as a result of taking those steps, and

41.2 Add "and the Consultant" after "Contractor" in subparagraph 9.5.3.4.

42. GC 10.1 TAXES AND DUTIES

42.1 Add to the end of paragraph 10.1.2 the following words:

", except for changes announced prior to the time of the bid closing that are to take effect at some time thereafter, shall be deemed to have been taken into account in the *Contract Price*. The *Contractor* shall furnish to the *Owner* such information concerning its acquisition of equipment, inventory and other materials to enable the *Owner* to accurately access effect upon the *Contractor* of such change in tax or duty.

42.2 Add new paragraphs 10.1.3 and 10.1.4 as follows:

10.1.3 The *Contractor* is not entitled to any mark-up for profit, overhead or otherwise, due to an increase in taxes or duties. The *Contractor* shall be entitled to claim for the increase in cost equal to the amount of the tax and/or duty on the uncompleted cost of the work. The *Owner* will be entitled to withhold payment to the *Contractor* a sum equal to the amount of tax and/or duty reduction on the uncompleted portion of the work.

10.1.4 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* or the *Owner's* representative, assist with 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

43. GC 10.2 LAWS, NOTICES, PERMITS, AND FEES

43.1 Add to the end of paragraph 10.2.4, the following words:

"The *Contractor* shall notify the Chief Building Official or the registered code agency where applicable, of the readiness, substantial completion, and completion of the stages of construction set out in the Ontario Building Code. The *Contractor* shall be present at each site inspection by an inspector or registered code agency as applicable under the Ontario Building Code."

43.2 Delete from the first line of paragraph 10.2.5 the word, "The" and substitute the following words:

"Subject to paragraph 3.4.1, the".

44. GC 11.1 INSURANCE

44.1 Delete paragraph 11.1.1 in its entirety and substitute the following:

"11.1.1 The Owner will provide Wrap-up Liability. General Liability insurance shall be in the joint names of the Contractor, the Owner, the Consultant, and any and all subcontractors and sub-consultants involved in the Work, with limits of not less than $5,000,000 per occurrence and with a property damage deductible not exceeding $10,000.

The insurance coverage shall include at least the following extensions: Premises, Property and Operations; Occurrence basis, Owners/Contractors protective, Products and Completed Operations: Blanket Contractual; Employees as Additional Insureds; Broad Form Property Damage; Broad Form Loss of Use; Personal Injury; Incidental Malpractice; Contingent Employers Liability; Cross Liability/ Severability of Interests; Non-Owned Automobile Liability including Endorsement Form 96; Intentional Injury to protect persons or property, Xplate/unlicensed/specially licensed vehicles; Attached Machinery; Hostile fire exception to any pollution exclusion; Voluntary Medical Payments. To achieve the desired limit, umbrella or excess liability insurance may be used. All liability coverage shall be maintained for the completed operations hazard from the date of Substantial Performance of the Work, for 24 months following. The Policy shall be endorsed to provide the Contractor with not less than 30 days notice in writing in advance of any cancellation or change or amendment restricting coverage.

44.2 Add new subparagraphs 11.1.1.1 as follows:

"11.1.1.1 The *Owner* will obtain and maintain "Builders' Risk" or "all risks" or "course of construction" property insurance shall be in the joint names of the *Owner, the Contractor,* and the *Consultant,* insuring not less than the full replacement cost of the building and associated equipment. The policy shall carry a deductible of not more than $10,000 for general claims and $25,000 for water related claims and shall be maintained continuously from commencement of work until 10 days after substantial completion.

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

(2) The *Contractor* shall be entitled to receive form the *Owner*, in addition to the amount due under the *Contract*, the amount at which the *Owner's* interest in restoration of the *Work* has been appraised, such amount to be paid as the restoration of the *Work* proceeds in accordance with progress payment provisions. In addition, the *Contractor* shall be entitled to receive from the payments made by the insurer the amount of the Contractor's interest in the restoration of the Work.

(3) In the case of loss or damage to the Work arising from the work of another contractor, or Owner's own forces, the Owner shall, in accordance with the Owner's obligations under the provisions relating to the construction by the Owner or other contractors, pay the Contractor the cost of restoring the Work as the restoration of the Work proceeds and in accordance with the progress payment provisions.

44.4 Delete paragraphs 11.1.6 and 11.1.7 in their entirety.

44.5 Delete paragraph 11.1.8 and substitute the following:

"A *Change Directive* shall not be used to direct a change in the insurance requirements to be provided by the *Contractor*."

45. GC 11.2 CONTRACT SECURITY

45.1 Add to the end of paragraph 11.2.1, the following words:

"guarantee the faithful performance of the *Contract* in accordance with the *Contract Documents*. The performance bond shall cover all extended warranty periods specified in GC 12.3. The Labour and Material Payment Bond shall ensure payment of wages and products to Subcontractors and suppliers, and discharge of liens and debts, including commitments in law, such as Employment Insurance, Income Tax Deductions, Workplace Safety and Insurance Board premiums and Vacation Pay."

45.2 Add new paragraphs 11.2.3, 11.2.4, 11.2.5, and11.2.6 as follows:

11.2.3 The *Contractor* and not the *Owner* shall be responsible for notifying the surety company of any changes made to the *Contract* during the course of construction.

11.2.4 Obligations incurred in the event of the *Contractor*'s default shall include, but not necessarily be limited to the following:

11.2.4.1 The payment of all legal, accounting, architectural, engineering and consulting fees incurred by the *Owner* in determining the extent of the *Work* executed and any additional work required as a result of the interruption of the *Work*, and

11.2.4.2 The payment of additional expenses by the *Owner* in the form of security, light, heat, power, etc. during the period between the default of the *Contractor* and the commencement of the work.

11.2.5 Without limiting the foregoing in any way, the Performance Bond shall indemnify and hold harmless the *Owner* for and against any and all costs and expenses (including all legal and professional fees and court costs) arising out of or as a result of or as a consequence of any default of the *Contractor* under the *Contract*."

11.2.6 The Performance Bond shall remain in effect for the duration of the warranty period as specified in GC 12.3, or as may be amended by these Supplementary Conditions.

46. GC 12.1 INDEMNIFICATION

46.1 Add new paragraph 12.1.7 as follows:

12.1.7 The Contractor shall indemnify and hold harmless the Consultant, its agents and employees from and against claims, demands, losses, costs, damages, actions, suits, or proceedings by third parties that arise out of, or are attributable to, the Contractor's performance of the Contract, provided such claims are attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property, and caused by negligent acts or omissions of the Contractor or anyone for whose acts the Contractor may be liable, and made in writing within a period of 6 years from the date of Substantial Performance of the Work as set out in the certificate of Substantial Performance of the Work, or within such shorter such period as may be prescribed by any limitation statute or the province or territory of the Place of Work".”

47. GC 12.2 WAIVER OF CLAIMS

47.1 Delete the last sentence of subparagraph 12.2.3.4 and substitute the following:

For purposes of this subparagraph 12.2.3.4, "substantial defects or deficiencies" means those defects or deficiencies in the *Work* where the reasonable cost of repair of such defects or deficiencies exceeds:

.1 if the *Contract Price* is $2 million or less, the sum of $50,000, before Value Added Tax;
.2 if the *Contract Price* exceeds $2 million, the sum of $100,000, before Value Added Tax.

In any event, "substantial defects or deficiencies" shall include defects or deficiencies in the *Work* which affect the *Work* to such an extent or in such a manner that a significant part or the whole of the *Work* is unfit for the purpose intended by the *Contract Documents.*

48. GC 12.3 WARRANTY

48.1 Delete from the first line of paragraph 12.3.2 the word, "The" and substitute the following words:

"Subject to paragraph 3.4.1, the...

49. PART 13 OTHER PROVISIONS

Add **new PART 13** as follows:

GC 13.1 OWNERSHIP OF MATERIALS

13.1.1 Unless otherwise specified, all materials existing at the *Place of the Work* at the time of execution of the *Contract* shall remain the property of the *Owner. All* work and *Products* delivered to the *Place of the Work* by the *Contractor* shall be the property of the *Owner.* The *Contractor* shall remove all surplus or rejected materials as its property when notified in writing to do so by the *Consultant.*

GC 13.2 CONTRACTOR DISCHARGE OF LIABILITIES

13.2.1 In addition to the obligations assumed by the *Contractor* pursuant to GC 3.7, the *Contractor* agrees to discharge all liabilities incurred by it for labour, materials, services, *Subcontractors* and *Products,* used or reasonably required for use in the performance of the *Work,* except for amounts withheld by reason of legitimate dispute which have been identified to the party or parties, from whom payment has been withheld.

GC 13.3 RECORD DRAWINGS

13.3.1 As provided in the *Contract Documents,* the *Contractor* shall prepare record *Drawings* and specifications and provide them to the *Consultant* for review.

GC 13.4 DAILY REPORTS/DAILY LOGS

13.4.1 The *Contractor* shall cause its supervisor, or such competent person as it may delegate, to prepare a daily log or diary reporting on weather conditions, work force of the *Contractor, Subcontractors, Suppliers* and any other forces on site and also record the general nature of *Project* activities. Such log or diary shall also include any extraordinary or emergency events which may occur and also the identities of any persons who visit the site who are not part of the day-to-day work force.

13.4.2 The *Contractor* shall also maintain records, either at its head office or at the job site, recording manpower and material resourcing on the *Project,* including records which document the activities of the *Contractor* in connection with GC 3.5, and comparing that resourcing to the resourcing anticipated when the most recent version of the schedule was prepared pursuant to GC 3.5.

GC 13.5 NEUTRAL APPOINTING AUTHORITY

13.5.1 For purposes of the Rules for Mediation and Arbitration of Construction Disputes CCDC 40, the term "neutral appointing authority", as used in both the Rules for Mediation of CCDC 2 Construction Disputes and the Rules for Arbitration of CCDC 2 Construction Disputes shall mean the head of the construction section of the ADR Institute of Ontario, Inc. presiding at the time notice of the dispute is given pursuant to the *Contract.*

GC 13.6 HUMAN RIGHTS AND SEXUAL AND GENDER HARASSMENT POLICIES

13.6.1 The parties agree to be governed by the provisions of the Ontario Human Rights Code. Furthermore, the parties agree to comply with the provisions of the Client's Human Rights Policy and any subsequent related policy or procedures that the Client may approve. The architect shall refer to www.uoguelph.ca/hre/hr.shtml for more information.

GC13.7 ACCESSIBILITY FOR ONTARIANS WITH DISABILITIES ACT (AODA)

13.7.1 The parties agree to be governed by the provisions of the Accessibility for Ontarians with Disabilities Act (AODA).

13.7.2 The Contractor agrees to:

(a) Comply with the accessibility standards established under the AODA by the Ontario Government and adhere to the University's policies and procedures in regards to accessibility as well as to ensure all of its subcontractors similarly do the same.

(b) Ensure that training on the requirements of the accessibility standards are provided to those of its employees who will be working with the public (students, staff, faculty, visitors or other third parties) at, or on behalf of, the University and who participate in developing the proponent's policies, practices or procedures.

(c) Keep records of such training.

(d) Provide such records when required by the University.

(e) Upon Notice of Award, provide to the University with a signed AODA Supplier Compliance Form prior to commencing any work for the University.

END OF SECTION

LANGUAGE FOR OWNER PERSONNEL OR FOR THIRD PARTY CONTRACTORS ENTERING A PROJECT SITE WHERE THE CONTRACTOR HAS ASSUMED OVERALL RESPONSIBILITY – IN CONTRACT – FOR OCCUPATIONAL HEALTH AND SAFETY

I/We (trade or employee name) acknowledge that the work we will perform on behalf of the *Owner* requires us to enter a job site which is under the total control of a *Contractor* which has a *Contract* with the University of Guelph.

I/We (trade or employee) further acknowledge that [name of *Contractor*] has assumed overall responsibility for compliance with all aspects of the health and safety legislation of Ontario, including all the responsibilities of the "constructor" under the Occupational Health and Safety Act (Ontario).

Further, (trade or employee) acknowledges that [name of *Contractor*] is also responsible to the University of Guelph to co-ordinate and schedule the activities of our work with the *Work* of the *Contractor.*

We agree to comply with [name of *Contractor*] directions and instructions with respect to occupational health and safety and coordination.

We acknowledge that it will be cause for termination under our contract with the *Owner* should (I/we) fail or refuse to accept the direction and instruction of the *Contractor* with respect to matters of occupational health and safety or matters related to coordination of work.

We agree to have the [name of *Contractor*] named as an additional insured on our comprehensive liability policy.

ACKNOWLEDGEMENT and SIGNATURES

Signed and sealed by : _____

Note: Affix Corporate Seal

Company Name

Seal:

_____

Printed Name

_____

Signature

_____

Name of Witness

_____

Signature of Witness

Dated this _____ day of _____ , 20__.

END OF SECTION

PART 1 - GENERAL

1.1 PARTNERING

.1 The Owner proposes a team building approach to this contract called “Partnering.” Partnering is a non-binding commitment by all parties, including the Owner, Consultant and Subconsultants, the Contractor and Subcontractors, and key equipment suppliers to work cooperatively as a team, in a spirit of trust and respect, to achieve common goals and objectives to promote smooth information exchange and creative problem solving. Partnering focuses on the strengths of each participant to efficiently and safely achieve a quality end product, on time and within budget, without unresolved disputes. The Contractor and Subcontractors directly benefit from the cooperation, fairness, openness, improved morale and efficiency of the partnering relationship. It is intended that Partnering will enhance all parties’ commitment and good faith for the duration of the project.

.2 The Partnering team includes key staff members from the Owner, Consultant, key suppliers, Contractor and Subcontractors. This includes project managers, work crew forepeople, project supervisors, quality assurance supervisors, off site construction administrators, and principals.

.3 The Partnering process will involve:

.1 A commitment of all parties to work as a team to achieve the goals identified for all the parties.

.2 An agenda item at each progress meeting to evaluate the partnering arrangement and resolve conflict.

.3 An initial project partnering meeting scheduled following the first progress meeting.

.4 Follow-up partnering meetings scheduled at approximately three (3) month intervals to provide regular evaluation of the Partnering effectiveness throughout the duration of the Contract.

.4 The Contractor shall record and distribute the minutes from the partnering meetings.

.5 A Partnering Charter will be developed by the participants at the initial partnering meeting to document goals shared by all parties. This Charter will serve as a guide in monitoring the Partnering effectiveness, remind participants of the commitments made, and document the common goals established. The Partnering Charter will be sent to all key equipment suppliers not directly involved in the initial Partnering meeting for their information, and to seek their endorsement of the Partnering process.

.6 Development of the Partnering Charter will take into account the Owner’s goals and objectives for this project as they relate to the working relationship necessary to deliver a first class facility in a safe, effective and timely manner.

.7 One of the key outcomes of the initial partnering meeting will be a non-binding “Dispute Resolution Ladder”. This will establish a clear hierarchy for resolving disputes as they arise using a process that is respectful, responsive, open and fair to all parties.

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 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work Covered by the Contract Documents generally comprises the renovation of Building #046, also known as the Former Veterinary Microbiology and Immunology (VMI) building, located on the University of Guelph campus and further identified as 50 College Avenue West.

.2 The Owner for the purpose of this Contract is The University of Guelph.

.3 The specifications are not a detailed description of installation methods, but serve to indicate particular requirements of the complete work.

.4 It is the intention of the drawings and specifications to provide finished work. Any items omitted, which are clearly necessary for the completion of the Work, are part of the Work.

.5 Material shown or specified on Drawings or Specifications, unless otherwise specified, shall conform to the standards designated in the Ontario Building Code. Similarly, unless otherwise specified, installation methods and standards of workmanship shall also conform to standards required by the Ontario Building Code.

.6 Parts of the specifications are written in short form; therefore, it is understood that where a component of Work is stated in the heading followed by a material or operation, “shall be”, “shall consist of” or similar words or phrases are implied which denote complete supply and installation of such material or operations for component of work designated by heading.

.7 Division 01 of the specifications shall be read into and form part of each Section of the Specifications.

.8 The Contract Documents are to be interpreted as a whole, although they are arranged in divisions and sections for convenience and clarity. The Contractor is responsible for all work, regardless of the division of the work in the Contract Documents, and such division does not impose any obligation on the Consultant or upon the Owner as arbiters to establish limits or responsibilities between the Contractor and Subcontractors.

1.2 SPECIFICATION FORMAT

.1 Specifications are not intended as a detailed description of installation methods but serve to indicate particular requirements to insure the performance of the completed work.

.2 Material shown or specified on Drawings or in Specifications, unless otherwise specified, shall conform to standards designated in Ontario Building Code. Similarly, unless otherwise specified, installation methods and standards of workmanship shall also conform to standards required by Ontario Building Code.

.3 Parts of specification are written in short form, therefore it is understood that where a component of Work is stated in heading followed by a material or operation, "shall be", "shall consist of" or similar words or phrases are implied which denote complete supply and installation of such material or operations for component of work designated by heading.

.4 Division 1 of the specifications shall be read into and form part of each Section of the Specifications.

.5 The Contract Documents are to be interpreted as a whole, although they are arranged in divisions and sections for convenience and clarity. The Contractor is responsible for all the work, regardless of the division of the work in the Contract Documents, and such division does not impose any obligation on the Consultant or upon the Owner as arbiters to establish limits or responsibility between the Contractor and the Subcontractors.

1.3 CONTRACT METHOD

.1 Construct Work under a single lump sum, Stipulated Price Contract, based on the CCDC 2-2008 document, as amended by the University of Guelph Supplementary General Conditions herein.

.2 Obtain Substantial Completion on or before time indicated on Bid Form, Declaration '1'.

.3 Contractor Use of Premises: assume responsibility for complete use of the Construction Site**.**

.4 Workplace Policies: Comply with all University of Guelph policies including, but not limited to the following:

.1 Human Rights and Sexual and Gender Harassment

.2 Accessibility for Ontarians with Disabilities

.3 Alcohol, Tobacco and Other Drugs – Consumption of tobacco, alcohol and other drugs on University property are strictly prohibited.

.5 Approvals and Permits:

.1 Refer to CCDC 2, GC 10.2 and University of Guelph Supplemental Conditions.

.2 Work is subject to the approval, inspection, by-laws and regulations of all municipal, provincial, federal and other authorities having jurisdiction.

1.4 QUALITY OF WORK

.1 Work shall be of the best quality, executed by workers experienced and skilled in the respective duties for which they are employed.

.2 Do not employ any unfit persons or anyone unskilled in their required duties.

.3 Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with the Consultant, whose decision is final.

1.5 WORKING DAYS AND HOURS

.1 Refer to Section 01 14 03 - Special Project Scheduling Requirements

1.6 CONTRACT TIME AND TIME FOR COMPLETION

.1 The project shall commence immediately upon execution of the Contract and/or the Contractor receiving a Letter of Intent from the Consultant/Owner.

.2 The Letter of Intent shall be a letter from the Consultant/Owner authorizing the Contractor to commence the Work. The start date indicated in the Letter of Intent shall have been agreed to in principle by all parties prior to issuance of the Letter of Intent.

.3 The work shall continue in an expeditious manner in order to obtain Substantial Performance on or before time indicated on Bid Form, Declaration '1'.

.4 The Work, save and except for the warranty period, shall be completed within 25 working days following Substantial Performance, deemed to be the 'Time for Completion'.

.5 The Contractor shall include a reasonable allowance in their overall project schedule for individual working days lost due to inclement weather. No extension to the Contract Time or Time for Completion shall be made by the Owner for individual working days lost due to inclement weather, except as otherwise provided for in the Contract.

1.7 FEES, PERMITS AND CERTIFICATES

.1 Refer to GC 10.2, Laws, Notices, Permits and Fees.

.2 The Owner will apply and pay for the Building Permit required under the Ontario Building Code. Contractor is advised that workload at the authorities having jurisdiction may delay permit issuance.

.3 Application and payment for all damage deposits, and other permits, licenses, fees and costs remain the responsibility of the Contractor. For clarification, the Contractor is required to post all damage deposits required by the authorities having jurisdiction as a condition of permit issuance.

.4 Obtain copy of Building Permit from Owner, complete with drawings on which authorities having jurisdiction may have made comments, and examine same. Advise Consultant of any changes required, complete with associated costs

.5 Arrange all required inspections by authorities having jurisdiction on behalf of the Owner. Furnish inspection certificates as evidence that work conforms to requirements of authority having jurisdiction.

.6 Pay all advertisement fees for substantial completion.

.7 Maintain and pay for insurance requirements in accordance with the University of Guelph Supplemental Conditions.

1.8 PROJECT COORDINATION

.1 Coordinate progress of Work, progress schedules, submittals, use of site, temporary utilities, construction facilities, Owner's continued use and occupancy of the building and site during the Work.

.2 Assume full responsibility for, and execute complete layout of work to locations, lines and elevations indicated including any existing utilities or services.

.3 Provide devices needed to layout and construct work. Refer to Section 01 71 00 – Examination and Preparation.

.4 Supply such devices as straight edges and templates required to facilitate Consultant's review of work.

.5 Each trade shall examine the work upon which the trade or specification Section depends. Have all defects and deficiencies corrected prior to proceeding with work. The application of work or any part of it shall be deemed acceptance by the Contractor of the work upon which subsequent work depends.

1.9 CONTRACTOR USE OF PREMISES

.1 Execute work with least possible interference or disturbance to normal use of premises.

.2 Limit use of premises for Work and access to allow:

.1 Owner occupancy and use of existing facilities on site.

.3 Coordinate use of premises under direction of Owner and Consultant.

.4 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.5 For work outside the construction area, traffic circulation and other normal use of the site is to be maintained at all times. Temporary security, fencing, trench covers, signage, flagmen, traffic control measures, etc., to be provided.

.6 Project equipment, furnishings, Owner's and occupants' effects remaining in any area in which work is occurring as required, and as specified elsewhere. Make good all damage to the satisfaction of the Owner. Relocate all furnishings, equipment and effects in existing facilities, as needed to execute the Work, and return same to original location before Owner re-occupies existing facilities.

.7 Maintain construction site in an organized and orderly state at all times.

.8 Clean-up grounds and access roads daily and whenever directed.

.9 Contractor shall be responsible to secure all buildings where construction is ongoing and to secure/lock all gates where site access is possible at the end of each workday.

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

.11 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.

.12 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Consultant.

.13 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.10 RESTRICTIONS ON CONTRACTOR MOVEMENT

.1 Contractor personnel are restricted to the job site and necessary access routes. No personnel shall visit other areas or buildings without prior authorization. The extent of the work site shall be confined to the areas in which work is occurring and access routes to those areas.

1.11 OWNER OCCUPANCY

.1 Owner will occupy premises during entire construction period for execution of normal operations. All work shall be scheduled and co-ordinated to accommodate this requirement and all necessary precautions shall be taken to ensure safe occupancy.

.2 Cooperate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

1.12 OWNER FURNISHED ITEMS

.1 Owner Responsibilities:

- .1 Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to Contractor.
- .2 Deliver supplier's bill of materials to Contractor.
- .3 Arrange and pay for delivery to site in accordance with Progress Schedule.
- .4 Inspect deliveries jointly with Contractor.
- .5 Submit claims for transportation damage.
- .6 Arrange for replacement of damaged, defective or missing items.
- .7 Arrange for manufacturer's field services; arrange for and deliver manufacturer's warranties and bonds to Contractor.

.2 Contractor Responsibilities:

.1 Designate submittals and delivery date for each product in progress schedule.

.2 Review shop drawings, product data, samples, and other submittals. Submit to Consultant notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.

.3 Receive and unload products at site.

.4 Inspect deliveries jointly with Owner; record shortages, and damaged or defective items.

.5 Handle products at site, including uncrating and storage.

.6 Protect products from damage, and from exposure to elements.

.7 Assemble, install, connect, adjust, and finish products.

.8 Provide installation inspections required by public authorities.

.9 Repair or replace items damaged by Contractor Design-Builder or subcontractor on site (under his control).

.10 Refer also to requirements of Section 01 73 01 – Supplementary Conditions and Appendix

.3 Schedule of Owner furnished and Contractor Installed items:

.1 Toilet and Bath Accessories – Refer to Section – 10 28 10 Toilet and Bath Accessories

.2 Soft Furnishings: The owner will procure the furniture under a separate contract. The contract will be responsible for the coordination of the furniture installation as it relates to The Work, including but not limited to, scheduling, supervision of the installation, coordination with the Owner and the Trades for location of services etc.

.4 Video Capture System (VCAP): The owner will procure a priority video monitoring package, including physical cameras, microphones and software, which under a separate contract. The Contractor will be responsible for the coordination of the installation of this system as it relates to The Work, including but not limited to, scheduling, supervision of the installation, coordination with the Owner and the Trades for location of services etc.

.5 System and Ancillary Furniture: The owner will procure furniture package under a separate contract. The Contractor will be responsible for the coordination of the installation of this system as it relates to The Work, including but not limited to, scheduling, supervision of the installation, coordination with the Owner and the Trades for location of services etc.

1.13 EXISTING SERVICES

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

.2 Where Work involves breaking into or connecting to existing services, give Owner and Consultant five (5) business days' notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to Owner operations.

.3 Where length of service shutdown will exceed twelve (12) hours, provide minimum seven (7) full working days advance notice.

.4 Provide alternative routes for pedestrian and vehicular traffic.

.5 Establish location and extent of service lines in area of work before starting Work. Notify Consultant of findings.

.6 Submit schedule to and obtain approval from Consultant for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

.7 Provide temporary services to maintain critical building systems.

.8 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.

.9 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.

.10 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

.11 Record locations of maintained, re-routed and abandoned service lines.

.12 Construct barriers in accordance with Section 01 56 00 – Temporary Barriers and Enclosures.

1.14 PRE-CONSTRUCTION SURVEY

.1 The pre-construction survey shall be prepared by the Contractor for all utilities, structures, surfaces, facilities, and equipment within the building likely to be impacted due to the proposed construction activities.

.2 The pre-construction survey means a detailed record in written form, accompanied by photos and/or video of the condition of the existing facilities prior to the commencement of any construction activities. All existing structures/cosmetic damage or defects shall be clearly documented.

.3 The pre-construction survey will be considered the basis by which claims for damages caused by construction activities will be made.

.4 Prior to commencing work, complete a survey of existing conditions within work area(s) and along path of travel for goods to be delivered and removed from the site.

.5 Prior to commencing work, complete a survey of existing site services and utilities within work area(s) and along path of travel for goods to be delivered and removed from the site.

.6 Owner will accompany Contractor on inventory tour. Arrange mutually agreeable time for survey.

.7 Inventory all existing damage, accurately recording all observed conditions. Use photographs, written records, spreadsheets videography, etc. to fully document existing conditions, noting existing damage in sufficient detail to act as record of conditions.

.8 Within two (2) business days of inventory, and prior to commencing demolition or construction, provide each of Owner and Consultant with copy of inventory records. Identify photographs using room numbers and detailed descriptions of observed damage.

.9 Owner will review submission. Revise and resubmit rejected inventory. Demolition and/or construction may only commence after acceptance by Owner of inventory records.

.10 Repair and make good any damage found subsequent to submission of inventory, which in the opinion of the Consultant is the result of the Work, and which is not documented in the inventory submitted to the Owner and Consultant to Owner. Repairs shall return damaged elements to their condition prior to start of work. Where work increases extent of existing damage, repair shall return element to match previous damaged condition. Refer to CCDC 2 – 2008, GC 9.1

.11 Where repairs cannot, in the opinion of the Consultant, be expediently implemented the Consultant shall ascertain the value to be deducted from the amounts due the Contractor in the manner permitted under CCDC 2 – 2008, GC 2.4

1.15 CONSTRUCTION EQUIPMENT

.1 Provide and maintain equipment such as temporary stairs, ladders, ramps, scaffolds, swing stages, runways, chutes and like as required for execution of work.

.2 Provide and maintain conveying equipment such as cranes, hoists, derricks and like as required for execution of work.

.3 Assume complete responsibility for construction strength, placing, anchoring and operation of cranes, derricks, hoists, and other mechanical equipment used for work and ensure that loads carried thereon can be safely supported.

.4 Remove such equipment immediately when no longer required for work.

.5 Ensure all construction vehicles and equipment are equipped with properly functioning noise attenuating devices.

1.16 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures, and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access, and maintenance.

.3 Submit field drawings to indicate relative position of various services and equipment when required by the Consultant.

.4 Provide detailed interference and coordination drawings when required by specific specification sections.

1.17 EQUIPMENT PROTECTION

.1 Deliver and store materials according to manufacturer's written instructions and protect from damage.

.2 Locate equipment, fixtures, and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacture's recommendations for safety, access, and maintenance.

.3 During construction, all equipment is to be protected against dust and/or moisture.

1.18 EQUIPMENT MAINTENANCE

.1 Equipment started prior to Substantial Performance is to be maintained by the Contractor in accordance with the manufacturer's written instructions.

.2 Maintain log of maintenance work as it is completed and submit to Owner prior to final acceptance.

1.19 WARRANTIES

.1 Provide overall project warranty in accordance with CCDC 2-2008 and the University of Guelph Supplemental Conditions. Project warranty to be measured from date of Substantial Performance.

.2 Provide individual equipment and systems warranties as called for in the documents.

.3 All work or materials replaced or repaired during the warranty period to be warranted for an additional period equaling term of original guarantee.

.4 Bind all warranties together and submit as a separate volume with the Operations and Maintenance Manual.

1.20 ISSUED FOR CONVENIENCE DRAWINGS AND SPECIFICATIONS

.1 Upon award of the contract either by executing the Agreement or issuance of an order to commence work the Contractor will initiate the works immediately based on the tender drawings and specifications and any addenda issued during the tender period.

.2 The Consultant will undertake to prepare drawings and specification that incorporate addenda and that are to be used as convenience to the Contractor. A time frame of approximately two (2) weeks is anticipated to complete this task, but is not guaranteed.

.3 Adding the addenda information to the drawings and specifications is being done only for convenience of all parties to facilitate construction of the works. The updated drawings and specifications will be referred to as ‘Issued with Addenda Information Added for Convenience”.

.4 The official Contract Documents will remain as those listed in the executed Agreement. Should there be any conflict or discrepancies between the documents update with Addend Information and those listed in the executed Agreement, the latter shall govern in all matters.

.5 There will be no guarantee to the completeness of the documents updated with Addenda Information. The Contractor will be responsible for checking these documents to ensure they account for all Addenda Information and ensuring the works are constructed fully in accordance the executed Agreement.

.6 There will be no change in the Contract Time or Price as a result of information being made available.

1.21 DAILY LOG

.1 Maintain a daily log recording the following data:

- .1 An address directory recording the names, address, and telephone number of representatives of all sub-contractors, trades, and suppliers doing work or suppling material for the project.
- .2 Record various items of work being carried out on each day including the number of workers and amount of work completed.
- .3 Record the maximum and minimum daily weather temperatures both inside and outside of the building. In this regard, the Contractor shall maintain a minimum/maximum thermometer both inside and outside the building for the duration of the project.
- .4 Record ordering dates and receiving dates of material F.O.B. job site to the site.
- .5 Record of any accidents and first aid given.
- .6 Record of any Fire Watch.

1.22 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Building Permit
.5 Reviewed Shop Drawings.
.6 List of Outstanding Shop Drawings.
.7 Change Orders.
.8 Other Modifications to Contract.
.9 Field Test Reports.
.10 Copy of Approved Work Schedule.
.11 Health and Safety Plan and Other Safety Related Documents.
.12 Record drawings.
.13 Other documents as specified.

1.23 DISCOVERED VALUABLES

.1 All articles of value, such as relics, antiquities, or items of historical or scientific interest which may be discovered during demolition, dismantling, or excavation of the Place of the Work are the property of the Owner and shall be immediately delivered into the custody of the Owner.

1.24 IDENTIFICATION

.1 All personnel engaged by the Contractor, directly or indirectly, in work of this Contract shall wear identification badge issued by Owner while on Owner's property.

.2 Badges are the property of the Owner and shall be returned at the earlier of completion of work or upon request.

1.25 AVAILABLE DOCUMENTATION OF EXISTING BUILDING

.1 Refer also to Section 00 31 01 Information Available to Bidders.

.2 Partial drawings of the existing site and building, as applicable, are available for review at the office of the Owner. Neither the Owner nor the Consultant represent or warranty that these drawings are complete or accurate, and these drawings are made available for information only.

.3 The Contractor remains solely liable for site verification of conditions.

1.26 SITE EXAMINATION

.1 Contractor warrants that:

.1 The Contractor has visited and assessed the site prior to submitting a bid, including a review of any existing pertinent drawings and other documents.
.2 The Contractor and the subcontractors are familiar with all matters discussed at any bidder's site briefing.

.3 The Contractor and the subcontractors are familiar with all visible, known, or reasonably inferable site conditions.

.2 No claims for extra payment will be allowed for extra work made necessary or difficulties encountered due to conditions of the site which were visible upon or reasonably inferable from an examination of the site, and the Contract Documents prior to the closing of the bids. Execution of the form of Contract shall be deemed a waiver of all claims for extra payment due to any visible or reasonably inferable condition of the site existing prior to the closing of bids.

.3 The Contractor expressly agrees that conditions above existing suspended acoustic tile ceilings but below the level of plaster or gypsum board at the underside of structure shall be considered exposed conditions for the purposes of making findings under the provisions of this Contract, and that there shall be no claims for extra costs under CCDC 2 - 2008, GC 6 for extra work due to hidden conditions in these areas.

1.27 SAFETY

.1 Refer to CCDC 2 – 2008, GC 9.4.

.2 Contractor’s current health and safety statement and policy shall be filed with University of Guelph - Design, Engineering and Construction prior to start of work, for the Owner’s information only.

.3 The health and safety statement and policy shall include:

.1 Current Material Safety Data Sheets for the products to be used.

.2 Provisions for safety including the use of continuous snow fencing in lieu of barricades or caution tape.

.3 Signage to indicate DANGER ZONES, CLOSURES, DETOURS, ETC.

.4 Set-up locations and procedures.

.5 Material storage and handling.

.6 Fire protection.

.7 Debris handling, storage, disposal and clean-up.

.8 Personnel safety required by the regulations including roof barriers, travel restraint systems and fall arrest systems.

.9 Other measures pertinent to the Work.

.4 Owner’s receipt of such policy is not approval of completeness and accuracy of policy, nor confirmation of compliance with applicable legislation. The Owner shall in no way be held liable for contents or enforcement of the Contractor’s health and safety statement and policy, or the Contractor’s detailed health and safety procedures. Owner’s comments, or lack thereof, shall not be construed as approval of the Contractor’s health and safety practices.

.5 Observe and enforce construction safety measures required by Ontario Building Code, Canadian Construction Safety Code 1977, Occupational Health and Safety Act 1980 and all latest amendments including the Regulations for Construction Projects, , Ontario Regulations 413/90 and all latest amendments, Workers' Compensation Board and municipal statutes and authorities.

.6 In the event of conflict between provisions of above authorities the most stringent provision applies.

.7 The General Contractor shall be designated the "Constructor", as defined by the Occupational Health and Safety Act. All Contractors on the Work site shall consider themselves as "employers" as defined by the Occupational Health and Safety Act.

.8 Do not permit any work in the existing building which may be hazardous or harmful to the occupants of the existing building. All such work must be scheduled for times the existing building will be unoccupied. Such work will include, but not be limited to, hoisting of materials and equipment over normally occupied spaces; the rise of toxic solvents or adhesives, the rise of carbon monoxide or carbon dioxide fumes generated by fuel-fired appliances or equipment, etc.

.9 Contractor is solely liable for construction safety and for compliance with applicable legislation.

.10 Provide a copy of the project registration filed with a Director under the Occupational Health and Safety Act (Ontario) called "Registration Forms of Construction and Employers of Workers".

.11 Where legislation requires a joint health and safety committee, provide minutes of the committee's meetings to the Owner for the Owner's information.

.12 Provide Owner and Consultant with a copy of Ministry of Labour inspection report and any orders arising within 24 hours of receiving report, for Owner's information.

.13 Correct all safety deficiencies immediately.

.14 Accidents

.1 In addition to requirements of applicable legislation, in any emergency requiring the use of a resuscitator, the University Fire Prevention Office shall be notified.

.2 Make arrangements for emergency treatment of accidents.

.3 Provide Owner and Consultant with a copy of WSIB injury report for all reportable accidents and injuries, for information purposes, within 24 hours of incident.

.15 The Contractor will be responsible for verifying through locates the location of any utilities or services that cross or enter the area of the Work. Submit, as a record, documented locations of all utilities and services at the Place of the Work

.16 Indemnify and hold harmless the Owner of any and all liability of every nature and description that may be suffered through bodily injuries, involving deaths of any persons, by reasons of negligence of the contractor, his agents, employees, or his sub-contractors.

1.28 CONSULTANT'S REVIEW

.1 The Contractor shall render all necessary assistance to the Consultant and if required shall take and furnish him with levels, measurements, or anything else required by the Consultant to review the Work. The Contractor shall provide sufficient, safe and proper facilities at all times for the review of the Work by the Consultant.

1.29 EXISTING ASSEMBLIES: FIRE SEPARATION INTEGRITY

.1 Unless otherwise indicated, assume all existing walls, floors and ceilings are fire separations that have a fire resistance rating of at least 1 hour. Assume all existing doors and frames have fire ratings, whether bearing a fire-rating label or not.

.2 Execute work to maintain fire resistance rating integrity and fire separation integrity, including but not limited to reclipping acoustic ceiling tiles, and fire stopping openings to Building Dept. satisfaction, and as otherwise specified or indicated.

1.30 SUBCONTRACTORS

.1 The Owner reserves the right to reject a proposed subcontractor in accordance with the provisions of CCDC 2 - 2008.

.2 Subcontractors named in the Contractor's Bid Form shall be engaged for work of this Contract, and shall not be replaced by the Contractor except with the Owner's prior consent.

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 HAZARDOUS MATERIALS

.1 Comply with applicable legislation regarding asbestos. Should the Contractor encounter asbestos or material that is suspected to contain asbestos during the course of the Work, report same to Owner. Owner will advise means of confirming or denying asbestos is present and will advise regarding process for removal.

.2 Refer also to the following sections:

.1 02 82 12 – Asbestos Abatement – Type 3 Procedures

.2 02 83 12 – Lead – Based Paint Abatement – Intermediate Precautions

.3 02 84 10 – PCB Packaging and Disposal

.4 02 84 11 – Mercury Packaging and Disposal

.5 02 87 00 – Biohazard Remediation

1.2 OTHER CONTRACTS: LEGISLATIVE COMPLIANCE

.1 Be advised that the Owner may let other contracts for other works in the building, and the work of this Contract shall be organized as directed by the Owner to prevent the Owner becoming the constructor for these projects as defined in applicable Occupational Health and Safety legislation.

.2 Comply with directives to achieve objectives in sentence above.

1.3 SPECIAL SUSPENSION REQUIREMENTS FOR SUSPENDED CEILINGS, MECHANICAL AND ELECTRICAL ELEMENTS

.1 Existing suspended acoustic tile ceilings, and suspended mechanical and electrical items, when re-installed, shall be suspended from and anchored to structural loadbearing members. Where existing hangers and supports are of inadequate length, size or strength, provide new suspension systems. The term loadbearing shall be as defined in the Ontario Building Code.

.2 For greater clarity, and in addition to other site conditions that affect support systems, note that suspended items are occasionally supported from suspended ceilings that will be demolished and not be replaced, requiring extended hangers to secure elements to loadbearing structural members. Unless otherwise indicated or accepted by the Consultant, existing suspended ceilings are not considered acceptable support for suspended elements.

1.4 TUNNEL ACCESS PROCEDURES

.1 The Owner restricts access to its service tunnels.

.2 Comply with all provisions of the Owner’s access procedures.

.3 Tunnels contain high pressure steam piping, chilled water piping, high voltage cabling, asbestos, and other hazards. Obtain details of hazards from Owner and take appropriate precautions.

1.5 CONTRACTOR COORDINATION SUBMITTALS

.1 The Contractor shall prepare and submit Interference and co-ordination drawings for the entire area of Work.

.2 These co-ordination drawings shall represent:

.1 The available space including all relevant structural and architectural components.

.2 All purchased / ordered equipment dimensions.

.3 Co-ordinate the installation of all duct and piping, and all other Divisions.

.3 These drawings shall be submitted in both AutoCAD format and electronic PDF, to the Consultant for review.

1.6 TELECOMMUNICATION PRE-CONSTRUCTION SURVEY

.1 The Contractor shall prepare and submit a complete survey, mapping and inventory of existing IT/Communication jacks, devices, cabling, tray and conduit in Wing C prior to demolition scope.

.2 These drawings shall be submitted in both AutoCAD format and electronic PDF, to the Consultant for review.

.3 Prior to completion of The Work, the Contractor must re-instate, through the use of un-spliced existing cabling or new cabling where required, all existing jacks and devices.

1.7 CONSULTANT REVIEW PRIOR TO COMMENCEMENT OF WORK

.1 After completion of abatement, and prior to commencement of demolition of mechanical and electrical services, the Contractor is to allow the Consultant a period of 48 hours to review existing systems on site.

.2 The Contractor must provide the Consultant seven (7) days written notice prior to commencement of the 48 hour period.

.3 The Consultant and the Owner will conduct an onsite review of the existing systems. Any instruction to the Contractor resultant from the review will be issued within ten (10) working days of the review.

1.8 SERVICES TO BE MAINTAINED TO WING A AND OTHER ADJACENT BUILDINGS

.1 Existing services serving Wing A currently run through Wings B and C of Building 046. Wing A must maintain full operation throughout entire duration of construction. Prior to disconnect or removal of any service, contractor to confirm it is not actively serving Wing A or adjacent buildings.

1.9 STANDARD OPERATION PROCEDURES (SOP) FOR ENTRY INTO WING A

.1 Entry into Wing A will be required throughout the construction period to complete The Work.

.2 All persons entering Wing A will require training provided by the Owner.

.3 All persons entering Wing A are required to adhere to the following SOP appended to this specification:

.1 IU.324 – Procedures for Getting Supplies In and Out of the Facility.

.2 IU.326 – Donning and Doffing of Personal Protective Equipment (PPE).

.3 IU.329 – Personal Items in the Containment Zone.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 EXISTING CONDITIONS

.1 Examine areas to be selectively demolished or dismantled, and confirm that their condition is substantially the same as the date on which bids closed, and as indicated in the Contract Documents. Advise the Consultant of any conditions that vary from this.

.2 Be familiar with structural system of the building, and the elements being demolished or dismantled.

.3 Inspect site and verify with Consultant items designated for removal and items to remain. Protect existing items designated to remain and materials designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Consultant and at no cost to Owner.

.4 Demolition of spray or trowel-applied asbestos can be hazardous to health. Should material resembling spray or trowel-applied asbestos be encountered in the course of demolition work stop work and notify the Consultant immediately. Do not proceed until written instructions have been received from the Consultant.

.5 Demolition of applied asbestos materials can be hazardous to health. Should material resembling asbestos be encountered in the course of demolition work, stop work and notify the Consultant immediately. Do not proceed until written instructions have been received from the Consultant.

3.2 EXTENT OF DEMOLITION

.1 Drawings showing extent of selective demolition are intended to be schematic and do not indicate full extent of all selective demolition work. Examine all documents to determine complete scope of selective demolition, removals and re-instatement, repair and make good required to complete Work.

3.3 SAFETY

.1 Comply with all applicable legislation.

3.4 ALTERATIONS, CUTTING AND PROTECTION

.1 Extent:

.1 Perform cutting and removal work so as not to cut or remove more than is necessary and so as not to damage adjacent Work.

.2 Responsibility and Assignment of Trades:

.1 Assign Work of moving, removal, cutting and patching and repair to trades under his/her supervision so as to cause the least damage to each type of Work encountered, and so as to return the building as much as possible to the appearance of new Work.

.2 Assigned only skilled tradesmen to perform patching and finishing Work.

.3 Protection:

.1 Protect remaining finishes, equipment and adjacent Work from damage caused by cutting, moving, removal and patching operations. Protect surfaces to remain as part of the finished Work.

.2 Prevent movement, settlement or damage of existing structures, services, walks, paving, trees, landscaping, adjacent grades and parts of existing building to remain.

.3 Provide bracing, shoring and underpinning as required. Make good damage caused by demolition.

.4 Take precautions to support affected structures and, if safety of building being demolished appears to be endangered, cease operations and notify Consultant.

.5 Prevent debris from blocking surface drainage system, elevators, mechanical and electrical systems which must remain in operation.

.6 Provide bracing, shoring, or needling as required to support portions of existing structure or building to remain, where demolition or dismantling, cutting out, or partial removal of any elements, as specified in other Sections degrades the structural integrity of the structure to a point where it will not support all imposed loads. All bracing, shoring, and needling shall be designed to cause no damage to existing surfaces upon which the bracing, shoring or needling bears.

.7 Shoring, bracing, or needling of structural items shall be designed by a Professional Engineer registered in the Province of Ontario, and drawings shall bear the seal of this Engineer. Submit drawings of shoring, bracing, or needling to the Consultant prior to installing.

.8 Maintain temporary supports in place until permanent structure is able to fully support all imposed loads.

.9 Make good damage to existing elements to remain caused by demolition.

.10 Prevent debris from blocking surface drainage system, and obstructing mechanical and electrical systems which must remain in operation.

.11 Protect salvaged elements from damage. Provide protective coverings and storage.

.4 Debris:

.1 Remove debris promptly from the site each day. Removed material, except that listed or marked by Consultant for retention, becomes the property of the Contractor. Load removed material directly on trucks for removal from site. Dispose of removed material legally. Do not burn on site. Do not allow debris to enter sewers. Refer to Section 01 74 21 – Construction Demolition Waste Management & Disposal.

.2 Do not let piled material endanger structure.

.3 Suppress dust. Prevent occurrence of unsanitary conditions, dirt or debris on the site and neighbouring property.

.4 As directed by Owner, deliver and store and/or dispose of, any salvaged items left over after completion of the Work.

.5 Repair and make good any damage found subsequent to submission of inventory, which in the opinion of the Consultant is the result of the Work, and which is not documented in the inventory submitted to the Owner and Consultant to Owner. Repairs shall return damaged elements to their condition prior to start of work. Where work increases extent of existing damage, repair shall return element to match previous damaged condition. Refer to CCDC 2 – 2008, GC 9.1

.6 Where repairs cannot, in the opinion of the Consultant, be expediently implemented the Consultant shall ascertain the value to be deducted from the amounts due the Contractor in the manner permitted under CCDC 2 – 2008, GC 2.4

3.5 DISMANTLING AND DEMOLITION

.1 Do all work in a manner to prevent endangering safety of building or occupants.

.2 Selectively dismantle parts of the building as required to suit installation of new work and remedial work. Salvage and reinstall elements unless otherwise indicated. Make good disturbed surfaces.

.3 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as work progresses.

.4 Do not disturb adjacent items designated to remain in place.

.5 At end of each day's work, leave work in safe condition so that no part is in danger of toppling or falling. Protect interiors of parts not to be demolished from exterior elements at all times.

.6 Demolish to minimize dusting. Keep materials wetted as directed by Consultant.

.7 Do not throw or allow debris to fall uncontrolled from heights. Use chutes and other controls.

3.6 PATCHING, EXTENDING AND MATCHING

.1 Patching:

.1 In areas where any portion of an existing finished surface is damaged, lifted, stained, peeling, cracked, or otherwise made or found to be imperfect, patch or replace imperfect surfaces with matching material.

.2 Do not incorporate salvaged material in new Work unless otherwise noted or approved by Consultant in writing.

.3 Provide adequate support or substrate for patching and finishing.

.4 For painted and/or coated imperfect surfaces, remove loose material, patch, sand, and repaint or recoat the patched portion to obtain a uniform colour and texture over the entire surface.

.5 Repaint or recoat entire surface where surrounding and/or adjacent surfaces cannot be matched.

.2 Quality:

.1 In the sections of the Specifications which follow these general requirements, no concerted attempt has been made to describe each of the various existing products that must be used to patch, match, extend or replace existing Work. Obtain all such products in time to complete the Work on Schedule. Such products shall be provided in quality, which is in no way inferior to the existing products.

.2 The quality of the products that exist in the building, as apparent during pre-bid site visits, shall serve as the minimum specification requirement for strength, appearance and other characteristics.

.3 Transitions:

.1 Where new Work abuts or finishes flush with existing Work, make the transition as smooth and workmanlike as possible. Perform patching Work to match existing adjacent Work in texture and appearance so as to make the patch or transition invisible to the eye at a distance of one (1) metre.

.2 In cases of extreme change of level such as 50mm or more, obtain instructions from Consultant as to method of making transition. Provide stepping, bulkheading, encasement, ramping, sloping or change of transition line, or any combination of these as directed in each case by Consultant.

.4 Matching:

.1 Restore existing Work that is damaged during construction to a condition equal to its condition at the time of the start of such Work.

.5 Overall requirement that the Work be complete:

.1 Where a product type of construction occurs in the existing building, and is not specified as a part of the new Work, provide such products or types of construction as needed to patch, extend or match the existing Work.

.2 These Specifications are not intended to describe existing products or standards of execution, nor will they enumerate products, which are not part of the new construction. The existing product is its own Specification.

.3 The presence of any product or type of construction in old Work shall cause its patching, extending or matching to be performed as necessary to make new Work complete and consistent, to identical standards of quality.

3.7 REPAIR

.1 Replace work damaged in the course of alterations, except at areas approved by Consultant in writing.

.2 Where full removal of extensive amounts Work would be required to replace damaged portions, then filling, straightening and similar repair techniques, followed by full painting or other finishing, will be permitted.

.3 If the repaired Work is not brought up to the standard for new Work, Consultant will direct that it be removed and replaced with new Work at no additional cost to the Owner.

3.8 CLEANING

.1 Clean in accordance with Section 01 74 11 – Cleaning.

.2 Each Successive Trade:

.1 Clean Work area and make Work surfaces ready for the Work of the succeeding trades as each trade finishes its Work on each part of the alterations Work and related new Work.

.2 Clean or remedied immediately spillage, overspray, collections of dust or debris, damage to Owner-occupied spaces made by any responsible trade.

.3 Each Area as it is Completed:

.1 Clean up all surfaces, remove equipment, salvage and debris and return in condition suitable for use by the Owner as quickly as possible as soon as Work in each area of the alterations is complete.

.2 Review final cleaning with Consultant prior to final acceptance.

.3 Reinstate areas and existing works outside areas of demolition to conditions that existed prior to commencement of work.

END OF SECTION

PART 1 - GENERAL

1.1 WORKING DAYS AND HOURS

.1 The Contractor must observe all local by-laws with respect to working hours and noise.

.2 Working day for construction shall be defined as Monday to Friday, excluding Statutory Holidays.

.3 Weekend and night work beyond 6:00 p.m. will not normally be permitted, unless indicated or approved otherwise.

.4 When required to meet owners requirements and as required to complete the Work on Schedule, the Contractor will perform work after normal work hours.

.5 The Contractor shall submit a written request to the Consultant and Owner a minimum of five (5) working days in advance of any occasion on which the Contractor proposes to work outside of normal working days and hours. Written authorization shall be received from the Consultant or Owner prior to Contractor proceeding to work outside of normal working days and hours.

.6 Arrange 48 hours in advance with Owner's representative to obtain keys and adjust security alarms for overtime work.

.7 The Contractor is responsible for ensuring doors and windows are secured prior to leaving the building.

.8 Work carried out during Owner's standard operating hours shall not adversely affect the Owner's ongoing use and occupancy of the existing facilities or site, otherwise work shall be carried out after hours, on weekends, and holidays. Schedule work with the Owner to minimize disruption to Owner's operations. The Contract Price includes all necessary overtime premium costs and cost to work statutory holidays, to ensure orderly progression of work and continuous operation of Owner's facilities.

.9 Execute construction work starting February 7, 2019 (subject to receipt of regulatory approvals) achieve Completion of Contract as defined in applicable lien legislation not later than thirty (30) days following Substantial Performance. Comply with the following milestones:

- .1 Submit shop drawings within 120 days of award.
- .2 Substantial Performance no later than April 30, 2020.
- .3 Occupancy no later than April 30, 2020.

.10 Confine vehicles to paved areas of the work site.

.11 Do not block fire access routes. Vehicles found parking in fire routes will be towed at vehicle owner's expense.

1.2 INTERRUPTION OF SERVICES TO WING A AND ADJACENT CONNECTED BUILDINGS

.1 Wing A of Building 046 and adjacent Buildings 146 and 049 will remain operational throughout the duration of the Work. Adjacent building's are 24-hour operations facilities, with restricted flexibility for shut-downs.

- .1 Contractor shall coordinate with the Owner to meet the shutdown requirements of the adjacent buildings.
- .2 The Work shall be performed in as many phases as required to meet these requirements.
- .3 The Work shall be performed after hours as required to meet these requirements.

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 FIRE PROTECTION AND FIRE SAFETY

.1 Provide temporary fire protection throughout the period of construction.

.2 Particular attention shall be paid to the elimination of fire hazards.

.3 Take all necessary precautions to prevent fires, and to prevent damage to buildings, materials, personnel, equipment, furnishings and chattels.

.4 Provide fire extinguishers as required by the stricter of the Occupational Health and Safety Act and regulations made thereunder, and the Ontario Fire Code.

.5 Comply with the Owner's directives regarding fire safety.

.6 Hot Work Permits

.1 A Contractor's Hot Work Permit must be submitted in writing to the Owner's Construction Coordinator for any and all work involving bitumen kettles, open flame, cutting, grinding, soldering or welding or any hot surface applications in occupied facilities. For clarification, all existing buildings are considered occupied facilities. Contractor's Hot Work Permit to contain, at a minimum, the following information:

.1 Company performing hot work.

.2 Location of hot work.

.3 Nature of hot work.

.4 Duration of hot work – including the time frame for fire watches.

.5 Name and contact information of person performing the work and of the person supervising hot work and of the person(s) conducting the fire watches.

.6 Protection method against false fire alarms and/or sprinkler activation including requests for any shutdown of any fire or life safety alarm system or fire suppression system, in part or in whole.

.7 Precautions being taken.

.2 Submit permits a minimum of 48 hours in advance of commencing hot work.

.3 Do not perform hot work without the Owner's written approval or sign-off on the Contractor's proposed Hot Work Permit.

.4 The approved hot work permit must be clearly displayed on site at the location of the hot work.

.5 Follow all applicable legislation and standards including but not limited to Ontario Fire Code O. Reg. 256/14 which amends O. Reg 213/07 and OHSA O. Reg 851 and CSA Standard W117.2-94 when performing hot work.

.7 Electric & Gas Welding & Cutting Operations

.1 Conduct all work involving electric and gas welding and cutting and grinding operations in accordance with the safety standards specified in the latest edition of CSA W117.

.8 Flammable Liquids

.1 Flammable liquids are to be kept to a minimum and shall be stored in approved safety containers. Obtain Owner's prior approval for storing flammable and combustible liquids in occupied buildings.

.9 Fire

.1 In the event of a fire use the nearest pull station and/or call Owner's emergency number 52000 or 9-911. If the fire is extinguished without using City of Guelph Fire Department, immediately notify Owner's Security Services at extension 52000.

.10 Emergency Telephone Numbers: be advised of the following emergency services telephone numbers:

.1 Guelph Ambulance, Fire and Police Service: 9-911

.2 Guelph General Hospital: 519-822-5350

.3 U. of G. Fire Division: 519-824-4120 (extension 52071 for administration, **extension 52000 for emergency**)

.4 U. of G. Police Division: 519-824-4120 (extension 52245 for administration, **extension 52000 for emergency**)

1.2 FIRE WATCHES

.1 For any fire watch required for any hot work permit and the partial or whole shut-down of any fire or life safety alarm system or fire suppression system, conform to the requirements of Fire Watch Duties and Log Sheet, as amended to suit the requirements of this Project, as posted on PR website at https://www.pr.uoguelph.ca/projects-planning/contractor-and-consultant-information

.2 Appoint personnel that are experienced and familiar with fire or life safety alarm system or fire suppression systems, have the knowledge and experience and are trained to the requirements of the Fire Watch Duties to conduct any fire watch.

1.3 FALSE FIRE ALARMS

.1 Reimburse the Owner, by means of a deduction from any amounts due the Contractor by the Owner, for all costs related to false alarms of the fire alarm system or the security alarm system attributable to acts or omissions of the Contractor. Costs shall include charges levied by local authorities, charges levied by the Owner's alarm monitoring service, labour and expense costs for Owner's staff to attend at site in response to a false alarm, Consultant's cost related to any work for a false alarm, all to a minimum of $500 per false alarm incident.

1.4 FIRE ALARM ACTIVATION

.1 A fire alarm system that has been activated by other than testing shall not be reset until the cause of the alarm has been investigated and until authorized by the Owner's Fire Prevention Office and City of Guelph Fire Department.

1.5 FIRE PROTECTION EQUIPMENT IMPAIRMENT

.1 Take all precautions when fire protection equipment (nearby hydrants, sprinklers, chemical fire suppression systems, standpipes, fire extinguishers, related water service, etc.) is taken out of service, including but not limited to restricting all hot work operations and hazardous processes.

.2 Take measures to minimize the shut down or impairment of use of fire protection. Plan operations required to reduce system impairment time to the least amount possible.

.3 Advise Owner of complete or partial impairment of fire protection system, including time required, areas affected, etc.

.4 Provide temporary protection such as extra extinguishers during all periods of fire protection equipment impairment.

.5 If fire protection system is restorable, either in whole or in part, assign personnel during the period of impairment to restore the system promptly in the event of a fire.

.6 During periods when fire protection service is interrupted, establish and maintain a fire watch. including but not limited to the following:

.1 Patrol all halls, corridors, stairwells and high-risk areas affected.

.2 Fire patrol shall have immediate access to a telephone and call University of Guelph Campus Community Police Dispatch at 519-840-5000 if they see a fire.

.3 Report all other problems encountered.

.2 Remain on patrol until fire and life safety system is restored to service

1.6 FIRE ROUTES

.1 Parking in posted fire routes will not be permitted. Vehicles found parked in a posted fire route will be towed without warning at vehicle owners' expense.

.2 Conform to approved plans related to any construction in or along posted fire routes.

.3 Where deliveries or pickups of large equipment are expected or the placement of large construction is required in or along a posted fire route, planning prior to any placement is required and is to include dates, duration of time, provision for alternative fire route access and acknowledgement that the delivery person or driver will be present at all times. Approval via the Owner's construction personnel is required.

1.7 FIRE SAFETY PLANS

.1 Conform to approved plans related to any construction that will affect existing fire alarm or life safety systems, fire suppression systems, existing means of egress and existing fire exits.

.2 When logistics or phasing of the work will affect the systems and exits noted above in 1.7.1 and will alter the approved plans, alternative measures related to maintaining fire alarm or life safety systems, fire suppression systems, existing means of egress and existing fire exits are to be planned with all parties clearly set down in writing which is to include requirements for posting and construction requirements, clearly delineated on floor plans and submitted for approval.

.3 Alternative measures must include signage, fire watches for the affected areas, procedures for notification to all occupants and users, construction personnel, Physical Resources, the University's Fire Prevention Office and City of Guelph Fire Department.

.4 Alternative measures related to fire alarm and life safety system shall include modifications and temporary installations related to maintaining any fire alarm and life safety system including elements such as detectors, early warning lights and bells and fire alarm pull stations.

.5 Approved alternative measures are to be posted in the building at the main entrance to the building.

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 OWNER'S USE OF PREMISES

.1 Take all measures necessary and as directed by the Owner to minimize disruption of facilities and their use by the Owner. Facilities generally include buildings, roads, parking lots, landscaped areas and all spaces normally occupied by the Owner and shall include any existing utilities and services.

.2 Take all measures necessary and as directed by the Owner to minimize disruption of adjacent facilities and areas of the Owner's property, and use by the Owner.

.3 Be advised that Owner's facilities and chattels include numerous scientific, research and other valuable efforts and goods, and the Owner's facilities contain irreplaceable contents. Unplanned loss of utilities may cause irreparable loss.

.4 Work carried out during Owner's standard operating hours shall not adversely affect the Owner's ongoing use and occupancy of the building, the site or adjacent buildings or facilities, otherwise work shall be carried out after regular working hours, on weekends and statutory holidays. Schedule work with the Owner to minimize disruption to Owner's operations. Contract Price includes all necessary overtime premium costs and cost to work statutory holidays, to ensure orderly progression of work and continuous operation of the Owner's facilities.

1.2 SYSTEM SHUTDOWN REQUIREMENTS: OWNER'S SYSTEMS

.1 Arrangements for shut down of Owner's utility and building systems (interruption of service) will be mutually arranged between the Owner and the Contractor. No shutdown to occur without the prior written consent of the Owner. Provide minimum five (5) full working days advance notice of any required shutdown of an Owner's system, either in whole or in part.

.2 Where length of service shutdown will exceed 12 hours, provide minimum seven (7) full working days advance notice of shutdown.

.3 Schedule service shutdowns to occur outside Owner's regular operating hours, unless otherwise agreed.

.4 Provide detailed schedule of operations for shutdown.

.5 Obtain Owner's acceptance of proposed shutdown.

.6 Unless otherwise agreed or as required by Contract Time, schedule steam system shutdowns to occur during warm weather where construction extends into periods of normally warm (summer) weather.

.7 Unless otherwise agreed or as required by Contract Time, schedule chilled water system shutdowns to occur during cool or cold weather where construction extends into periods of normally cool or cold weather.

.8 Unless otherwise agreed or as required by Contract Time, where construction extends into Owner's summer semester, schedule all other shutdowns to occur during this period.

.9 Take all measures to minimize period of shutdown/interruption of service.

.10 Systems that may require shutdown include, but are not limited to:

.1 Normal power, including power distribution, lighting, etc.
.2 Essential (emergency) power.
.3 Heating, cooling or ventilating systems.
.4 Domestic water.
.5 Chilled water.
.6 Sanitary sewer or drains.
.7 Storm sewer or storm drains.
.8 Steam.
.9 Compressed air.
.10 Natural gas.
.11 De-ionized water.
.12 Fire alarm or life safety system.
.13 Sprinkler system or fire suppression system.
.14 Hose and standpipe system.
.15 Medical and scientific gases.
.16 Telephone, data or other telecommunications systems.
.17 Roads, parking lots and walkways.
.18 Areas of buildings.

.11 Subject to 1.2.12 below, the Contractor is responsible for providing qualified personnel to implement shutdown and re-activation of services. The Owner reserves the right to attend and monitor the shutdown and re-activation to assess effects on remainder of property and physical plant.

.12 The Owner reserves the right to shutdown and reactivate Owner's utilities and/or services under the Contractor's direction, where the utility and/or service affects buildings or parts thereof outside the Contractor's work area and in the Owner's opinion there is a significant concern of adverse impacts outside the work area arising from the shutdown and re-activation. Where Owner elects to implement shutdown and re-activation, Contractor shall have qualified personnel attend and direct the shutdown and re-activation process.

1.3 FIRE ALARM SHUT DOWN PROCEDURE

.1 Arrangements for shutdown (interruption of service) of fire alarm system will be mutually arranged between the Owner and the Contractor. No shutdown to occur without the prior consent of the Owner. Provide minimum five (5) full working days advance notice of any required shutdown of Owner's system, either in whole or in part. Where length of service shutdown will exceed 12 hours, provide minimum 7 full working days advance notice of shutdown.

.2 Schedule service shutdowns to occur outside Owner's regular operating hours, unless otherwise agreed.

.3 Provide detailed schedule of operations for shutdown.

.4 Obtain Owner's acceptance of proposed shutdown.

.5 A Certified Fire Alarm Technician, per the Ontario Fire Code section 1, subsection 1, shall supervise additions, shutdowns and changes to the fire alarm system, including but not limited to changes in device location, and removal and re-installation of devices.

.6 Provide proof of staff certification upon request.

.7 Minimize periods of interruption of existing fire alarm system (shut down).

.8 Wherever possible, shut down only the devices or the zone needing work and schedule this down time in unoccupied hours to the greatest extent possible.

.9 Place signs at all de-activated pull stations indicating pull station is out of service. Remove signs immediately once pull stations are re-activated.

.10 During periods of audibility and visibility testing, place signs at all building entries indicating such testing is occurring, and indicating hours of testing. Remove signs upon completion of testing.

.11 Review the proposed period when the system will be disabled, in whole or in part, with Owner prior to any partial or complete system shut down, and obtain Owner's prior approval for shut down.

.12 The Owner will advise affected Owner's personnel normally resident in affected building of fire alarm system shut down. This will include instructions to call extension 52000 or to call 9-911 if a fire is observed.

.13 Establish and maintain a fire watch and patrol which conforms to the requirements of Fire Watch Duties and Log Sheet as posted on PR website at https://www.pr.uoguelph.ca/projects-planning/consultant-and-contractor-lists-and-information for all periods when the fire alarm is shut down, in whole or in part, and such fire watch shall include but is not limited to the following:

- .1 Patrol all halls and high-risk areas affected.
- .2 Fire patrol shall have immediate access to a telephone and call University of Guelph Campus Community Police Dispatch at 519-840-5000 if they see a fire.
- .3 Report all other problems encountered.
- .4 Remain on patrol until system is restored to service.
- .5 Where alarms (bells, etc.) are temporarily disabled, provide staff to monitor panel. Staff shall be knowledgeable with panel operation and be able and prepared to either immediately return panel to service, or be capable of raising fire alarm in the building through other means such as manual activation of bells, and through use of phones to alert Fire Dept. Such panel monitoring staff shall be equipped with two-way radios connected to other staff in the building who can advise the panel monitor to sound the alarm.

.14 Provide full details to Owner's fire alarm monitoring service as requested including contact name, company name, and length of time service is interrupted.

.15 An approved inspection firm shall verify all new and replaced fire alarm devices, in accordance with applicable regulations. Submit Certificate of Verification prior to applying for Substantial Performance, or Completion of Contract as defined in applicable lien legislation where no application is made for Substantial Performance.

1.4 SYSTEM SHUTDOWN REQUIREMENTS: MUNICIPAL UTILITY SYSTEM

.1 Provide Owner with minimum five (5) full working days advance notice of any required shutdown of municipal utility, either in whole or in part.

.2 Where length of service shutdown will exceed 12 hours, provide not less than seven (7) full working days advance notice of shutdown.

.3 In general, schedule service shutdowns to occur outside Owner's regular operating hours.

.4 Provide detailed written schedule of operations for shutdown.

.5 Obtain Owner's written acceptance of proposed shutdown.

.6 Take all measures to minimize period of shutdown/interruption of service.

1.5 SAFETY

.1 Provide all necessary safety measures resulting from or required by shutdown of utility or service.

.2 Advise Owner of any safety precautions required of Owner during system shutdown. Such measures may include, with Owner's prior consent, rescheduling uses, cancellation of uses, etc.

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 Construction Documents Committee (CCDC):
  .1 CCDC 2- 2008, Stipulated Price Contract.

.2 Project Supplementary Conditions

1.2 CASH ALLOWANCES

.1 Refer to CCDC 2, GC 4.1.

.2 Include in Contract Price specified cash allowances.

.3 Expenditures under cash allowances shall be authorized by the Owner through the Consultant.

.4 Cash allowances, unless otherwise specified, cover net cost to the Contractor of services, products, construction machinery and equipment, freight, handling, unloading, storage, and other authorized expenses incurred in performing Work.

.5 Where costs under cash allowances exceed the total amount of the cash allowances indicated by less than 10% of the aggregate stated values, the Contractor will be compensated for any excess incurred and substantiated, without any allowances for overhead and profit.

.6 Where costs under cash allowances exceed the total amount of the cash allowances indicated by more than 10% of the aggregate stated values, the Contractor will be compensated for any excess incurred and substantiated plus an allowance for overhead and profit as set out in the Contract Documents.

.7 Contract Price, not cash allowance, includes Contractor's overhead and profit in connection with such cash allowance.

.8 Include progress payments on accounts of work authorized under cash allowances in Consultant's monthly certificate for payment.

.9 Prepare schedule jointly with Consultant to show when items called for under cash allowances must be authorized by Consultant for ordering purposes so that progress of Work will not be delayed.

.10 Unexpended total balance of allowances shall be deducted from the Contract Price by Change Order.

.11 Contractor to provide a minimum of three (3) quotations for all Work to be performed under the Allowances unless otherwise noted.

.12 Unused balances of any allowance, at the sole discretion of the Owner, can be transferred to the balance of any other allowance.

.13 Include in the Contract for the following allowances for Work specified:

  .1 IT/Communications Work in Wing C

    .1 Allowance:$30,000

.2 Scope of Work:

.1 Contractor to provide survey, mapping and inventory of existing IT/Communication jacks, devices, cabling, tray and conduit in Wing C prior to demolition scope.

.2 Supply and installation of IT/Communication jacks, devices, cabling, tray and conduit in Wing C required to re-instate system in accordance with initial survey, mapping and inventory.

.3 Prior to completion of The Work, the Contractor must re-instate, through the use of un-spliced existing cabling or new cabling where required, all existing jacks and devices.

.2 Material Testing and Inspection Services

.1 Allowance: $25,000.00

.2 Scope of Work:

.1 Material testing services for soils, compaction, concrete, and asphalt pavement to be completed by Contractor-appointed firm(s).

.2 Third party inspection of structural steel and metal fabrications to be completed by Contractor-appointed firm(s).

.3 Testing and inspections required for abatement of hazardous materials. Coordinate with the following Sections:

.1 02 82 12 – Asbestos Abatement – Type 3 Procedures

.2 02 83 10 – Lead-based paint abatement – Intermediate Precautions

.3 02 84 10 – PBC Packaging and Disposal

.4 02 84 11 – Mercury Packaging and Disposal

.5 02 87 00 – Biohazard Remediation

.4 Existing foundations underpinning inspections during construction.

.5 Contractor is responsible for engaging and coordinating all third-party material testing and inspections services.

.6 Allowance covers material testing and inspections firms' fees only.

.7 All other inspections, including those to be carried out by a Manufacturer's representative, are to be paid for separately by the Contractor, unless noted otherwise.

.3 Landscaping

.1 Allowance: $5,000.00

.2 Scope of Work:

.1 Site landscaping as directed on site by Consultant including but not limited to clearing, grubbing, grading, top soil, hydro seeding and plantings.

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 GENERAL

.1 Prices included in the Agreement shall be complete for the applicable work, and shall constitute the full consideration, payment, compensation and remuneration to the Contractor for all such. For greater certainty, but without limitation to the foregoing, such prices will constitute full and complete consideration, payment, compensation and remuneration to the Contractor for the following (subject to adjustment only as specified in the Contract Documents):

.1 Expenditures for wages and for salaries of workmen, engineers, superintendents, draftsmen, foremen, timekeepers, accountants, expeditors, clerks, watchmen and other such personnel as may be approved, employed directly under the Contractor and while engaged on the applicable work at the site and expenditures for travelling and board allowances of such employees when required by location of the applicable work or when covered by trade agreements and when approved; provided, however, that nothing shall be included for wages or salary of the Contractor's firm if the Contractor is a firm or the salary of any officer of the Corporation if the Contractor is a corporation, unless otherwise agreed to in writing.

.2 Expenditures for material used in or required in connection with the construction of the applicable work including material tests and mix designs required by the laws or ordinances of any authority having jurisdiction and not included under Subparagraph .9 (or paid from a cash allowance in Section 01 21 00 – Allowances).

.3 Expenditures for preparation, inspection, delivery, installation and removal of materials, plant, tools, and supplies.

.4 Temporary facilities as required for the applicable work.

.5 Travelling expenses properly incurred by the Contractor in connection with the inspection and supervision of the applicable work in connection with the inspection of materials prepared or in course of preparation for the applicable work and in expediting their delivery.

.6 Rentals of all equipment whether rented from the Contractor or others, in accordance with approved rental agreements including any approved applicable insurance premiums thereon and expenditures for transportation to and from the site of such equipment, costs of loading and unloading, cost of installation, dismantling and removal thereof and repairs of replacements during its use on the applicable work, exclusive of any repairs which may be necessary because of defects in the equipment when brought to the work or appearing within thirty (30) days thereafter.

.7 The cost of all expendable materials, supplies, light, power, heat, water and tools (other than tools customarily provided by tradesmen) less the salvage value thereof at the completion of the applicable work.

.8 Assessments under the Workers' Compensation Act, the Unemployment Insurance Act, Canada Pension Act, statutes providing for government hospitalization, vacations with pay or any similar statutes; or payments on account of usual vacations made by the Contractor to his employees engaged on the applicable work at the site, to the extent to which such assessments or payments for vacations with pay relate to the work covered by the specified price; and all sales taxes or other taxes where applicable.

.9 The amounts of all Subcontracts related to the specified price.

.10 Premiums on all insurance policies called for under this Contract.

.11 Royalties for the use of any patented invention on the applicable work.

.12 Fees for licences and permits in connection with the applicable work.

.13 Duties/taxes imposed on applicable work.

.14 Such other expenditures in connection with the applicable work as may be approved.

.15 Provided always that except with the consent of the Owner, the above items of cost shall be at rates comparable with those prevailing in the locality of the work.

1.2 UNIT PRICES

.1 Unit prices included in the Agreement, and which were submitted as a part of the bid, shall be based on units of measurement described in the bidding documents to include for labour, materials, preparation of shop drawings, design fees, delivery, handling, disposal of surplus material, applicable taxes, excluding Value Added Tax, and any other direct or indirect expenditures, of such work measured complete in place, and as further described in other Sections of the Specifications.

.2 The above noted list together with the list provided in paragraph 6.3.7 of the Agreement (CCDC 2-2008) shall be used to determine the itemized accounting for any quotation or a Change Directive.

.3 Unit prices for specified units of measurements, shall apply to any and all work which can be measured in the said units regardless of the variations in productivity and job conditions, or the time when instructions to carry out that work will be issued.

.4 Unit prices shall apply only to the net change in quantities for each unit of work in each change to the work, provided that the instructions to change have been given before the start of applicable work and/or ordering of equipment. The Contract Price shall be adjusted by multiplying the unit price figure in the Contractor's Bid Form by the quantity used for measurement for payment. Consultant's determination of quantity used for measurement for payment shall be final.

.5 After the applicable work has started, the unit prices shall cover the new work without any credit for the work already completed. Work completed and to be removed to accommodate new work shall be paid for as described for Changes in the Work in the General Conditions on a lump sum or by cost and fixed or percentage fee basis.

Changes to the quantities of the work executed under Unit Prices, which result in Change to the Contract value, shall not be subject to the allowable overhead and profit mark-ups specified elsewhere for changes.

.6 Unit Prices for "CREDIT" shall be not less than 80% of Unit Prices for "EXTRA".

.7 Value Added Taxes will be calculated on the net change.

.8 The unit prices required are:

.1 Hourly Rates for: Construction Manager, Project Coordinator, Project Superintendent, Site Labour (General Contractor's Own Forces), Site Labour (Mechanical Sub-Contractor), Site Labour (Electrical Sub-contractor), Site Supervisor (Abatement Sub-contractor), Site Labour (Abatement Sub-contractor).

.2 After-hours Rates for: Construction Manager, Project Coordinator, Project Superintendent, Site Labour (General Contractor's Own Forces), Site Labour (Mechanical Sub-Contractor), Site Labour (Electrical Sub-contractor), Site Supervisor (Abatement Sub-contractor), Site Labour (Abatement Sub-contractor).

.3 Unit Rates for the following abatement conditions:
  .1 Price per square metre for the removal and disposal of asbestos containing floor tile and mastic.
  .2 Price per fitting price for the removal and disposal of an additional asbestos containing parged pipe fitting.
  .3 Price per ballast price for the removal and disposal of an additional PCB ballast.
  .4 Price per tube price for the removal and disposal of an additional mercury containing light tube.
  .5 Price per square metre for the removal and disposal of asbestos containing spray applied fireproofing.

.4 Unit rate per square metre to repair and/or repoint existing brick.

1.3 SEPARATE PRICES

.1 Separate prices, requested in the Tender Documents, shall not be included in the Stipulated Price consistent with their acceptance or rejection by the Owner. They will be carried in the Agreement as an amount separated from the Contract Amount or in a separate agreement.

.2 The required separate prices are as follows:

  .1 Separate Price No. 1
    .1 Provide separate price for the testing, abatement, demolition and removal of all piping and equipment associated with the receiving/holding tanks in the Sewage Room.

  .2 Separate Price No. 2
    .1 Provide separate price for the supply and installation of millwork MW123b.

  .3 Separate Price No. 3
    .1 Provide separate price for the replacement of existing panels LP-U, LP-R, LP-T, LP-P as indicated on electrical drawings.

1.4 PROJECT RECORD DOCUMENTS

.1 Contractor’s as-built drawings shall show the quantity/extent of work executed under Prices.

PART 2 - PRODUCTS

.1 Refer to other Sections for requirements related to each material.

PART 3 - EXECUTION

.1 Refer to other Sections for requirements related to each material.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Construction Documents Committee (CCDC):
  .1 CCDC 2-2008, Stipulated Price Contract.

1.2 GENERAL

.1 All submissions under this section shall bear the project name, Owner's name and Project No., Consultant's Project No., and date.

.2 Where a Certificate of Clearance from the Workplace Safety and Insurance Board (WSIB) is requested, the Certificate submitted shall clearly show that the Contractor is in good standing with the WSIB.

.3 WSIB "independent operator" status for any Contractor is not acceptable.

.4 Contractor is solely responsible for ensuring that each of the Contractor's personnel, including but not limited to employees, directors officers, principals and executives of the Contractor, are covered by WSIB insurance.

.5 Contractor warrants and certifies to the Owner that each of the Contractor's personnel, including but not limited to employees, directors, officers, principals and executives of the Contractor, are covered by WSIB insurance.

.6 Contractor shall defend, indemnify, and hold harmless the Owner against any and all claims made due to failure to pay WSIB premiums or provide WSIB coverage for any person engaged by the Contractor, directly or indirectly, for Work of this Contract.

.7 Obtain a valid WSIB Certificate of Clearance from each Subcontractor or Supplier prior to releasing payment to the subcontractor or supplier. Indemnify and hold harmless the Owner against any failure of the Contractor to obtain valid Subcontractor's or Supplier's WSIB Certificate of Clearance prior to releasing payment to respective Subcontractor or Supplier.

.8 All applications for payment after first shall be accompanied by CCDC Statutory Declaration 9A, duly executed. CCDC Statutory Declaration 9A is acceptable only where it bears an original CCDC Statutory Declaration 9A copyright seal.

.9 All applications for payment must include an update project schedule, in accordance with 01 32 16 – Construction Progress Schedule – Bar Gantt Chart.

1.3 APPLICATIONS FOR PROGRESS PAYMENT

.1 Refer to CCDC 2, GC 5.2., and University of Guelph Supplemental Conditions.

1.4 SCHEDULE OF PROJECTED MONTHLY PROGRESS DRAWS

.1 A minimum of ten (10) business days prior to submission of the first application for payment, provide schedule of projected monthly progress draw values, supported by evidence as Consultant may reasonably direct.

1.5 SCHEDULE OF VALUES

.1 Refer to CCDC 2, GC 5.2 and University of Guelph Supplemental Conditions.

.2 A minimum of ten (10) working days prior to submission of the first application for payment provide schedule of values supported by evidence as Consultant may reasonably direct and when accepted by Consultant, be used as basis for applications for payment.

.3 Include statement based on schedule of values with each application for payment.

.4 Include in schedule of values a separate line item for bonds, insurances, and temporary facilities, and controls.

.5 Costs of temporary facilities and utilities shall be amortized over the duration of the Work. Claims for 'mobilization', 'bidding costs' or similar lump sums at or before start of work are not acceptable.

.6 Include in schedule of values a separate line item for each of the following items:

.1 Monthly update of Record Drawings,

.2 Submission of Operation and Maintenance Manuals, and Warranty Manuals, otherwise referred to as Closeout Submittals. Refer to Section 01 78 00 – Closeout Submittals.

.3 The value for each closeout submittal item included on the schedule of values shall be proportionate to the overall project value and shall be subject to review and acceptance by the Owner and Consultant.

.4 Submittals.

.5 Value Added Tax.

.6 Final cleaning – by a professional cleaning service.

.7 Commissioning, valued at 1% of the overall contract value. The Commissioning Authority (CxA) will review the construction draws from a commissioning perspective and provide recommendations to the Prime Consultant and the University. The chart below will be utilized by the CxA to evaluate the construction draws.

Carry 1% of overall contract value for cx'ing paperwork only. Validation of the cx'ing process is tied to progress draws and in particular Schedule of Values using the following chart. For example, fans cannot invoice more than 75%, if the pre-functional verifications are not complete, or more than 95% if the equipment start-up checklists & execution and functional performance testing is not complete.

	Schedule of Values % Complete					
	10%	**25%**	**75%**	**95%**	**97%**	**99%**
Cx'ing Tasks to be Completed by these Milestone Percentages	* Cx'ing Kick Off Meeting Held	* Shop Drawing Submittal Review Process Complete	* Pre-functional Verifications Complete	* Equipment Start-up Checklists & Execution Complete	* As-built Drawings and O&M Manuals Submitted	* All Items on the Cx'ing Issues Log have been Addressed
	* Contractors Name Their Cx Agent (Designated Representative)	* Project Schedule has Incorporated Cx'ing Tasks		* Functional Performance Testing Complete	* Owner Training Complete	

1.6 PROGRESS PAYMENT

.1 Refer to CCDC 2, GC 5.3, and University of Guelph Supplemental Conditions.

.2 Submit monthly progress invoices. Invoices shall be dated last day of each month. Submit final invoice within 45 days of Completion of Contract as defined in applicable lien legislation. Failure to submit invoices within schedule voids Owner's obligations to pay invoices.

.3 Progress Applications:

.1 Progress applications for payments shall indicate the value complete of each item in the Schedule of Values, percentage complete to date of application, value previously certified for payment by the Consultant, and value of work remaining.

.2 Include a summary of changes with application for payment, showing values complete.

.3 Refer to Section 01 29 03 for sample progress invoice format.

.4 All values shall be exclusive of Value Added Tax, except that Value Added Tax shall be applied to the total amount claimed, and the value of the Value Added Tax indicated on the application.

.5 Include a summary of changes with application for payment, showing values complete.

.6 No payment will be made for products ordered or manufactured, but not yet delivered to the Place of Work.

.7 Include evidence to support claims for products delivered to the place of the work, but not yet incorporated in the Work, as the Consultant may require to establish the value and delivery of the products.

.8 Products delivered to the place of work are the property of the Owner and shall not be removed without the Owner's consent, except where rejected as defective products or removed as legitimate debris. Any products delivered to the place of the work but not yet incorporated in the Work shall remain at the risk of the Contractor not withstanding that title has passed to the Owner.

.9 In addition to other requirements, progress applications shall indicate the cost of the following items as separate items:

.1 Bonds

.2 Insurances

.3 Temporary facilities and controls

.4 Contract closeout, record and as-built drawings, maintenance and operating manuals.

.5 Value Added Tax

1.7 RECORD DRAWINGS

.1 Maintain project "As-Constructed" record drawings. Refer to Section 01 78 00 – Closeout Submittals. Record drawings are to be maintained current through course of construction and will be reviewed at each application for payment.

1.8 SUBSTANTIAL PERFORMANCE OF WORK

.1 Refer to CCDC 2, GC 5.4, University of Guelph Supplemental Conditions, and Section 01 78 00 – Closeout Submittals.

.2 Applications for a Certificate of Substantial Performance, release of holdback, and Statement of Completion shall be completed in accordance with OAA/OGCA Document 100 Takeover Procedures (latest edition). In Document 100, substitute "Consultant" for "Architect", and "review" for inspection where it appears in relation to the Consultant's assessment of the Work.

.3 The Contractor shall make written application to the Consultant or the Payment Certifier for the certificate.

.4 The application shall also include:

.1 Statements that the contract is substantially performed.

.2 A statement that all required submissions have been made.

.3 Statements of completion with a cost value for deficiencies, outstanding documentation, work that cannot be performed and which is beyond the Contractor's control, and any work which is to be completed at a later date as agreed to by the Owner.

.4 A separate invoice showing the amount of holdback to be released.

.5 If the Consultant finds the application to be complete, the Consultant will visit the Place of the Work to verify the validity of the application.

.6 If the application is approved by the Consultant, the Consultant will issue a certificate of Substantial Performance to the Owner and to the Contractor.

.7 Immediately following issuance of certificate of Substantial Performance of Work, in consultation with Consultant, establish reasonable date for finishing Work as permitted by lien legislation applicable to place of work.

1.9 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF WORK

.1 Refer to CCDC 2, GC 5.5, and University of Guelph Supplemental Conditions.

1.10 FINAL PAYMENT

.1 Refer to CCDC 2, GC 5.7 and University of Guelph Supplemental Conditions.

1.11 SITE INSTRUCTIONS/SUPPLEMENTAL INSTRUCTIONS

.1 Site Instructions/Supplemental Instructions are issued only for the purpose of recording any clarifications of the Contract Documents or giving direction on field conditions. These instructions are subject to the provisions of the Contract Documents and unless stated herein and specifically co-authorized by the Owner, will not affect the contract price or contract time.

.2 If in the Opinion of the Contractor a Supplemental Instruction involves an increase in the contract price or contract time, the Contractor shall within 7 working days of receipt of the Supplemental Instruction advise the Consultant in writing accordingly, complete with an itemized proposal. Failure to provide written notification within time stipulated shall be deemed acceptance of Supplemental Instruction by the Contractor without any increase to the contract price or contract time.

.3 Where the Contractor requests a change in contract price or contract time due to the provisions of Supplemental Instruction, the Contractor shall not proceed with any work of the Supplemental Instructions until directed. If the Owner accepts the proposal, the Supplemental Instructions will be issued as a Change Order.

.4 Where, in the reasonable opinion of the Consultant or the Owner, the Supplemental Instruction involves a decrease in the contract price or contract time, the Consultant or Owner through the Consultant shall advise the Contractor of such opinion, including the details of the proposed adjustment, in writing prior to the final payment being made. The Contractor shall provide satisfactory evidence that an adjustment is not warranted, failing which the Owner shall proceed to deduct the applicable amount from final payment or adjust the contract time as the case may be.

1.12 VALUATION OF CHANGES IN THE WORK

.1 Further to CCDC 2-2008, Part 6, the method to be used in determining the value of a change to the Work, by either Change Order or Change Directive, shall be:

.1 Estimate and acceptance in a lump sum, unless the Consultant otherwise determines that the method shall be one of:

.1 Unit prices set out in Contract.

.2 Cost and a fee.

.2 The Contractor shall provide the Consultant with a detailed cost analysis of the contemplated change indicating:

.1 Quantity of each material.

.2 Unit cost of each material.

.3 Time involved.

.4 Subtrade quotations including a complete analysis of costs.

.5 Cost of changes to boding requirements, if applicable.

.6 Markups, if applicable.

.7 Value of Value Added Tax, as applicable.

.8 Proposed change in contract time.

.3 The following shall not be included in the cost of the work but are covered by the allowance (mark-ups) for overhead and profit:

.1 The Contractor's head office and site office expenses, including stationary, postage and other office supplies.

.2 The costs of any and all of the Contractor's Project Manager, clerical and administrative personnel including but not limited to any estimator and assistances, and executive personnel.

.3 Use of temporary offices, sheds, small tools, etc., including the cost of telephone, light, power, water, and heat used therein.

.4 Insurance premiums.

.5 Licenses and permits, except where these are special for a particular item of work.

.6 Printing charges for Proposed Changes, Change Orders and Drawings for Contractor's and Subcontractor's use in the work.

.7 The cost of record drawings and shop drawings.

.8 The cost of clean-up and disposal of waste material.

.4 The Contractor shall not be entitled to any additional compensation arising out of changes to the Work other than the amounts determined and agreed to under CCDC 2-2008 GC 6.2.

.5 In computing accounts for extras and credits for any Proposed Change, all credits shall be deducted from the total sum of the extras before markups or charges for overhead and profit are added.

1.13 PERMITTED MARK-UPS

.1 The following maximum net overhead and profit mark-ups by Contractors will be permitted for extra work under Change Order or Change Directive:

Cost of Extra Work, not including Value Added Tax	Contractor's Mark-Up on Work of Own Forces (%)	Contractor's Mark-Up on Subcontracted Work (%)
$0 to $5,000	10	7
>$5,000 to $10,000	10	7
>$10,000 to $50,000	7	5
>$50,000	5	4

.2 The following maximum net overhead and profit mark-ups by Subcontractors will be permitted for extra work:

Cost of Extra Work, not including Value Added Tax	Subcontractor's Mark-Up on Work of Own Forces (%)	Subcontractor's Mark-Up on Sub-subcontracted Work (%)
$0 to $5,000	10	7
>$5,000 to $10,000	10	7
>$10,000 to $50,000	7	5
>$50,000	5	4

.3 The permitted overhead and profit mark-ups are not cumulative or escalating. They are a one-time mark-up based on the total cost.

.4 The maximum permitted overhead and profit mark-up on materials shall be 10%.

.5 Where a proposed change order includes both credits and extras, overhead and profit mark-ups apply to the net extra or credits, if any, of the entire change.

1.14 TAX RECOVERY

.1 When an exemption or recovery of government sales taxes, duties or excise taxes is applicable to the Contract, the Contractor shall at the request of the Owner assist, join in, or make application for an exemption, recovery or refund of all such taxes and duties. 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 as may be required to implement the foregoing failing which the Owner is authorized to deduct the amount from any Contract payment that is then or may thereafter become due to the Contractor.

.2 Maintain accurate records, tabulating equipment and component costs showing all respective taxes and duties or excise taxes. At the request of the Owner, assist, join in, or at Owner's expense, make application on behalf of the Owner for any exemption, recovery or refund, and provide the Owner with copies, or where required originals of records, invoices, purchase orders or other documentation as may be necessary to support such application.

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 SAMPLE INVOICE FORMAT

.1 Refer to Section 01 29 00.1 – Payment Procedures for invoicing requirements.

.2 The following illustrates a **sample format** to follow when submitting progress invoices. Values shown are for illustration purposes only. Provide actual project name and numbers, and name of Owner's representative on completed invoices. Variations from this format are acceptable where all of the information indicated below is provided.

.3 Invoice shall bear be printed on the Contractor's corporate letterhead or otherwise bear the Contractor's name, address, telephone number, and HST registration number.

Attention: Project Coordinator (Name)
Design, Engineering and Construction
Physical Resources, Hersey Building
University of Guelph
Guelph, Ontario N1G 2W1
Facsimile (519) 837-0581

Project: **Project Name**
University of Guelph, Guelph
Consultant File No.:
Physical Resources Project No.:
Date:

Application for Payment No. XX

This is to certify that the value of Work performed and Products delivered to the Place of the Work as of February-28-13 by the Contractor is $ 45,000.00 (exclusive of Value Added Taxes

	Contract Summary			
1	Original Contract Price (excluding HST)		$100,000.00	
2	Change Orders (numbers 1 to 2)		$2,000.00	
3	Current value of Change Directives		$0.00	
4	Value of *Contract Price* on last day of payment period (1+2+3)		$102,000.00	
5	*Value Added Taxes* at 13%		$13,260.00	
6	Total amount payable for the construction of the *Work* including ***Value Added Taxes*** (4+5)			$115,260.00
	Certification Summary			
7	Total Certified 44.1%		$45,000.00	
	Value of Change Orders included above (7)	$2,000.00		
	Value of Change Directives included above (7)	$0.00		
8	Total Holdback @ 10%		$4,500.00	
9	Holdback Released		$0.00	
10	Current Holdback (8-9)		$4,500.00	
11	Amount (value of *Work* performed and *Products* delivered to the *Place of the Work* less holdback retained) (7-10)		$40,500.00	
12	Less amount from previous certificate for payment (include any holdback release)		$15,000.00	
13	amount of *Contract Price* payable current period (11-12)		$25,500.00	
14	Value Added Taxes at 13%		$3,315.00	
15	Amount payable this Certificate including ***Value Added Taxes***			**$28,815.00**

Invoice to be signed by Contractor

INCLUDE:

.1 Name, credentials, and position of person signing.

.2 Contractor's HST Registration No.

.3 Attachments (WSIB, Stat Dec 9A, summary of change orders, contract price breakdown, substantiation for cash allowance expenditures, project schedule, etc.).

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Scheduled pre-construction and progress meetings.

1.2 ADMINISTRATIVE

.1 The Contractor shall schedule and administer project meetings throughout the progress of Work.

.2 The Contractor shall provide physical space and make arrangements for meetings.

.3 The Contractor shall record the minutes. The purpose of the meeting minutes is to document significant proceedings and decisions and identify actions by parties

.4 The Contractor shall reproduce and issue a copy of minutes within three (3) business days after each meeting to the Owner, Consultant and all parties in attendance for their review. Within two (2) business days of receipt of the meeting minutes, the Contractor shall be notified of any noted errors and/or omissions. Contractor will revise the meeting minutes if deemed appropriate and return the revised meeting minutes to the Owner, Consultant and all parties in attendance.

.5 Representative of Contractor, Subcontractor and suppliers attending meetings shall be qualified and authorized to act on behalf of party each represents.

1.3 PRE-CONSTRUCTION MEETING

.1 Submit at this meeting, proof that application has been made to the Ministry of Labour for “Notice of Project” where legislation requires this notification be made. Work may not proceed until the Ministry has been notified.

.2 Within seven (7) days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.3 Senior representatives of Owner, Consultant, Contractor, major Subcontractors, and supervisors will be in attendance.

.4 Establish time and location of meeting and notify parties concerned a minimum of five (5) days before meeting.

.5 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.6 Agenda to include:
- .1 Appointment of official representative of participants in the Work.
- .2 Status of Building Permit.
- .3 Contractor use of premises, and workplace policies in accordance with Section 01 11 00 – Summary of Work.
- .4 Schedule of Work: in accordance with Section 01 32 16 – Construction Progress Schedules - Bar (GANTT) Chart.

.5 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 – Submittal Procedures.
.6 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 – Construction Facilities.
.7 Delivery schedule of specified equipment in accordance with Section 01 32 16 Construction Progress Schedules – Bar (GANTT) Chart.
.8 Site security in accordance with Section 01 56 00 – Temporary Barriers and Enclosures.
.9 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
.10 Owner provided products.
.11 Record drawings in accordance with Section 01 33 00 – Submittal Procedures.
.12 Maintenance manuals in accordance with Section 01 78 00 – Closeout Submittals.
.13 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 – Closeout Submittals.
.14 Monthly progress claims, administrative procedures, photographs, hold backs.
.15 Appointment of inspection and testing agencies or firms in accordance with Section 01 45 00 – Quality Control.
.16 Insurances, transcript of policies.
.17 Site concerns/inquiries to date.
.18 List of outstanding project specific building permit conditions.
.19 Environmental protection, measures specific to the project and place of work in accordance with Section 01 35 43 – Environmental Procedures.
.20 Commissioning Requirements in accordance with 01 91 01 – Commissioning.
.21 Next Meeting.
.22 Other Business.

1.4 PROGRESS MEETINGS

.1 During course of Work and two (2) weeks prior to project completion, schedule and administer bi-weekly progress meetings.

.2 Schedule and administer additional progress meetings as directed by the Consultant.

.3 Contractor, major Subcontractors involved in Work, Consultant, and Owner are to be in attendance.

.4 Notify parties a minimum of five (5) working days prior to meetings.

.5 Contractor shall record minutes of meetings and circulate to attending parties and affected parties.

.6 Agenda to include the following:
.1 Owner’s guidelines and policies.
.2 Review, approval of minutes of previous meeting.
.3 Review of Work progress since previous meeting.
.4 Review and update critical path construction schedule including a “look ahead” of construction activities for the next month.
.5 Field observations, problems, conflicts.
.6 Problems that impede construction schedule.

.7 Review of off-site fabrication delivery schedules.
.8 Review material delivery dates/schedule.
.9 Corrective measures and procedures to regain projected schedule.
.10 Revision to construction schedule.
.11 Progress schedule, during succeeding work period.
.12 Review submittal schedules: expedite as required.
.13 Review status of submittals.
.14 Maintenance of quality standards, quality plan submissions, and third-party testing and inspections
.15 Review proposed changes for effect on construction schedule and on completion date.
.16 Review of Contract modifications and interpretations including, but not limited to: requests for interpretation and log, contemplated change orders, Change Orders, Change Directives, Supplemental Instructions, for effect on construction schedule and on Contract Time.
.17 Review of status of as-built documents.
.18 Review of site safety including review of approved plans and alternatives related to means of egress and exiting, parking in fire routes, fire alarm and life safety and fire suppression shut-downs.
.19 Review of commissioning schedule and requirements and commissioning status.
.20 Other business.

.7 The tracking documents specified above shall be provided for information purposes and shall not be subject to the review process specified under Section 01 33 01 unless otherwise directed by the Consultant, and an absence of comment on such tracking documents by the Consultant or the Owner shall not imply approval or acceptance of the logs so submitted.

.8 Sub-trades who have work in progress or imminent at the time of the meeting shall attend project meetings.

.9 Attendees at progress meetings shall include the following:
.1 Contractor
.2 Contractor's site superintendent(s)
.3 Consultant
.4 Owner
.5 Commissioning Authority
.6 Commissioning Agent (appointed by GC)
.7 Major Sub-trades including mechanical and electrical

1.5 PRE-INSTALLATION MEETINGS

.1 During the course of the Work prior to Substantial Performance of the Work, schedule pre-installation meetings as required by the Contract Documents and coordinated with the Consultant.

.2 As far as possible, pre-installation meetings shall be scheduled to take place on the same day as regularly scheduled progress meetings.

.3 Agenda to include the following:
.1 Owner's guidelines and policies.
.2 Appointment of official representatives of participants in the Project.
.3 Review of existing conditions and affected work, and testing thereof as required.

.4 Review of installation procedures and requirements.
.5 Review of environmental and site condition requirements.
.6 Schedule of the applicable portions of the Work.
.7 Schedule of submission of samples, colour chips, and items for Consultant's consideration.
.8 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences.
.9 Requirements for notification for reviews. Allow a minimum of 48 hours' notice to Consultant for review of the Work.
.10 Requirements for inspections and tests, as applicable. Schedule and undertake inspections and tests.
.11 Delivery schedule of specified equipment.
.12 Special safety requirements and procedures.

.4 The following shall be in attendance:
.1 Contractor.
.2 Subcontractors affected by the work for which the pre-installation meeting is being conducted.
.3 Consultant.
.4 Manufacturer's representatives, as applicable.
.5 Inspection and testing company, as applicable.

1.6 COMMISSIONING MEETINGS

.1 Refer also to Section 01 91 01.

1.7 SPECIAL MEETINGS:

.1 Owner and/or Consultant reserve the right to require special meetings which may be held on short notice and at which attendance by Contractor and representatives of affected Subcontractors and Suppliers is mandatory. Contractor shall keep detailed and accurate meeting notes and distribute copies promptly to all in attendance and those affected by agreements made at such meetings.

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 DEFINITIONS

.1 Activity: element of Work performed during course of project. Activity normally has expected duration, expected cost, and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

.3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five (5) day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.6 Master Plan: summary-level schedule that identifies major activities and key milestones.

.7 Milestone: significant event in project, usually completion of major deliverable.

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.9 Project Planning, Monitoring and Control System: overall system operated by Consultant to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately ten (10) business days, to allow for progress reporting.

.4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit to Consultant within five (5) business days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

.3 Submit Project Schedule complete with an electronic copy in a format acceptable to Consultant within five (5) business days of receipt of acceptance of Master Plan.

1.4 PROJECT MILESTONES

.1 Project milestones form interim targets for Project Schedule. Indicate project milestone dates with Master Plan for the following:
- .1 Abatement work completion date from Award of Contract date.
- .2 Demolition work completion date from Award of Contract date.
- .3 Completion IT Inventory of Wing C from Award of Contract date.
- .4 Interior finishing and fitting work completion date from Award of Contract date.
- .5 Mechanical work completion date from Award of Contract date.
- .6 Electrical work completion date from Award of Contract date.
- .7 VCAP installation date from Award of Contract date.
- .8 Furniture installation date from Award of Contract date.
- .9 Substantial Completion date from Award of Contract date.

1.5 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.2 Consultant will review and return comments within five (5) business days.

.3 Revise impractical schedule and resubmit within five (5) business days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.6 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
- .1 Award.
- .2 Shop Drawings, Samples.
- .3 Permits.
- .4 Mobilization.
- .5 Abatement.
- .6 Demolition.
- .7 Interior Architecture (Walls, Floors and Ceiling).
- .8 Plumbing.
- .9 Lighting.
- .10 Electrical.
- .11 Piping.
- .12 Controls.
- .13 Heating, Ventilating, and Air Conditioning.
- .14 Millwork.
- .15 Fire Systems.
- .16 IT/Communications.
- .17 Security.
- .18 Exterior Envelope Upgrades including window replacement.

.19 Scheduled shutdowns.

.20 Testing and Commissioning.

.21 Supplied Equipment Long Delivery Items.

.22 Close-out Documentation.

1.7 PROJECT SCHEDULE MONITORING AND REPORTING

.1 Monitor progress of work relative to approved schedule.

.2 Prior to each project meeting as per Section 01 31 19 –Project Meetings, update Project Schedule to reflect activity changes and completions, as well as activities in progress.

.3 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

.4 Advise Consultant and Owner where progress of work varies from schedule, paying particular attention to variances that may result in delay of completion of Work, in whole or in part, or achievement of any milestone dates.

.5 Where progress of work varies from approved schedule, revise and resubmit schedule, showing means to recover from delays and achieve completion date(s).

.6 Revise and resubmit schedule to reflect extensions in Contract Time agreed to in Change Orders.

.7 All Site Instructions, Change Orders and Requests for Information must be entered on the schedule and then indicated how they affect the overall schedule. All weather conditions initiating resulting in lost days must also be entered on the schedule with their overall affect noted. Owner's or Consultant's acceptance of revised schedules showing completion dates later than contractually agreed shall not relieve Contractor of any responsibility for compensating Owner for costs incurred as a result of delayed completion of work, nor result in any liability by the Owner or the Consultant to the Contractor for additional costs due to the Contractor's delay in completing Work.

1.8 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

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 SECTION INCLUDES

.1 Documentation required

.2 Shop drawings and product data

.3 Samples

.4 Certificates and transcripts

.5 Building Permit

1.2 REFERENCES

.1 Canadian Construction Documents Committee (CCDC):

.1 CCDC 2-2008, Stipulated Price Contract.

1.3 ADMINISTRATIVE

.1 Submit to Consultant submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed. Allow a minimum of 10 working days for Consultant's review. The review time commences when the submittal is received at the Consultant's office and ends when the submittal leaves the Consultant's office. Larger, more complex shop drawing submissions may require longer review periods than 10 working days. The Contractor is to take this into account when preparing submittals schedule.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data, samples and mock-ups in units as indicated on Contract Drawings.

.4 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 coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.5 Notify Consultant in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.6 Verify field measurements and affected adjacent Work is coordinated.

.7 Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review of submittals.

.8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant review.

.9 Keep one (1) reviewed copy of each submission on site.

1.4 DOCUMENTATION REQUIRED

.1 Refer to CCDC 2, GC 3.5. - Construction Schedule.

.2 Prior to construction start, submit the following:

.1 An executed construction contract.

.2 Performance Bond(s) and Labour and Material Bond(s).

.3 Proof of liability insurance, with provisions preventing unilateral cancellation, and with the names of the Owner(s) and Consultant(s) listed as additional insured.

.4 Proof that a building permit or applicable clearances from authorities having jurisdiction, has been issued.

.5 Proof of environmental clearances, permits as required by authorities having jurisdiction.

.6 Proof of compliance with site specific requirements as prescribed in the site plan control agreement with the township, municipality, or city.

.7 Copy of 'Notice of Project' to Ontario Ministry of Labour.

.8 Certificate of good standing from the Worker's Compensation Board.

.9 Copy of company health and safety policies complete with names of employees and subcontractor employees.

.10 A Detailed Breakdown of Stipulated Price Contract amount, in a form and detail acceptable to the Consultant.

.11 Construction schedule.

1.5 ALTERNATIVE PRODUCTS, MATERIALS AND EQUIPMENT

.1 Alternatives submitted as approved equals to Specified Products, Materials and Equipment may be proposed by the Contractor(s) **up** to ten (10) days before the Tender closure; otherwise, one of the named products listed in the Tender documents shall be included in the Tender price. Proposals can still be submitted by the successful Contractor after Tender close following the procedures listed herein. Proposals must be submitted with a completed form, included as Section 013410 Submission Form Schedule 'A'— Alternative Products, Materials or Equipment and include detailed engineering information, references, etc. Alternatives will be accepted into the contract documents prior to Tender close only by way of written addendum. There are no guarantees that an alternative will be accepted prior to Tender close even if a proposal is received ten (10) days before Tender close.

.2 Products, materials and equipment are specified throughout the Contract Documents in one of the following ways:

.1 **Specified/First Named Manufacturer/Supplier** of Products, Materials and Equipment for which the contract documents and design have been based upon – no alternative Manufacturer/ Supplier of products, materials or equipment will be considered, unless accepted into the contract documents by way of written addendum, prior to Tender closing or unless listed as part of the "Acceptable Other Manufacturers/Suppliers" and subject to Clauses 1.5.4 and 1.5.8 of this Section. The design has been developed with the specified / first named products, materials or equipment and considering alternatives risks design integrity; hence the need to comply with Clauses 1.5.4 and 1.5.8 of this Section.

.2 **Standard of Acceptance** – lists one product, material or equipment. Other products, materials or equipment may be accepted by way of submitting a Request for Alternate Products, Materials or Equipment form, included as 013410 Submission Form Schedule 'A'. Proposals will not necessarily be accepted by the Consultant.

.3 **Acceptable or Alternative Named Manufacturers/Suppliers** – list one or more acceptable named alternative Manufacturers/Suppliers of products, materials or equipment after the specified/first named manufacturer/supplier.

.4 **Or Approved Equal** – following a list of one or more manufacturers/suppliers or products, if "or approved equal" is added, Contractor may propose an alternative following the guidelines noted above and as per the General Conditions. Proposals will not necessarily be accepted by the Consultant.

.5 A written specification only without a named manufacturer/supplier in which case the Contractor is to propose a product that meets the written specification requirements during shop drawing submission.

.3 Submission for alternative products, materials and equipment supply will be accepted only from the Contractor and not directly from suppliers.

.4 Listing of an acceptable manufacturer supplier in the documents does not automatically indicate that their standard material, product or equipment meets the requirements of the written specifications. Listing of a name in the specification is an indication that the manufacturer or supplier may be capable of providing a product equal to the requirements of the written specification. Contractor to provide products, materials and equipment which meets the written specifications with respect to performance through the range of operation, quality of material, spatial requirements, workmanship and other specified details. Include all accessories and options to meet contract requirements. All characteristics and/or performance requirements of specified product may not be specifically listed in the specifications. Product proposed by Acceptable Manufacturers/Suppliers to provide a similar performance capability through the range of operation for the equipment, similar installation, similar operation and level of maintenance. The Consultant/Owner will be the sole judge of equivalency or not to the specified product.

.5 Where alternate products, materials and equipment are proposed by the Contractor or selected by the Contractor from the "Acceptable Manufacturers/Suppliers" list, the Contractor shall be responsible for all related modifications and their coordination to piping, wiring, controls, accessories, etc. necessary to complete the works, at no extra cost to the Owner.

.6 Where alternative products, materials and equipment are proposed by the Contractor or listed in the specification as an Acceptable Manufacturer/Supplier, the Contractor shall reimburse the Owner in the form of a Credit to the Contract for all additional Consultant costs for re-design resulting from the alternate products, materials or equipment to be agreed upon in writing prior to acceptance of the use of the product.

.7 Alternative products, materials and equipment must meet the specification requirements with respect to performance, quality of material, spatial requirements, workmanship and other specified details.

1.6 SHOP DRAWINGS AND PRODUCT DATA

.1 Refer to CCDC 2 GC 3.10 and Supplementary Conditions.

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

.3 Submit shop drawings as described in each specification section.

.4 Do not proceed with any component of the Work nor provide Products without reviewed shop drawings being accepted and returned to the Contractor. Should Work commence, or Products be supplied prior to Contractor's receipt of reviewed shop drawings, the Contractor shall be liable for all corrections and costs incurred.

.5 Submit where indicated, shop drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

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

.7 Adjustments made on shop drawings by Consultant are not intended to change Contract Price or Contract Time. If adjustments affect value of Work or the construction schedule, state such in writing to Consultant prior to proceeding with Work.

.8 Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of revisions other than those requested.

.9 Accompany submissions with transmittal letter containing:

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

.10 Submissions to include:

- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents. Shop drawings submitted without the Contractor's executed stamp of review will not be considered and will be returned to the Contractor for review and re-submission.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.

.11 Should the Consultant deem the Contractor has not complied with the requirements of this section, the Contractor shall be held fully responsible for all delays in the Work to the same extent as if no shop drawings or details had been submitted for that section of the Work.

.12 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.

.13 Submit electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.

.14 Submit electronic copy of test reports for requirements requested in specification Sections and as requested by Consultant.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within three (3) years of date of contract award for project.

.15 Submit electronic copy of certificates for requirements requested in specification Sections and as requested by Consultant.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.16 Submit electronic copy of manufacturer’s instructions for requirements requested in specification sections and as requested by Consultant.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.17 Submit electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Consultant.

.1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.18 Submit electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Consultant.

.19 Delete information not applicable to project.

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

.21 If upon review by the Consultant, no errors or omissions are discovered or if only minor corrections are made, a copy with appropriate comments where applicable will be returned electronically in PDF format and fabrication and installation of Work may proceed. If shop drawings are rejected, a copy complete with appropriate comments where applicable will be returned electronically in .PDF format and resubmission procedure indicated above, shall be repeated prior to fabrication and installation of Work.

1.7 SAMPLES

.1 Submit samples for each product together in one submission with all other required submittals for the various specification sections. Submittals for the building interior may however be submitted independently from that for the building exterior.

.2 Submit for review samples in duplicate as requested in respective specification sections. Label samples with origin and intended use.

.3 Deliver samples prepaid to Consultant's business address.

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

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

.6 Adjustments made on samples by Consultant are not intended to change contract price or contract time. If adjustments affect value of Work or contract time, state such in writing to Consultant prior to proceeding with Work.

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

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

.9 Keep all approved samples at the Place of the Work. Maintain in good order and available to the Consultant and his representatives for the duration of the Work.

1.8 MOCK-UPS

.1 Erect mock-ups in accordance with Section 01 45 00 – Quality Control.

1.9 CERTIFICATES AND TRANSCRIPTS

.1 Prior to commencing work on site, and with each application for progress payment, submit Workplace Safety Insurance Board Certificate (WSIB) of good standing.

.2 Prior to commencing work on site submit:

.1 Certificate of General Liability Insurance.

1.10 BUILDING PERMIT

.1 Refer to GC 10.2

.2 Unless otherwise indicated, the Owner shall obtain and pay for building permit as required.

.3 Prior to commencing work on site:

.1 Obtain notification from Owner that required permits had been approved and paid for.

.4 No person shall construct or demolish a building, or any part of a building, unless a permit has been issued by the juridical authorities.

1.11 PROOF OF PURCHASE

.1 Submit proof of purchase as requested by the Consultant.

.1 Acceptable proof of purchase: purchase order, or letter of confirmation from supplier.

.2 Proof of purchase to include a delivery date.

.2 Delay in shop drawing approval WILL NOT excuse delay in purchase orders.

.3 Provide letter of intent or purchase order prior to submission of shop drawings.

.4 Provide production confirmation within five (5) business days of shop drawing return.

1.12 ENGINEERED SUBMITTALS

.1 Submittals for items required to be sealed by professional engineer (engineered) shall be duly prepared, sealed, and signed under the direct control and supervision of a qualified professional engineer registered in the Place of the Work, having in force, professional liability insurance with minimum limit of liability of $1,000,000 per claim.

.2 Include with engineered submittal, proof of insurance identifying insurer, policy number, policy term, and limit of liability, on duly signed letterhead and / or certificate of insurance.

.3 Design includes life safety, sizing of supports, anchors, framing, connections, spans, and as additionally required to meet or exceed requirements of applicable codes, standards, regulations, authorities having jurisdiction, and design requirements of the Contract Documents.

.4 Engineered submittals shall include design calculations, complete with references to codes and standards used in such calculations, supporting the proposed design represented by the submittal. Prepare calculations in a clear and comprehensive manner so that they can be properly reviewed.

.5 Professional engineer responsible for the preparation of engineered submittals shall undertake periodic field review, including review of associated mock-ups where applicable, at locations wherever the work as described by the engineered submittal is in progress, during fabrication and installation of such work, and shall submit a field review report after each visit. Field review report shall be submitted to the Consultant, to authorities having jurisdiction as required, and in accordance with the building code.

.6 Field reviews shall be at intervals as necessary and appropriate to the progress of the work described by the submittal to allow the engineer to be familiar with the progress and quality of such work and to determine if the work is proceeding in general conformity with the Contract Documents, including reviewed shop drawings and design calculations.

.7 Upon completion of the parts of the Work covered by the engineered submittal, the professional engineer responsible for the preparation of the engineered submittal and for undertaking the periodic field reviews described above, shall prepare and submit to the Consultant and authorities having jurisdiction, as required, a letter of general conformity for those parts of the Work, certifying that they have been Provided in accordance with the requirements both of the Contract Documents and of the authorities having jurisdiction over the Place of the Work.

.8 Costs for such field reviews and field review reports and letters of general conformity are included in the Contract Price.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

SUBMISSION FORM SCHEDULE A

.1 Request for Quality Assurance Listing of manufacturer/supplier to be submitted by Contractor prior to ten (10) days before close of tenders. Refer to Section 01 33 00 – Submittal Procedures for additional details.

.2 Specification Section Reference _____

.1 Equipment Tag No. _____

.3 Manufacturer/Supplier

.1 Name _____

.2 Address _____

.3 City/Province _____

.4 Product Representative

.1 Contact Name _____

.2 Telephone _____

.3 Fax _____

.4 Email _____

.5 Equipment:

.1 Model _____ Size _____

.2 Type _____

.6 Include the following **product specific** information with this submission:
- .1 Technical specifications and general requirements
- .2 Performance charts
- .3 Accessories Listing
- .4 Options Listing
- .5 List of References

.4 Reasons for proposing alternate:
- .1 Cost: yes/no (provide details)
- .2 Improved Schedule Delivery: yes/no (provide details)
- .3 Availability: yes/no (provide details)
- .4 Others (provide details)

List three (3) recent Canadian projects where above equipment has been used.

Project Name	Location	Equipment Start Up Installation Date

Above product is submitted as information only for the purpose of including the above manufacturer in the Quality Assurance List of Manufacturers. Contractor is fully responsible for all requirements and conditions of these specifications.

Signed: _____ Contractor Name: _____

Date: _____ Title: _____

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.

.2 Province of Ontario:

.1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 1990, c.0.1, as amended and O. Reg. 213/91 as amended - Updated 2005.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit site-specific Health and Safety Plan: Within five (5) business 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.

.3 Submit electronic copy of Contractor's authorized representative's work site health and safety inspection reports to Consultant as per their request.

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

.5 Submit copies of incident and accident reports.

.6 Submit WHMIS MSDS - Material Safety Data Sheets.

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

1.3 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to beginning of Work.

.2 Agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

1.4 SAFETY ASSESSMENT

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

1.5 REGULATORY REQUIREMENTS

.1 Perform Work in accordance with Section 01 41 00 – Regulatory Requirements.

1.6 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:
- .1 Owner.
- .2 Public.
- .3 Staff/Students.

1.7 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.

1.8 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Be responsible and assume the role Constructor as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

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

1.9 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990, c. 0.1 and Ontario Regulations for Construction Projects, O. Reg. 213/91.

1.10 UNFORESEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, advise Health and Safety coordinator, follow procedures in accordance with Acts and Regulations of Ontario, and advise Consultant verbally and in writing.

1.11 HEALTH AND SAFETY COORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-coordinator. Health and Safety Co-coordinator must:
- .1 Have site-related working experience specific to activities associated with the Work.
- .2 Have working knowledge of occupational safety and health regulations.

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

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

.5 Be on site during execution of Work.

.2 It is acceptable for the site supervisor to also act as the Health and Safety Coordinator if the above requirements are met and if deemed appropriate by the Contractor.

1.12 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 Ontario.

1.13 CORRECTION OF NON-COMPLIANCE

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

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

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

1.14 WORK STOPPAGE

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

1.15 ADDITIONAL OWNER HEALTH AND SAFETY REQUIREMENTS

.1 Contractor’s current health and safety statement and policy shall be filed with University of Guelph - Design, Engineering and Construction prior to start of work, for the Owner’s information only.

.2 The health and safety statement and policy shall include:

.1 Current Material Safety Data Sheets for the products to be used.

.2 Provisions for safety including the use of continuous snow fencing in lieu of barricades or caution tape.

.3 Signage to indicate DANGER ZONES, CLOSURES, DETOURS, ETC.

.4 Set-up locations and procedures.

.5 Material storage and handling.

.6 Fire protection.

.7 Debris handling, storage, disposal and clean-up.

.8 Personnel safety required by the regulations including roof barriers, travel restraint systems and fall arrest systems.

.9 Other measures pertinent to the Work.

.3 Owner's receipt of such policy is not approval of completeness and accuracy of policy, nor confirmation of compliance with applicable legislation. The Owner shall in no way be held liable for contents or enforcement of the Contractor's health and safety statement and policy, or the Contractor's detailed health and safety procedures. Owner's comments, or lack thereof, shall not be construed as approval of the Contractor's health and safety practices.

.4 Accidents

.1 In addition to requirements of applicable legislation, in any emergency requiring the use of a resuscitator, the University Fire Prevention Office shall be notified.

.2 Make arrangements for emergency treatment of accidents.

.3 Provide Owner and Consultant with a copy of WSIB injury report for all reportable accidents and injuries, for information purposes, within 24 hours of incident.

.5 The Contractor will be responsible for verifying through locates the location of any utilities or services that cross or enter the area of the Work.

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 Definitions:

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

.3 Adequate Ventilation: ventilation, including air circulation and air changes, required to cure material, dissipate humidity, and prevent accumulation of dust fumes, vapours or gases.

.4 Construction and Demolition Waste: includes solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair, and demolition operations.

.1 Includes both combustible and non-combustible wastes, such as paper, boxes, glass, crockery, metal and lumber scrap, metal cans and bones.

.5 Debris: includes both combustible and non-combustible wastes, such as leaves and tree trimmings that result from construction or maintenance and repair work.

.6 Chemical Waste: includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.

.7 Environmental Pollution and Damage: the presence of chemical, physical, or biological elements or agents that adversely affect human health or welfare; unfavourably alter ecological balances; or degrade the utility of the environment for aesthetic, cultural, or historical purposes.

.8 Hazardous Materials: includes pesticides, biocides, and carcinogens, as listed by recognized authorities.

.9 Interior Final Finishes: materials and products that will be exposed at interior, occupied spaces, including flooring, wall coverings, finish carpentry and ceilings.

.10 Municipal Solid Waste Landfill: a permitted facility that accepts solid, nonhazardous waste such as household, commercial and industrial waste, including construction and demolition waste.

.11 Packaged Dry Products: materials and products that are installed in dry form and are delivered to the site in manufacturer's packaging, including carpets, resilient flooring, ceiling tiles, and insulation.

.12 Sediment: soil and other debris that has been eroded and transported by storm or well production runoff water.

.13 Sanitary Wastes:

.1 Garbage: refuse and scraps resulting from preparation, cooking, distribution, or consumption of food.

.2 Sewage: domestic sanitary sewage.

.14 Wet Products: materials and products installed in wet form, including paints, sealants, adhesives and special coatings.

.2 Reference Standards:

.1 CCDC 2-2008 Stipulated Price Contract.

.2 U.S. Environmental Protection Agency (EPA)/Office of Water:

.1 EPA 832/R-92-005-92, Storm Water Management for Construction Activities, Chapter 3.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Prior to commencing construction activities or delivery of materials to site, provide Environmental Protection Plan for review by Consultant.

.3 Ensure Environmental Protection Plan includes comprehensive overview of known or potential environmental issues to be addressed during construction.

.4 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.5 Include in Environmental Protection Plan:

.1 Names of person(s) responsible for ensuring adherence to Environmental Protection Plan.

.2 Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from site.

.3 Name(s) and qualifications of person(s) responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Drawings showing locations of proposed temporary material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.6 Traffic Control. Ensure plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.

.7 Spill Control Plan including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.8 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.9 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.

.10 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.11 Waste Water Management Plan identifying methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

1.3 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 – Submittal Procedures.

1.4 SUBSTITUTIONS

.1 Notify Consultant in writing when Contractor is aware of materials, equipment, or products that meet the aesthetic and programmatic intent of Contract Documents but are more environmentally sensitive than materials, equipment, or products specified or indicated in the Contract Documents.

1.5 FIRES

.1 Fires and burning of rubbish on site is not permitted.

1.6 DISPOSAL OF WASTE

.1 Do not bury rubbish and waste materials on site.

.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

1.7 DRAINAGE

.1 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

.2 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

.3 Do not pump or permit water containing suspended materials into waterways, sewer, or drainage systems.

1.8 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties.

.2 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.

.3 Protect roots trees to dripline to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Restrict tree removal to areas indicated or designated by Consultant.

1.9 POLLUTION CONTROL

.1 Control emissions from equipment and plant to local authorities' emission requirements.

.2 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.

.3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

.4 Collection: implement a recycling / reuse program that includes separate collection of waste materials of the following types:

- .1 Metal:
  - .1 Ferrous
  - .2 Nonferrous
- .2 Wood
- .3 Debris
- .4 Glass
- .5 Paper:
  - .1 Bond
  - .2 Newsprint
  - .3 Newsprint

.5 Environmental Controls: disposal operations for waste materials that are not identified to be salvaged, recycled or reused:

- .1 Remove debris, rubbish, and other waste materials from construction operations from site.
- .2 No burning permitted.
- .3 Transport materials with appropriate vehicles, and dispose off-site to areas that are approved for disposal by governing authorities having jurisdiction.
- .4 Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways. Remove spillage, and sweep, wash or otherwise clean project site, streets, or highways.
- .5 Comply with applicable regulations.

.6 Air Resources: prevent creation of dust, air pollution, and odours.

- .1 Use water sprinkling, temporary enclosures, and other appropriate methods to limit to lowest practical level dust and dirt rising and scattering in air.
  - .1 Do not use water when it may create hazardous or other adverse conditions such as flooding and pollution.
- .2 Store volatile liquids, including fuels and solvents, in closed containers.
- .3 Properly maintain equipment to reduce gaseous pollutant emissions.
- .4 Interior final finishes: schedule construction operations involving wet products prior to packaged dry products to the greatest extent possible.
- .5 Temporary Ventilation:
  - .1 Provide adequate ventilation during and after installation of interior wet products and interior final finishes.

.2 Provide adequate ventilation of packaged dry products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources, and residues. Do not ventilate within limits of Work unless otherwise approved by Consultant.

.3 Preoccupancy Ventilation: after final completion and prior to initial occupancy, provide adequate ventilation for minimum five (5) days. Preoccupancy ventilation procedures:

.1 Use supply air fans and ducts only.

.2 Temporarily seal exhaust ducts.

.3 Temporarily disable exhaust fans.

.4 Provide exhaust through operable windows or temporary openings.

.5 Provide temporary exhaust fans as required to pull exhaust air from deep interior locations. Stair towers may be used for exhausting air from the building during the temporary ventilation.

1.10 INDOOR AIR QUALITY MANAGEMENT DURING CONSTRUCTION

.1 HVAC Protection

.1 Prevent dust from settling into HVAC system. Seal off any duct work during construction and then keep ducts sealed in plastic to prevent dust from getting into them.

.2 Do not use HVAC system during construction.

.3 Do not store construction or waste materials in mechanical rooms.

.4 Seal diffusers and grilles with plastic.

.5 Inspect and clean all ducts, diffusers and grilles at completion of the Work.

.2 Source Control

.1 Prohibit the idling of motors and internal combustion engines on site during construction.

.2 Use bottled gases for equipment rather than diesel.

.3 Switch to electrical equipment rather than fossil fuel equipment wherever possible.

.4 Ensure any exhaust is emitted directly to the exterior and well away from any intakes or door or window openings.

.5 Use enclosed tankers rather than open kettles for roofing operations.

.3 Work Area Separation

.1 Use dust curtains, continuous heavy duty sheet plastic seals to separate work areas containing any dust and dirt particulates from other cleaner areas

.4 Housekeeping

.1 Minimize dust with wetting agents or sweeping compounds.

.2 Remove spills quickly when dealing with odorous or noxious materials.

.3 Remove any accumulated water. Keep all work areas dry and dehumidify when and where necessary.

.4 Vacuum with HEPA filtered vacuums to reduce airborne dust particles.

.5 Keep porous materials dry. Do not allow any insulation to become wet.

.6 Clean site daily.

.5 Scheduling

.1 If the building is occupied after substantial completion, on-going work areas are to be kept under negative pressure to prevent the migration of dust and dirt into the occupied spaces.

.2 Wherever possible, work, where off-gassing occurs is to be scheduled during off-hours.

1.11 HISTORICAL / ARCHAEOLOGICAL CONTROL

.1 Refer to CCDC-2.

1.12 NOTIFICATION

.1 Consultant will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Consultant of proposed corrective action and take such action for approval by Consultant.

.3 Do not take action until after receipt of written approval by Consultant.

.4 Consultant will issue stop order of work until satisfactory corrective action has been taken.

.5 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

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 AND CODE

.1 Perform Work in accordance with Ontario Building Code (OBC) including amendments up to tender closing date and other codes of local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.2 HAZARDOUS MATERIAL DISCOVERY

.1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Consultant. Refer to Section 02 82 12 – Asbestos Abatement – Type 3 Procedures.

.2 PCB: Polychlorinated Biphenyl: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Consultant. Refer to Section 02 84 10 – PCB Packaging and Disposal.

.3 Mercury: stop work immediately when material resembling mercury is encountered during demolition work. Notify Consultant. Refer to Section 02 84 11 – Mercury Packaging and Disposal

.4 Lead-based paint: Refer to Section 02 83 10 – Lead-based paint abatement – Intermediate Precautions.

.5 Biohazard: Refer to Section 02 87 00 – Biohazard Remediation.

1.3 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions and municipal by-laws.

.2 Smoking or vaping is forbidden within all buildings on the Owner's property and within 9.0 meters of any entrance or exit. Failure to comply will require offenders to leave the property and may result in loss of future business. Repeat offenders shall be removed from the site.

.3 The Contractor and any sub-trades shall comply with all Owner restrictions regarding smoking, vaping and drug use on campus.

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 SECTION INCLUDES

.1 Concept.

.2 Requirements.

.3 Submissions.

1.2 REFERENCES

.1 Canadian Construction Documents Committee (CCDC):
  .1 CCDC 2-2008, 'Stipulated Price Contract'.

1.3 CONCEPT

.1 The Contractor is to develop, submit for approval and implement an overall Quality Plan for the project that outlines a course of action to ensure quality standards for all materials and workmanship provided meet the Contract Specifications and Contract Drawings (Contract Documents).

.2 In order to ensure accountability towards all Quality Assurance and field quality control responsibilities, the Quality Plan shall clearly identify all tasks, inspections, third parties and submissions that are required by the Contractor for each section of this contract.

.3 Individual sections within the Contract may also require their own specific Quality Plans. The Quality Plan requirements outlined in this section are not a substitute for individual Quality Plan/ Quality Submission requirements outlined in individual specification sections. Refer to sections for details.

1.4 REQUIREMENTS

.1 The Quality Plan shall describe, as a minimum, the following:
  .1 Identify the personnel responsible for the implementation and oversight of the Quality Plan for the entirety of this Contract.
  .2 Identify the personnel responsible to ensure the Contractor's Quality Assurance requirements for each Section of this Contract are met.
  .3 Identify the personnel responsible to ensure the Field Quality Control requirements for each Section of this Contract are met.
  .4 Describe the roles and responsibilities for each individual above, pertaining to the Quality Plan.

.2 The Quality Plan shall include, as a minimum, the following:
  .1 Samples of the Contractor's Field Quality Control forms to be used. These would include, but are not limited to the following:
    .1 Inspection forms
    .2 Logs
    .3 Shop Drawing Review and Sign Off
    .4 Consultant/Third Party Review Request
    .5 Deficiency Sign-Off
  .2 Procedural steps for the review of shop drawings by the Contractor prior to submission to the Consultant.
  .3 Identifies the anticipated timeframes for scheduling of conformance reviews by the Consultant or the appointed qualified professional.

.4 Identifies the anticipated timeframes for scheduling of Material Testing.

.5 Identifies the anticipated timeframes for scheduling of Manufacturer's Representative/Third Party review.

.6 Procedures to identify and document defective supplies, materials and workmanship, including their proposed repair procedures or corrective action follow-up.

.7 Risk Management: List and describe any anticipated project specific risk associated and outline proposed means of mitigation.

.3 The Quality Plan shall be of sufficient detail to demonstrate the performance requirements of the contract.

.4 Construction Schedule:

.1 Contractor is to identify each Quality Control procedural step within the Construction Schedule. The minimum schedule milestones to identify shall include:

.1 Shop drawing submissions.

.2 Site inspections/reviews as identified in the specifications.

.3 Mock-ups

.4 Equipment Commissioning

.5 Factory and site acceptance testing of equipment where identified in specifications.

.5 Review of Quality Plan Effectiveness:

.1 The implementation of the Contractor's Quality Plan will be an agenda item at each progress meeting.

1.5 SUBMISSIONS

.1 Submit Quality Plan in accordance with Section 01 33 00 – Submittal Procedures.

.2 The Quality Plan shall be prepared by the Contractor taking into account the specific requirements of this Contract. Generic Quality Plans that, in the Consultant reasonable opinion, fail to address the specific contract requirements will be returned, "Revise and Resubmit".

.3 The Quality Plan shall be submitted to the Consultant for review within (10) business days following the pre-construction meeting.

.4 The Consultant will have ten (10) business days to review and provide comments upon receipt of the Quality Plan.

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 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.

.2 Tests and mix designs.

.3 Mock-ups.

.4 Mill tests.

1.2 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)
  .1 CCDC 2-2008, Stipulated Price Contract.

1.3 SITE REVIEW

.1 Refer to CCDC 2, GC 2.3 Review and Inspection of the Work and Supplemental Conditions.

.2 Allow Owner and Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.3 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Consultant instructions, or law of Place of Work.

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

.5 Consultant will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

1.4 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies to be engaged by Contractor for purpose of inspecting and/or testing portions of Work.

.2 Acceptable costs to be invoiced under allowances, refer to Section 012100 – Allowances. All other testing and inspection to be included in Contract Price.

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

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

.5 Independent Inspection/Testing Agency to submit copies of all inspection/testing reports directly to Consultant.

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

1.5 SUPERINTENDENT

.1 Refer to CCDC 2, GC 3.6 – Supervision.

.2 The Superintendent shall be satisfactory to the Owner and Consultant and shall not be changed except for good reason and only then after consultation with and agreement by the Owner and Consultant.

.3 The Superintendent shall represent the Contractor at Work site and directions given to him by the Consultant shall be held to have been given to the Contractor.

.4 The Contractor shall remove the Superintendent of the Work if in the opinion the Superintendent is unable to carry out their proper functions and duties, due to whatever reason, to the complete satisfaction of the Consultant and the Owner.

.5 Should the Contractor wish to replace the Superintendent, the Contractor shall submit to the Consultant, a request for the change in writing. Include in the written request the reason for the change and the experience and qualifications of the replacement superintendent. The acceptance of the replacement superintendent will be at the sole discretion of Owner and Consultant and issued to the Contractor in writing. Should the replacement superintendent be deemed unacceptable to the Owner or Consultant, submit experience and qualifications of other superintendents for review and approval by the Owner and Consultant until a suitable replacement is accepted.

.6 The Superintendent of the work shall remain at the place of Work until all deficiencies of all trades have been rectified and the project is deemed Totally Performed by the Consultant.

.7 The duties of the Superintendent shall include, but not be limited to the following:

- .1 Co-ordination of the Work of all trades including own forces.
- .2 Expediting labour and Products of all trades including own forces.
- .3 Total project control and co-ordination.
- .4 Project scheduling.
- .5 Quality control and supervision as required to ensure the project is constructed in accordance with the Contract Documents.

1.6 ACCESS TO WORK

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

.2 Cooperate to provide reasonable facilities for such access.

1.7 PROCEDURES

.1 Notify appropriate agency and Consultant two (2) business days in advance of requirement for tests, in order that attendance arrangements can be made.

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

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

1.8 REJECTED WORK

.1 Refer to CCDC, GC 2.4.

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

.3 Make good other Contractor's work damaged by such removals or replacements promptly at no cost to the Owner.

.4 If in opinion of the Consultant it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by the Consultant.

1.9 REPORTS

.1 Submit electronic copy of inspection and test reports to Consultant.

.2 Provide copies to subcontractor of work being inspected or tested and/or manufacturer or fabricator of material being inspected or tested.

1.10 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

.2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised Consultant and may be authorized as recoverable.

1.11 MOCK-UPS

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

.2 Construct in locations as directed by Consultant.

.3 Prepare mock-ups for Consultant's review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be permitted.

.5 Failure to prepare mock-ups to Consultant approval is not considered sufficient reason for an increase to Contract Price and no claim for increase by reason of such default will be accepted.
.1 Rectify, and/or remove and replace all such rejected mock-ups to Consultant approval.

.6 Approved mock-ups may remain as part of Work subject to the approval of the Consultant

1.12 MILL TESTS

.1 Submit mill test certificates as required of specification Sections.

1.13 EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

1.14 TOLERANCES

.1 Unless more stringent tolerances are required by a Section of the Specifications or a referenced standard, meet the following tolerances for installed Work:
.1 “plumb” shall mean plumb within 3 mm (1/8”) in 3 m (10 ft.).
.2 “level” shall mean level within 3 mm (1/8”) in 3 m (10 ft.).
.3 “square” shall mean not in excess of 10 seconds less or more than 90°.
.4 “straight” shall mean within 3 mm (1/8”) in 3 m (10 ft.) under a 3 m (10 ft.) straight edge.

1.15 BUILDING COMPONENTS

.1 Requirements specified herein apply to all elements of the building components.

.2 Continuity of fire separations, air barriers, vapour barriers, air/vapour barriers and insulation components are critical and must be maintained at all locations. Where different systems meet, ensure proper interface and continuity between adjacent components by implementing suitable construction sequences and by using compatible materials only.

.3 Provide control joints in interior and exterior building components of design and spacing which will permit expansion and contraction of components without causing distortion, failure of joint seals, undue stress, cracking, bowing or other defects detrimental to appearance and performance. Review design and location of control joints with Consultant prior to start of Work and follow directions given by Consultant.

.4 Anchor exterior components to structure in manner suitable to accommodate structural deflection and creep. Design anchorage to withstand expected wind loads, positive and negative, in accordance with applicable regulations.

.5 Ensure that air spaces within building components are fire stopped in accordance with applicable regulations.

.6 Ensure that air spaces on the outside of vertical air barrier/vapour barriers (walls) are constructed with adequate drainage provisions to the exterior.

1.16 DRAINAGE

.1 Lay out and construct Work to ensure that positive drainage is provided to roof drains, floor drains, site drains and catch basins, as set in their final position, preventing undrained areas and ponding.

.2 Ensure that allowable construction tolerances and structural deflection do not cause ponding of water.

.3 Report to Consultant in writing prior to executing Work affected, in case adequate drainage cannot be provided.

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 U.S. Environmental Protection Agency (EPA) / Office of Water:
- .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

1.3 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

.3 Maintain temporary utilities and plant in good operating order.

.4 Use utilities and execute work to prevent waste of utilities.

1.4 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.

.3 Provide temporary heat and ventilation in enclosed areas as required to:
- .1 Facilitate progress of Work.
- .2 Protect Work and products against dampness and cold.
- .3 Prevent moisture condensation on surfaces.
- .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
- .5 Provide adequate ventilation to meet health regulations for safe working environment.

.4 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.

.5 Do not use electricity for temporary heating except with Owner's prior permission.

.6 Ventilating:
- .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
- .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
- .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
- .4 Ventilate storage spaces containing hazardous or volatile materials.
- .5 Ventilate temporary sanitary facilities.
- .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.7 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
- .1 Conform to applicable codes and standards.
- .2 Enforce safe practices.
- .3 Prevent abuse of services.
- .4 Prevent damage to finishes.
- .5 Vent direct-fired combustion units to outside.

.8 Pay costs for maintaining temporary heat and ventilation.

.9 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

.10 With Owner's permission, temporary connection may be made to natural gas service for construction purposes. Provide meter, and compensate Owner for cost of fuel consumed at Owner's costs. Obtain all necessary permits and inspections. Owner shall be final authority to determine costs. Provide all other piping, fittings, connections, hoses, etc. as required for temporary connection.

.11 Be responsible for damage to work due to failure in providing adequate heat and protection during construction.

.12 Prevent excessive use or waste of utilities, and minimize utility costs to Owner.

.13 New and existing equipment and systems shall not be used for temporary ventilating.

1.5 TEMPORARY POWER AND LIGHT

.1 Provide and pay for temporary power during construction for temporary lighting, operating of power tools, project job site temporary offices, and other construction requirements.

.2 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.

.3 Provide temporary power for electric cranes and other equipment as required.

.4 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.

.5 Connect to power supply according to Canadian Electrical Code and provide meters and switching. Maintain fire watch during use of open flame heaters.

1.6 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary fax, telephone, cell phones, computers with email and high speed internet access, and other equipment necessary for own use.

1.7 FIRE PROTECTION

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

.2 "Hot work" shall not be performed unless:
- .1 The area can be made safe for the work;
- .2 The work has been approved by the Owner; and
- .3 The Hot Work is performed within the authorized time frame and only as long as conditions remain safe.

.3 "Hot work" shall not be performed if:
- .1 Processes involving flammable liquids, gases and dusts cannot be shut down and made safe;
- .2 Lint conditions are severe beyond correction;
- .3 Partitions, walls, ceilings, or roofs have combustible coverings (e.g., expanded plastic insulation);
- .4 Partitions are made of combustible sandwich-type construction.

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

1.8 CONSTRUCTION AID

.1 Provide temporary stairs, ladders and ramps required for movement and placing of materials, equipment and personnel.

.2 Use of Owner's temporary facilities such as portable ladders, work lights, extension cords, tools etc. is prohibited. Contractor to provide all such items.

.3 Provide mechanical hoisting equipment and fully qualified operators as required during construction.

.4 Erect required scaffolding independent of walls. Arrange to avoid interference with work of other Sections as much as possible. Design and construct scaffolding in accordance with CSA S269.2-1975.

.5 Provide and maintain regular shoring and bracing in accordance with Construction Safety Act and other applicable regulations. Design and construct falsework in accordance with CSA S269.1-1975.

1.9 DEWATERING

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

1.10 WATER SUPPLY

.1 The Owner will provide a continuous supply of potable water for construction use.

.2 Provide temporary connections to existing supply points, and pay all costs for installation, maintenance and removal

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 Construction Documents Committee (CCDC):
- .1 CCDC 2-2008, Stipulated Price Contract.

.2 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
- .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.3 Canadian Standards Association (CSA International):
- .1 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA-0121-M1978 (R2003), Douglas Fir Plywood.
- .3 CAN/CSA-S269.2-M1987 (R2003), Access Scaffolding for Construction Purposes.
- .4 CAN/CSA-Z321-96 (R2001), Signs and Symbols for the Occupational Environment.

.4 U.S. Environmental Protection Agency (EPA) / Office of Water:
- .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

1.3 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

.4 Provide construction facilities in order to execute work expeditiously.

.5 Remove from site all such work after use.

1.4 COLD WEATHER CONDITIONS

.1 The term “cold weather periods” shall mean the periods between the 15th of September to the 31st day of May of the following year; from the date of commencement of the Work until the Work is completed.

.2 Assume full responsibility and pay all costs for snow or ice removal from the project site. Maintain site during cold weather periods including but not limited to cleaning and/or clearing any snow or ice accumulation as required to perform the Work and to provide a safe working environment around the building and project site. Remove snow from project site. Dump snow at properly designated areas to the requirements of local authorities.

.3 Where the climate may affect in any manner the ways and means for the performance of the work or the timing for the project, thoroughly examine the climatic data for the past 10 year period, and incorporate all information reasonably inferable from such data into the Contract Price, Construction Schedule and Contract Time.

1.5 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

.2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms, and temporary stairs as required to perform Work.

1.6 HOISTING

.1 Provide, operate and maintain hoists cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.

.2 Hoists cranes to be operated by qualified operator.

1.7 SITE STORAGE/LOADING

.1 Refer to CCDC 2, GC 3.11.

.2 Confine work and operations of employees to limits indicated by Contract documents or where no limits shown on drawings, to immediate area of work. Do not unreasonably encumber premises with products.

.3 Do not load or permit to load any part of work with a weight or force that will endanger the work, or any part of existing structures, components or elements.

.4 On-site storage of construction materials and equipment shall be kept to a minimum at all times. All materials being stored shall be protected by the Contractor from damage or loss and shall be repaired or replaced by the Contractor should damage or loss occur.

.5 Do not store goods and materials within existing buildings except with Owner's prior permission. Materials are to be stored in a location and manner to cause the least interference with work activities, pedestrian or vehicular traffic.

.6 Where storage is not permitted within existing buildings, provide lockable sheds and trailers to store goods and materials. Pay parking costs associated with storage trailers.

.7 Determine with the Owner locations that are suitable for receiving/storage of materials and equipment.

.8 All materials and equipment shall be kept in a secure area, at contractor's expense, or removed from the job site when work is not actually in progress.

1.8 CONSTRUCTION PARKING

.1 Except as noted below, pay costs of parking. Owner's available parking is subject to charge. Obtain schedule of available parking locations, rate schedule and permits from Owner's Parking Services, Trent Lane.

.2 Parking costs will apply to office and/or storage trailers occupying parking spaces.

.3 Parking within construction hoarding is without charge. Owner reserves right to approve extent of hoarding. Owner's requirements take precedence over Contractor's use of site.

.4 Parking in posted fire routes will not be permitted. Vehicles found parked in a posted fire route will be towed without warning at vehicle owners' expense.

1.9 SECURITY AND KEYS

.1 Comply with Owner's policy and practices regarding site and building security. Do not reduce level of security afforded to building and site by work of this Contract.

.2 Provide and pay for security as may be required to guard site and contents of site after working hours and during holidays.

.3 For unoccupied buildings, ensure that buildings are maintained locked at all times, except when doors are unlocked and continuously monitored by Contractor.

.4 For occupied buildings, cooperate with Owner's schedule of unlocking and locking. Maintain locking schedule unless otherwise directed by Owner. Continuously monitor all doors unlocked at periods when Owner would normally maintain locked doors.

.5 Owner will issue keys for areas upon receipt of cheque, made payable to the University of Guelph as refundable deposit upon return of keys in good condition.

.1	Service keys--NSK, HOSK singular or as a pair	$500.00 each
.2	Building masters	$500.00 each
.3	Building sub masters	$300.00 each
.4	Housekeeping keys	$300.00 each
.5	Individual room keys	$200.00 each

.6 Owner's policy requirements include but are not limited to:

- .1 Minimum 48 hours prior to start of work arrange with Owner to obtain keys and adjust security alarms for overtime work.
- .2 Do not copy Owner's keys. Return Owner's keys to Owner prior to issuing final invoice for work. Owner reserves the right to withhold all or part of final payment, in addition to deposit made, until keys have been returned. In the event of loss of key, the Contractor shall reimburse the Owner, by means of a deduction from any amounts due the Contractor and by direct reimbursement, for all costs associated with keying plus 100% overhead.
- .3 Upon return of keys obtain receipt of keys from Owner. Make arrangements via Owner's representative for refund of key deposit.
- .4 Calls to the Owner from the subcontractors for keys or access to the building are prohibited. It shall be the Contractor's responsibility to arrange access for workers.

.7 Ensure all doors and windows are locked and secured prior to leaving the site.

1.10 OFFICES

.1 Provide office heated to 22 degrees C, lighted, and ventilated, of sufficient size to accommodate site meetings and furnished with drawing layout table and filing cabinets for construction documents as follows:

- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Reviewed Shop Drawings.

.5 List of Outstanding Shop Drawings.
.6 Site Instructions.
.7 Change Notices.
.8 Change Orders.
.9 Other Modifications to Contract.
.10 Field Test Reports.
.11 Copy of Most Recent and Approved Work Schedule.
.12 Health and Safety Plan and Other Safety Related Documents.
.13 'Notice of Project' from Ontario Ministry of Labour.
.14 Building permit.
.15 Meeting Minutes.
.16 Other documents as specified.

.2 Provide marked and fully stocked first-aid case in a readily available location.

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

1.11 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.12 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.13 CONSTRUCTION SIGNAGE

.1 Provide within two (2) weeks of signing Contract, and prior to submitting first claim for payment, minimum 4' x 8' x 5/8" G1S plywood sign, complete with wood framing and supports, showing University's cornerstone logo; listing project title, Owner's project number, name of Owner's representative (Construction Co-ordinator) complete with telephone extension; consultant and contractor name and address for all; sign background and rear face of sign shall be white; letters for names 1.25" high, black paint; typeface as respective corporate standard; provide logo for each firm listed, in corporate colour. Provide 1.25" vertical space between parties.

Submit sign sketch to the Consultant for the Owner's approval before fabrication. Sign shall be executed with exhibit lettering produced by a professional sign manufacturer/painter.

.2 Locate sign as directed by Consultant and with Owner's consent.

.3 Maintain sign in good condition for duration of work. Clean periodically. Remove immediately after Substantial Performance of the Contract, or at Completion of Contract as defined in applicable lien legislation where there is no application for Substantial Performance of the Contract.

.4 No other signs or advertisements, other than warning signs, or signs required by law, are permitted on site, without Owner's consent.

1.14 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Consultant.

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

.4 Protect travelling public from damage to person and property.

.5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

1.15 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

1.16 WASTE DISPOSAL CONTAINERS AND SERVICES

.1 Provide for garbage chutes, on-site debris collection and disposal equipment, and services needed to dispose of all debris. Do not use Owner's waste containers for disposal of debris arising from work of this Contract. Provide and pay for dedicated waste disposal for work of this Contract.

.2 Locating garbage chutes, on-site debris collection and disposal equipment, and services needed to dispose of all debris in posted fire routes will not be permitted. Vehicles and equipment found located in a posted fire route will be towed or moved without warning at vehicle owners’ or Contractors’ expense.

1.17 COMPRESSED GAS OR EXPLOSIVE-ACTUATED FASTENER TOOLS

.1 Use of compressed gas or explosive-actuated fasteners and associated tools is prohibited in buildings occupied by the Owner.

.2 Use of compressed gas or explosive-actuated fasteners and associated tools is accepted in buildings unoccupied by the Owner, and where stray fasteners will not injure personnel.

.3 Use explosive-actuated and compressed gas fastener tools only under strictest safety conditions. Keep equipment locked in storage cabinet unless in active use by personnel. Equipment shall not be left unattended, or be accessible to anyone other than authorized users.

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 SITE

.1 Lines, levels, and locations for building as per site plan.

.2 Lay out Work with reference to building and as shown on Drawings.

.3 Verify grades, lines, levels and dimensions indicated and report any errors or inconsistencies to Project Manager before commencing work. Confirm job dimensions at once to allow prompt checking of shop and other drawings.

.4 Locate and fix locations of walls, partitions, shafts and all parts of the construction, as work proceeds.

1.2 BUILDING DIMENSIONS

.1 Prior to undertaking construction, the Contractor shall be responsible for determining from measurements taken at the Place of the Work the exactness of unconfirmed dimensions.

If required, the Contractor shall obtain and pay for the services of a licensed Ontario Land Surveyor to ascertain and determine unconfirmed dimensions. Once established, the Contractor shall provide the Consultant with the results.

Also, in consultation with the Consultant, the Contractor shall determine if adjacent dimensions are affected. If they are, the Consultant shall adjust same to comply with dimensions obtained at the Place of the Work. Such determinations shall not affect the Contract Price.

.2 Ensure necessary job dimensions are taken and trades are coordinated for accuracy and completeness of such dimensions and for coordination.

.3 Verify that Work as it proceeds, is executed in accordance with dimensions and positions indicated which maintain levels and clearances to adjacent Work, as set out by requirements of the Drawings, and ensure that Work installed in error is rectified before construction continues.

.4 Check and verify dimensions referring to Work and interfacing of services. Dimensions, when pertaining to the Work of other Trades, shall be verified with the Trade concerned. Ensure that Subcontractors from various Trades cooperate for the proper performance of the Work.

.5 Do not scale directly from drawings. If there is ambiguity or lack of information, immediately inform Consultant. Any change through disregarding of this clause to be the responsibility of Subcontractor concerned.

.6 All dimensional changes resulting from the above shall be noted on the Contractor's as-built drawings.

.7 All details and measurements of any Work which is to fit or to conform to Work installed shall be taken at the Site.

.8 Where verified and determined dimensions from the Place of the Work are required in the preparation of Shop Drawings, the Contractor shall determine the exactness of the dimensions prior to the preparation of these drawings.

.9 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

1.3 LAYOUT AND SURVEY

.1 Survey Requirements: Where the work consists of an addition or extension of an existing building, or a new building, provide a survey, undertaken by an Ontario Land Surveyor, referencing the foundation and exterior walls to adjacent site features, including: existing buildings, roads, walks, trees, hydrants, and light fixtures. Submit three (3) hard copies of plan of survey and one (1) digital copy in AutoCAD format.

1.4 UTILIY AND SITE SERVICE LOCATES

.1 Employ an Ontario Land Surveyor to:

- .1 Locate by whatever means necessary, all existing services and utilities that cross or enter the Place of the Work.
- .2 Lay out all existing services and utilities on site with stakes, flags and paint.
- .3 Verify elevations of levels all existing services and utilities and relate to bench mark datum.
- .4 Verify that present, or known future restrictions, are not violated by construction on the site or lines of traverse to all public utilities.
- .5 Correlate geodetic elevation of bench mark datum with elevations in use by public utilities adjacent to Project.
- .6 Document, clearly on a copy of the site plan, the locations and elevations of all existing services and utilities and provide a copy of the documentation with other as-built documentation.

1.5 DRAINAGE

.1 Ensure that positive drainage is provided to roof, floor, and site drains and catch basins, as set in their final positions. Provide constant slopes for drained surfaces to drains and drainage courses.

.2 Ensure that allowable construction tolerances and structural tolerances do not permit ponding of water.

.3 Verify the extent of each area served by a drain, or drainage course, to eliminate possible undrained surfaces. Coordinate the work of involved trades before each proceeds.

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 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
- .2 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.

.2 Canadian Standards Association (CSA International):
- .1 CSA-O121-M1978 (R2003), Douglas Fir Plywood.

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.3 HOARDING

.1 Erect hoarding and solid overhead protection to the requirements of the authorities having jurisdiction as required to protect public, workers, occupants, public and private property from injury or damage.

.2 Erect walkways, hoarding, guards, or other protective measures and directional devices required to provide persons with safe access to the building. Temporary accesses shall permit persons to have access to the buildings over excavated areas by means of duckboards or other suitable measures to keep persons free of mud or other tracking and soiling substances. Temporary lighting to a minimum level of 20 foot-candles shall be provided for lighting of the walkways at all times.

.3 Provide hoarding at all exterior work areas, including but not limited to outdoor storage areas, garbage bins, below all exterior work operations above grade, and at other hazardous exterior work areas, and as may be indicated.

Unless otherwise indicated, or as otherwise agreed with the Owner and as may be required by legislation, acceptable exterior hoarding shall be minimum 6’ high, and be galvanized steel fence, or plywood on wood framing. “InstaFence” (905) 842-3545 portable fencing will be accepted as galvanized fencing in place of fixed galvanized fencing. Panels must be provided with T base suitable for pinning and shall be clipped together at top corners.

Contractor remains solely responsible for site security and safety and shall supplement these requirements as necessary. Erect hoarding as required to protect all persons, and all public and private property from injury and damage. Ensure conformance with all requirements of authorities having jurisdiction.

.4 Provide hoarding at interior work areas as indicated or required. Unless otherwise indicated, or as otherwise agreed with the Owner and as may be required by legislation, acceptable interior hoarding shall be vinyl-clad gypsum board screwed to steel studs or other acceptable framing/supports.

.5 Where required, provide lockable gates/doors within hoarding for access. Ensure that requirements for exiting /egress from the area are maintained and provide panic hardware as required.

.6 Provide and maintain required hoardings, barricades, guardrails, and lights in accordance with applicable regulations.

.7 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.

.8 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

.9 Erect signs to prohibit entry of unauthorized personnel into work areas.

1.4 GUARD RAILS, BARRICADES AND WARNING NOTICES

.1 Provide and maintain all required signage, construction barriers, dust screens etc. to adequately restrict and protect the public from the work site and the work being undertaken.

.2 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs, and as otherwise required by governing authorities.

.3 Wherever the Contractor's work may expose persons to danger, provide all necessary protection to prevent injury and post notices advising of the hazard.

1.5 WEATHER AND SECURITY ENCLOSURES

.1 Provide weather-tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.

.2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.

.3 Design enclosures to withstand wind pressure and snow loading.

.4 Where the existing building envelope is opened, breached, or otherwise compromised by work of this Contract, possibly permitting entry of wind or precipitation into the building, or possibly adversely affecting usual interior temperatures and humidity, provide temporary weathertight and dust-tight enclosures and protection for exterior openings made until permanently enclosed.

.5 Where the existing building envelope is opened, breached, or otherwise compromised by work of this Contract, reducing or adversely affecting the Owner's normal level of security, install temporary closures to prevent unauthorized entry and maintain Owner's usual level of security until the exterior openings permanently enclosed.

.6 Where existing interior partitions that afford security to the Owner's personnel and chattels are opened, breached, or otherwise compromised by work of this Contract, reducing or adversely affecting the Owner's normal level of security, install temporary closures to prevent unauthorized entry and maintain Owner's usual level of security until the openings permanently enclosed.

1.6 DUST TIGHT SCREENS

.1 Provide dust tight screen partitions or insulated partitions where required to localize dust generating activities, and for protection of workers, finished areas of Work and public.

.1 Provide dust tight wood door frame and wood door complete with hinges, door closer, lockset and weatherstripping at all required access points.

.2 Provide positive dust tight seal at all:

.1 Plywood joints using continuous 38 mm / 1½" wide foam tape.

.2 Access doors using weather stripping at jamb, head and sill.

.3 Around entire perimeter using continuous foam rods between dust tight screen partition and floor, walls, and ceilings.

.3 Apply plywood panels vertically flush and butt jointed.

.2 Maintain and relocate dust tight screen protection until such work is complete.

.3 Maintain and relocate protection until such work is complete.

.4 Install temporary filters to existing mechanical grilles, louvers, exhausts, etc., unless the Owner has consented to disconnect the equipment involved in which case seal off with temporary plastic sheet dust barriers.

.5 Use fans to maintain appropriate positive/negative pressure to limit migration of dust outside barriers.

1.7 FIRE SEPARATIONS

.1 Where required, erect fire separations for any temporary alternative exits from the building including any exit doors and exit corridors and including signage and lighting.

.2 Maintain all components for the temporary alternative exit during construction.

1.8 ODOUR CONTROL

.1 Where work, such as painting, asphalting or roofing, will generate odours, take all necessary measures to limit migration of odours outside immediate work area and limit effect on Owner’s operations.

.2 Acceptable measures include working outside normal working hours to permit smells to dissipate by the time Owner’s personnel return to work, extending ductwork. Only as a last resort, and the absence of any other acceptable measure, arrange shutdown of Owner’s air handling equipment, and/or Owner’s operations.

1.9 NOISE CONTROL

.1 Take all efforts to limit adverse impact of noise generating operations on Owner’s ongoing use of adjacent areas.

.2 Be advised that low frequency vibrations, in particular, such as those from coring and drilling, transmit throughout structures.

.3 Execute work that creates noise unacceptable to the Owner outside Owner's normal working hours, and such work shall be included in Contract Price.

1.10 ACCESS TO SITE

.1 Use existing driveways, roads, parking areas, and sidewalk crossings as may be required for access to the work.

.2 Maintain reasonable access at all times to all buildings, roads, walkways, service roads and adjacent parking areas.

.3 Arrange with the Owner for use of building loading docks, where applicable.

.4 Protect existing driveways, roads, parking areas and sidewalk crossings from damage, and make good damage arising.

.5 Keep public roads clean of soiling. Clean as required.

.6 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.11 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

.2 Parking in posted fire routes will not be permitted. Vehicles found parked in a posted fire route will be towed without warning at vehicle owners' expense.

.3 Conform to approved plans related to any construction in or along posted fire routes.

.4 Where deliveries or pickups of large equipment are expected or the placement of large construction is required in or along a posted fire route, planning prior to any placement is required and is to include dates, duration of time, provision for alternative fire route access and acknowledgement that the delivery person or driver will be present at all times. Approval via the Owner's construction personnel is required.

1.12 FIRE ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.13 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.14 PROTECTION OF BUILDING FINISHES AND EQUIPMENT

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Be responsible for damage incurred due to lack of or improper protection.

.4 Furnishings and Equipment Relocation and Protection:

.1 Unless otherwise indicated, the Owner will not remove portable furnishings and equipment from the work area to suit work of this Contract. Protect and keep safe all chattels remaining in place.

.2 Subject to the Owner's approval, furnishings and equipment may be relocated by the Contractor to other areas of the facility in which work occurs. Contractor to protect and relocate these furnishings and equipment to suit work. Return furnishings and equipment to original location when location ready to receive furnishings.

.3 Protect all finishes, furnishings, fittings, equipment, occupants' effects, etc. from damage and soiling. Protect building, equipment, furnishings and remaining in or adjacent to any area in which work is occurring as required, and as specified elsewhere. Make good all damage to the satisfaction of the Owner. Erect dust protection as needed to maintain existing building clean of all disruption and debris from work of this Contract.

.5 Provide 6 mil polyethylene coverings to prevent soiling of complex surfaces and compartments. Tape polyethylene in place. Provide additional protection to prevent other damage where required. This includes but is not limited to using plywood or OSB sheets to prevent impact damage. Fastening shall not damage elements being protected.

.6 At wall murals, plaques, display cabinets, and other elements of significance in rooms in which work will occur, provide temporary protection consisting of 6 mil polyethylene dust protection and minimum 1/2" OSB impact protection, secured to wood framing and blocking. Fastening shall not damage elements being protected. Protection shall remain in place until all adjacent work is complete.

.7 Provide all necessary protection to furnishings and chattels that remain in place during the Work. Use 6 mil polyethylene coverings, movers' quilts, OSB, etc., as required. Prevent all damage.

1.15 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

1.16 GARBAGE CHUTES

.1 Debris shall not be allowed to free-fall from openings in the building's exterior walls. Provide garbage chutes in compliance with applicable legislation where debris from upper floors is dropped from the building. Existing windows may be removed and re-installed to suit this requirement, subject to maintaining weather and security protection.

1.17 LOCKOUT PROCEDURES

.1 All work to be done on systems or machinery, where the unexpected switching on or off of the system or machinery could result in personal injury, shall be done in accordance with the Contractor's standard lockout procedure. The Contractor shall provide his/her own locks for the above procedure. At a minimum, lock out procedures shall consist of switches padlocked in off position, and tagged to advise of inadvertent operation.

.2 Where there is risk of injury to both the Owner's and the Contractor's personnel due to equipment re-activation, double lockout procedures shall be employed, with each of the Contractor and the Owner providing separately keyed locks and tags to the switches. Do not remove locks and tags until each party's responsible has:

.1 Independently ascertained that no injury will be caused to personnel by re-activating the equipment.

.2 Verified to the other party that no injury will be caused to personnel by re-activating the equipment.

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 SECTION INCLUDES

.1 Product quality, availability, storage, handling, protection, and transportation.

.2 Manufacturer's instructions.

.3 Quality of Work, coordination, and fastenings.

1.2 REFERENCES

.1 Canadian Construction Documents Committee (CCDC):
.1 CCDC 2-2008, Stipulated Price Contract.

.2 Within text of each specifications section, reference may be made to reference standards.

.3 Conform to these reference standards, in whole or in part as specifically requested in specifications.

.4 If there is question as to whether products or systems are in conformance with applicable standards, Consultant reserves right to have such products or systems tested to prove or disprove conformance.

.5 Cost for such testing will be borne by Owner in event of conformance with Contract Documents or by Contractor in event of non-conformance.

.6 Conform to latest date of issue of referenced standards in effect on date of submission of bids, except where a specific date or issue is specifically noted.

1.3 QUALITY

.1 Refer to CCDC 2.

.2 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.3 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

.4 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous reviews. Consultant review does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.5 Should disputes arise as to quality or fitness of products, decision rests strictly with Consultant based upon requirements of Contract Documents.

.6 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.7 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.

.8 Products, which are specified by their proprietary names, or by parts or catalogue number, shall form the basis for the specifications and the Contract. No substitutes for these products may be used without the Consultant's approval in writing. Substitutes will be considered only when submitted in sufficient time to permit proper investigation by the Consultant.

.9 In applying for permission to use substitutes, the Contractor shall prove to the Consultant's satisfaction that the substitute meets or exceeds the characteristics of the specified product. Each application shall be accompanied by a list of properties of the specified product and the proposed substitute. When requesting approval for the use of substitutes, the Contractor shall include in his submission any effect that the substitution may have on the Contract Price and Contract Time. No application to use substitutes will be considered unless made in this way.

.10 Whenever more than one product is specified for use, the Contractor may use any of the products so specified unless the drawings or specifications indicate otherwise.

.11 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

1.4 AVAILABILITY

.1 In submitting Bid, Contractor warrants that all materials are available in suitable time to meet Contract dates.

.2 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.3 In event of failure to notify Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

.4 Where the Contractor can show that the Contractor promptly ordered the originally specified materials the Owner will pay the differential in cost between the originally specified material and the substitute material without any mark-ups applicable by the Contractor, subcontractors, subcontractors or suppliers. For greater certainty, the Contractor’s failure to submit shop drawings or other submittals or seek direction in those instances where the Contract Documents so require in sufficient time to permit ordering materials is not cause for the Owner to pay the cost differential in 1.4.2 above.

1.5 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in 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 seal and labels intact. Do not remove from packaging or bundling until required in 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, lumber and other similar materials on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in 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 satisfaction of Consultant.

.9 Touch-up damaged factory finished surfaces to Consultant's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.6 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

.2 Transportation cost of products supplied by Owner will be paid for by Owner. Unload, handle and store such products.

1.7 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in 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.

.2 Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant will establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Consultant to require removal and re-installation at no increase in Contract Price or Contract Time.

1.8 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Consultant if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Consultant reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Consultant, whose decision is final.

1.9 COORDINATION

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.10 CONCEALMENT

.1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation inform Consultant if there is interference. Install as directed by Consultant.

1.11 REMEDIAL WORK

.1 Refer to CCDC 2.

.2 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.3 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.12 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Consultant of conflicting installation. Install as directed.

.3 Where job conditions require reasonable changes in indicated locations and arrangements, make changes at no change to the Contract Price. Similarly, where existing conditions interfere with new installation and require relocation, include such relocation in the work of this Contract.

.4 Install and arrange fixtures and equipment to maintain maximum headroom and space.

1.13 FASTENINGS

.1 Provide permanent fastenings, anchors, adhesives and accessories required for performance of the work in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.3 Prevent electrolytic action between dissimilar metals and materials.

.4 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.5 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.6 Keep exposed fastenings to a minimum, space evenly and install neatly.

.7 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

.8 Fastenings, anchors, accessories and adhesive shall be of appropriate type and of sufficient quantity and in such a manner as to provide positive permanent anchorage of the unit to be anchored in position. Install anchors at spacing within limits of load bearing and shear capacity to accommodate applied loads so that the secured unit cannot work loose, fall, or shift out of position. Ensure fastenings, anchors, accessories and adhesives provide positive permanent anchorage.

1.14 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.15 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Consultant.

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 Construction Documents Committee (CCDC):
.1 CCDC 2-2008, Stipulated Price Contract.

1.2 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Consultant of findings.

1.3 LOCATION OF EQUIPMENT AND FIXTURES

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Consultant of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Consultant.

1.4 SUBSURFACE CONDITIONS

.1 Promptly notify Consultant in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.

.2 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

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 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit written request in advance of cutting or alteration which affects:
- .1 Structural integrity of elements of project.
- .2 Integrity of weather-exposed or moisture-resistant elements.
- .3 Efficiency, maintenance, or safety of operational elements.
- .4 Visual qualities of sight-exposed elements.
- .5 Work of Owner or separate contractor.

.3 Include in request:
- .1 Identification of project.
- .2 Location and description of affected Work.
- .3 Statement on necessity for cutting or alteration.
- .4 Description of proposed Work and products to be used.
- .5 Alternatives to cutting and patching.
- .6 Effect on Work of Owner or separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.2 MATERIALS

.1 Required for original installation.

.2 Change in Materials: submit request for substitution in accordance with Section 01 33 00 – Submittal Procedures.

1.3 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.4 CONCRETE CUTTING AND CORING

.1 Prior to cutting or coring any concrete slab, suspended or on grade, or any concrete beam, investigate by telemetrically scanning the element for presence of embedded services (piping, cabling, conduit, etc.), and for locations of reinforcing steel.

.2 Acceptable telemetric scanning systems include:

.1 X-Ray scanning of suspended slabs and for concrete beams.

.2 (Ground-penetrating) radar for slab on grade, for suspended slabs and for concrete beams.

.3 Magnetic radio scanners not acceptable for telemetric scanning.

.4 The term x-rays includes gamma ray methods, and procedures that use electrically generated x-rays.

.5 Where x-rays employed:

.1 Provide Owner minimum 5 working days advance notice of scanning time in order to provide sufficient advance notice to occupants to evacuate building to extent required for protection required from radiation.

.2 Post on all exterior doors of any building in which radiography will occur a completed "Construction X-Ray Advisory" form. Where the radiography occurs on an outdoor site, or affects outdoor areas, or is otherwise not in an occupied building, place a completed "Construction X-Ray Advisory" form on all faces of the hoarding, in the most visible locations, and on the exterior doors of any affected buildings. Where the area that is off-limits to persons extends outside hoarding, place signs on approaches at least 10'/3m outside the point where warning barricades will be erected.

.3 Sign postings shall occur on or before the day on which the work will occur. Immediately prior to x-ray image exposure verify signs are in place, replace any missing signs. Remove upon completion of x-ray work.

.4 At least 5 days prior to x-rays being completed, provide to the Owner the name(s) of the supervising radiographer and the personnel who will be posted as watchpersons at the barricades. Provide details of where each watchperson will be located and confirm full coverage to prevent inadvertent exposure of occupants to radiation.

.5 The radiographer supervising the x-ray work shall have a cell phone on his/her person during the work and it shall remain 'on' at all times during x-ray work. Provide the supervising radiographer's cell phone number to the Owner.

.6 Provide barriers and watch persons at each barrier during x-ray image exposures. Minimum acceptable barrier is pre-printed plastic tape. Continuous sawhorse barricades, hoarding, fencing (where equipped with signage required by regulations) also acceptable.

.7 Post all required safety and warning notices in advance of scanning and remove same immediately upon completion of scanning.

.8 On request provide copies of all exposure records or exposure logs to Owner. Provide material within 72 hours of request.

.6 Provide Owner and Consultant with inspection agency's written report, summarizing investigations and conclusions.

.7 Obtain Consultant's direction where investigations reveal that cutting or coring required in Contract would cut or damage embedded services, or cut or damage reinforcing steel in suspended concrete slabs or beams.

.8 Execute cutting and coring to prevent damage to all embedded services. Make good all damage arising from cutting embedded services.

.9 Make good all damage arising from cutting reinforcing steel in concrete slabs and beams.

1.5 EXECUTION

.1 Execute cutting, fitting, and patching to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

.6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.9 Restore work with new products in accordance with requirements of Contract Documents.

.10 Fit Work to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.11 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with fire stopping material in accordance with Section 07 84 00 – Fire stopping, full thickness of the construction element.

.12 Refinish surfaces to match adjacent finishes: refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

.13 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

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 SECTION INCLUDES

.1 Progressive cleaning.

.2 Final cleaning.

1.2 REFERENCES

.1 Canadian Construction Documents Committee (CCDC):
  .1 CCDC 2-2008, Stipulated Price Contract.

1.3 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site.

.3 Clear snow and ice from access to building. Remove from site.

.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.5 Provide on-site waste containers for collection of waste materials and debris.

.6 Provide and use marked separate bins for recycling. Refer to Section 01 74 2 – Construction/ Demolition Waste Management and Disposal.

.7 Dispose of waste materials and debris-off-site, in accordance with authorities having jurisdiction.

.8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

.9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

.13 Where walks and roads are soiled by work of this Contract:

.1 At a minimum, weekly sweep and wash Owner's roads and walks soiled by work of this Contract. Sweep and wash roads and walks more frequently where soiling may be tracked into adjacent buildings. Sweep and wash public roads and walks weekly, at a minimum, and more frequently as required by local municipality.

.14 Clean work area(s) upon completion of each day's work, and maintain areas free of dust and other contaminants during finishing operations. On a daily basis maintain project site and public properties free from debris and waste material.

.15 Provide for garbage chutes, on-site debris collection and disposal equipment, and services needed to dispose of all debris. Do not use Owner's waste containers for disposal of debris arising from work of this Contract. Provide and pay for dedicated waste disposal for work of this Contract.

1.4 FINAL CLEANING

.1 Refer to CCDC 2, GC 3.13.

.2 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.3 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.4 Prior to final review remove surplus products, tools, construction machinery and equipment.

.5 Remove waste products and debris.

.6 Remove waste materials from site at regularly scheduled times. Do not burn waste materials on site.

.7 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.8 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

.9 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.

.10 Clean lighting reflectors, lenses, and other lighting surfaces.

.11 Vacuum clean and dust building interiors, behind grilles, louvres and screens.

.12 Unless noted otherwise wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.

.13 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.14 Broom clean and wash exterior walks, steps and surfaces, paved areas and rake clean other surfaces of grounds affected by the Work.

.15 Remove dirt and other disfiguration from exterior surfaces affected by the Work.

.16 Clean and sweep roofs, gutters, areaways, and sunken wells.

.17 Sweep and wash clean paved areas.

.18 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.

.19 Clean roofs, downspouts, and drainage systems.

.20 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.21 Remove snow and ice from access to building.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

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 Definitions:

.1 Approved/Authorized Recycling Facility: waste recycler approved by applicable provincial authority

.2 Class III: non-hazardous waste - construction renovation and demolition waste.

.3 Construction, Renovation and/or Demolition (CRD) Waste: Class III solid, non-hazardous waste materials generated during construction, demolition, and/or renovation activities

.4 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.

.5 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.6 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

.7 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors.

.8 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

.9 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.

.2 Reference Standards:

.1 Ontario Ministry of Environment:

.1 Ontario 3 R's Regulations (regulation 102/94) for waste management programs applicable to construction and demolition projects greater than 2,000 m^2.

.2 Ontario Environmental Protection Act (EPA)

.1 Regulation 102/94, Waste Audits and Waste Reduction Workplans.

.2 Regulation 103/94, Source Separation Programs.

.2 Canadian Construction Association (CCA):

.1 CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.

1.2 USE OF SITE AND FACILITIES

.1 Execute Work with minimal interference and disturbance to normal use of premises.

.2 Maintain security measures established by facility.

1.3 WASTE PROCESSING SITES

.1 Contractor is responsible to research and locate waste diversion resources and service providers. Salvaged materials are to be transported off site to approved and/or authorized recycling facilities or to users of material for recycling.

1.4 STORAGE, HANDLING AND PROTECTION

.1 Unless specified otherwise, materials for removal become Contractor's property.

.2 Protect, stockpile, and store salvaged items.

.3 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.4 Protect structural components not removed for demolition from movement or damage.

.5 Support affected structures. If safety of building is endangered, cease operations and immediately notify Consultant.

.6 Protect surface drainage, mechanical and electrical from damage and blockage.

.7 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.

.8 Separate and store materials produced during dismantling of structures in designated areas.

.9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.

- .1 On-site source separation is recommended.
- .2 Remove co-mingled materials to off-site processing facility for separation.
- .3 Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

1.5 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of waste, volatile materials, mineral spirits, oil, or paint thinner into waterways, storm, or sanitary sewers.

.3 Remove materials on-site as Work progresses.

1.6 SCHEDULING

.1 Coordinate Work with other activities at site to ensure timely and orderly progress of Work.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Handle waste materials not reused, salvaged or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.2 Source separate materials to be reused/recycled into specific sort areas.

END OF SECTION

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 2-2008, Stipulated Price Contract.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Procedures for Acceptance of Work:
  .1 Contractor's Inspection: Prior to making application for substantial performance of the Work:
    .1 Conduct inspection of Work, identify in writing a comprehensive list of deficiencies and defects, and repair as required to conform to Contract Documents.
    .2 Notify Consultant in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
  .2 Request in writing for Consultant to review Work and identify defects and deficiencies.
  .3 Completion Tasks: submit written certificates that tasks have been performed as follows:
    .1 Work: completed and inspected for compliance with Contract Documents.
    .2 Defects: corrected and deficiencies completed.
    .3 Equipment and Systems: tested, adjusted, and balanced and fully operational.
    .4 Elevator has been tested and certified by authorities having jurisdiction and is fully operational.
    .5 Fire alarm verification certificate issued to Consultant.
    .6 Final Electrical Safety Authority (ESA) Inspection Certificate issued to Consultant.
    .7 Certificates required by Utility companies: submitted.
    .8 Operations and maintenance manuals have been submitted and reviewed by Consultant.
    .9 Operation of Systems: demonstrated to Owner's personnel.
    .10 Commissioning of mechanical systems: completed in accordance with 01 91 01 – Commissioning and except for warranty and seasonal verification activities specified within, submit four (4) copies of final Commissioning Report submitted to Consultant.
    .11 Work: complete and ready for final review.
  .4 Consultants Review (Stage 1):
    .1 When completion tasks are done, make application for Certificate of Substantial Performance. Refer to CCDC 2, General Conditions Article GC Part 5, and Payment. Request in writing for a review of Work to be performed, Consultant, and Contractor for the purpose of obtaining Substantial Performance.
    .2 The Consultant will prepare a written list of deficiencies which will be issued to the Contractor. The Contractor shall then proceed to correct the deficiencies and complete the Work.

.3 Should the Work be deemed complete by the Consultant for the purpose of declaring the project Substantially Performed, the Consultant will issue a Certificate of Substantial Performance to the Contactor and Owner in accordance with the requirements of the lien statute of Place of Work. The Contractor shall then proceed to Stage 2 for Finishing Work.

.4 Should Work be deemed incomplete according to Owner and Consultant, complete outstanding items and repeat the steps noted above for additional Stage 1 reviews. Refer also to Item 1.4 Number of Reviews.

.5 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.6 Final Payment (Stage 2):

.1 Upon completion of the outstanding items noted in Stage 1, request in writing for a final review of Finishing Work to be performed by Owner, Consultant, and Contractor for the purpose of obtaining Total Performance.

.2 When the Consultant considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment. Should the Work be deemed complete by the Consultant for the purpose of declaring the project Totally Performed, the Consultant will request from the Contractor complete with the required submittals as prescribed in Section 01 29 00 Payment Procedures, Final Payment.

.3 Refer to CCDC 2: when Work is deemed incomplete by Consultant. Complete outstanding items and request re-inspection.

.4 Should Work be deemed incomplete according to Owner and Consultant, complete outstanding items and repeat the steps noted above for additional Stage 2 Reviews. Refer also to Item 1.4 Number of Reviews.

.7 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.4 NUMBER OF REVIEWS

.1 The Consultant and the Owner will perform final reviews as described above, under the headings of Stage 1 and Stage 2.

.2 Should additional reviews be necessary in the opinion of the Consultant as noted in Stage 1 and / or Stage 2 reviews, such reviews will be performed by the Consultant and Owner and the Contractor shall pay all costs of time, transportation and miscellaneous expenses incurred by any and all members of the Consultant and Owner team.

.3 The applicable Consultant rates shall be J.L. Richards & Associates Limited current per diem professional rates. The Owner shall be reimbursed at the Owner’s established rates.

1.5 SYSTEMS DEMONSTRATION

.1 Prior to final review, demonstrate operation of each system to Owner. Ten (10) days prior to demonstration, provide an agenda for demonstration and a written description of operating procedure and maintenance, including schematics and diagrams for operation and maintenance of building services equipment and systems being demonstrated.

.2 Responsible personnel from Contractor, Subcontractors and equipment suppliers whose work is being demonstrated shall be present as required at these demonstrations.

.3 Refer also to Section 01 91 01 - Commissioning.

1.6 FINANCIAL CLOSEOUT

.1 Execute transition of Performance and Labour and Materials Payment Bond, if any, to warranty period requirements.

.2 Submit a final statement of accounting giving total adjusted Contract Price, previous payments, and monies remaining due.

.3 Consultant will issue a final change order reflecting approved adjustments to Contract Price not previously made.

1.7 FINAL CLEANING

.1 Clean in accordance with Section 01 74 11 – Cleaning.

.2 Remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

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 SECTION INCLUDES:

.1 Record documents, samples, specifications.

.2 Equipment and systems.

.3 Product data, materials and finishes, and related information.

.4 Operation and maintenance data.

.5 Record Drawings.

.6 Warranties and bonds.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one month prior to contract completion with Consultant and Owner, in accordance with Section 01 31 19 – Project Meetings to:

.1 Verify Project requirements.

.2 Review manufacturer's installation instructions and warranty requirements.

.2 Consultant to establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for type of defects.

.3 Determine reasonable response time.

.3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.

.4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Two weeks prior to Substantial Performance of the Work, submit to the Consultant:

.1 Four (4) final copies and an electronic copy of operating and maintenance manuals.

.2 Four (4) copies and an electronic copy of Commissioning Report, except warranty and seasonal verification activities manuals.

.3 Two weeks following Substantial Performance of the Work, provide to the Consultant and / or Owner as directed by Consultant:

.1 Spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.

.1 Provide evidence, if requested, for type, source and quality of products supplied.

.2 Defective products will be rejected, regardless of previous inspections. Replace products at no cost to Owner.

.2 Record documents.

.3 Maintenance materials.

.4 Warranties.

1.4 FORMAT

.1 Organize data as instructional manual.

.2 Binders: black vinyl, hard covered, with labelling pocket on spine, 3 'D' ring, loose leaf 8 ½ x 11 inches with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings.

.1 Identify contents of each binder on spine.

.4 Cover: enclose title sheet labelled "Operating and Maintenance Data Manual", project name, date and list of contents.

.5 Arrange content by systems, 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.

.1 Bind in with text; fold larger drawings to size of text pages.

1.5 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for each volume (provide title of project):

.1 Date of submission; names.

.2 Addresses, and telephone numbers of Consultant and Contractor / Subcontractor with name of responsible parties.

.3 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.

.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 – Quality Control.

.6 Operational information on equipment, cleaning and lubrication schedules, filters, overhaul and adjustment schedules and similar maintenance information; copy of building permit;

.7 Testing and Inspection Reports:

.1 Copy of final inspection certificate by Electrical Safety Authority;

.2 Copy of fire alarm verification certificate;

.3 Copy of sprinkler test verification certificate;

.4 Copy of certificates issued by other utilities;

.5 Copies of field tests;

.6 Copies of all inspection and testing reports;

.8 Maintenance instructions for finished surface and materials;

.9 Copy of hardware and paint schedules;

.10 Training: refer to Section 01 91 01 – Commissioning.

1.6 RECORD DOCUMENTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, at site for Consultant one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Supplemental Instructions.

.5 Change Orders and other modifications to Contract.

.6 Reviewed shop drawings, product data, and samples.

.7 Field test records.

.8 Inspection certificates.

.9 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.

.1 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.

.1 Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition.

.1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for review by Consultant.

1.7 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 After award of Contract, the Owner will provide an electronic copy of the contract drawings and specifications (or project manual) for purpose of maintaining record drawings and specifications. The Contractor will be responsible for printing three (3) sets of whiteprint (blueline or blackline) contract drawings and specifications. Accurately and neatly record deviations from Contract Documents caused by site conditions and changes ordered by Consultant and the Owner. Mark all copies as "Project Record Copy"

.2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress:

- .1 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 Concealed components of mechanical and electrical services.
- .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
- .4 Field changes of dimension and detail.
- .5 Supplemental Instructions.
- .6 Changes made by change orders.
- .7 Details not on original Contract Drawings.
- .8 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 Supplemental Instructions.
- .3 Changes made by Addenda and change orders or change directives.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

.7 At completion of project and prior to final review, neatly transfer notations to a second and third set of drawings and specifications. In addition, create an electronic copy of the record drawings and specifications complete with references to the notations and any specific details, in the .pdf format of the original electronic copy. Submit all final copies to Owner via the Consultant.

1.8 EQUIPMENT AND SYSTEMS

.1 For each item of equipment and each system include description of unit or system, and component parts.

- .1 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.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.

.1 Include regulation, control, stopping, shut-down, and emergency instructions.

.2 Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Include test and balancing reports as specified in Section 01 91 01 - Commissioning.

.15 Additional Requirements: as specified in individual specification sections.

1.9 MATERIALS AND FINISHES

.1 Building Products, Applied Materials and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

.1 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.

1.10 MAINTENANCE MATERIALS

.1 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:

.1 Submit inventory listing to Consultant.

.2 Include approved listings in Maintenance Manual.

.3 Obtain receipt for delivered products and submit prior to final payment.

.2 Extra Stock 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:

.1 Submit inventory listing to Consultant.

.2 Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

.3 Special Tools:

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue items:

.1 Submit inventory listing to Consultant.

.2 Include approved listings in Maintenance Manual.

1.11 DELIVERY, STORAGE AND HANDLING

.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 for review by Consultant.

1.12 WARRANTIES AND BONDS

.1 Develop warranty management plan to contain information relevant to Warranties.

.2 Submit warranty management plan, thirty (30) days before planned pre-warranty conference, to Consultant approval.

.3 Warranty management plan to include required actions and documents to assure that Owner receives warranties to which it is entitled.

.4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

.5 Submit, warranty information made available during construction phase, to Consultant for approval prior to each monthly pay estimate.

.6 Assemble approved information in binder, submit upon acceptance of work and 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.

.7 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.

.8 Conduct joint four (4) month and nine (9) month warranty inspection, measured from time of acceptance, by Consultant.

.9 Include information contained in warranty management plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.

.2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and commissioned systems such as fire protection, alarm systems, sprinkler systems, and lightning protection systems,.

.3 Provide list for each warranted equipment, item, feature of construction or system indicating:

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

.5 Names, addresses and telephone numbers of sources of spare parts.

.6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

.9 Summary of maintenance procedures required to continue warranty in force.

.10 Cross-reference to specific pertinent Operation and Maintenance manuals.

.11 Organization, names and phone numbers of persons to call for warranty service.

.12 Typical response time and repair time expected for various warranted equipment.

.4 Contractor's plans for attendance at four (4) and nine (9) month post-construction warranty inspections.

.5 Procedure and status of tagging of equipment covered by extended warranties.

.6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

.10 Respond in timely manner to oral or written notification of required construction warranty repair work.

.11 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the Consultant to proceed with action against Contractor.

1.13 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag.

.2 Attach tags with copper wire and spray with waterproof silicone coating.

.3 Leave date of acceptance until project is accepted for occupancy.

.4 Indicate following information on tag:

.1 Type of product/material.

.2 Model number.

.3 Serial number.

.4 Contract number.

.5 Warranty period.

.6 Inspector's signature.

.7 Construction Contractor.

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 RELATED SECTIONS

.1 Section 01 11 00 – Summary of Work

.2 Section 01 33 00 – Submittal Procedures

.3 Section 01 43 00 – Quality Plan

.4 Section 01 45 00 – Quality Control

.5 Section 01 61 00 – Common Product Requirements

.6 Section 01 77 00 – Closeout Procedures

.7 Divisions 20 - 27 – Mechanical, Electrical and Communications

1.2 DEFINITIONS

.1 Commissioning Authority (CxA) – Owner's appointed representative – retained by the University of Guelph.

.2 Consultant Team – consists of those professionals who are responsible for the design and performance objectives and are listed in Section 00 00 03 – Project and Consultant Identification.

.3 Commissioning Team – consists of various participants involved in the commissioning process. The commissioning documentation and tasks of each team member will be coordinated through the CxA.

1.3 CONSULTANT TEAM

.1 The Consultant Team for the Project is responsible for developing a set of performance objectives and providing a design that meets those objectives. The Consultant Team will be required to assist with developing and witnessing the system tests. Consultants are to advise the Contractor as to which tests require witnessing.

1.4 COMMISSIONING TEAM

.1 Members of the team shall include the following as a minimum:

- .1 Owner:
  - .1 Owner's Representative
  - .2 Owner's Facility Management Representative
  - .3 Owner's Commissioning Authority (CxA)
- .2 Consultant Team:
  - .1 Architect
  - .2 Mechanical Consultant
  - .3 Electrical Consultant

.3 Contractors
  .1 General Contractor (GC/CM)
  .2 Mechanical Sub-contractor
  .3 Electrical Sub-contractor
  .4 Testing and Balancing Agent
  .5 Controls Sub-Contractor
  .6 Other Sub-Contractors (as applicable)

.4 Other key players in the commissioning process include:
  .1 Manufacturer's Representatives (as applicable)
  .2 Inspectors and Testing Agencies:
    .1 Building Inspection
    .2 Power Utility

1.5 DESCRIPTION

.1 Commissioning is a systematic process of ensuring that all building systems installed in accordance with the drawings and specifications, manufacturer's requirements and good industry practice. Commissioning also ensures that equipment operates and performs, in and of itself as well as in the system, as was intended by the designers in response to the owner's requirements. Finally, commissioning ensures the owner has the documentation and training required to operate the equipment and systems in a safe, efficient and long lasting manner.

.2 During the construction phase, commissioning will include the following specific activities:

  .1 Review of shop drawings for commissionable mechanical and electrical equipment and systems at the same time as the design engineers. Comments from the CxA will be given to the design engineers to incorporate into their review as appropriate. Contractors will respond to the comments from the engineer of record.

  .2 Integration of commissioning activities into the project schedule. The CxA will provide a list of milestone activities complete with expected durations and due dates for inclusion in construction schedule. Progress will be monitored against these dates during commissioning inspections.

  .3 Verify equipment is installed in accordance with the manufacturer's recommendations and industry accepted standards including review of completed manufacturers' start-up sheets, supplemented where required with commissioning pre-functional checklists provided by the CxA. Contractor shall complete check sheets as required by the CxA.

  .4 Verify equipment is set-up, adjusted and balanced to perform as specified. This will include review of Testing, Adjusting, and Balancing (TAB) procedures, review of TAB reports and spot checking measurements on site. The TAB contractor shall cooperate with the CxA providing information requested and tools and manpower for spot checking measurements as required by the CxA.

  .5 Functional Performance Testing (FPT) of mechanical and electrical equipment and systems to ensure proper, complete and efficient operation under the range of conditions they are expected to encounter. Contractors shall provide manpower, tools and other services as required by the CxA to perform the FPT.

  .6 Provide a review of the construction draws from a commissioning perspective and provide recommendations to the Prime Consultant and the University.

.7 CxA will review O&M documentation provided to the owner to ensure it is complete and acceptable for ongoing operation and maintenance of the equipment. The review shall be sent to the consultant for incorporation with his comments. The Contractors shall provide changes as required by the Engineer.

.8 The CxA will witness the Owner's operating personnel training to verify it was adequate and complete to ensure they fully understand the requirements of operating and maintaining the equipment. Contractors shall ensure training meets the approval of the CxA and provide additional training if requested.

.3 Commissioning does not take away from, reduce responsibility of or in any way diminish the requirement for the consultant team and installing contractors to provide a complete, finished and fully functioning product.

1.6 OWNER RESPONSIBILITIES

.1 Responsibilities of the owner are as follows:

.1 Retain the services of the Commissioning Authority.

.2 Work with the CxA to define the design intent of the building and system by developing the Owner's project Requirements. Provide a copy of the document to the commissioning team.

.3 To provide operating personnel to attend training and instruction regarding specific components, equipment and systems.

.4 To observe on-site installation, start-up and testing equipment and systems.

.5 To provide assistance to resolve issues identified by the CxA including scheduling concerns.

1.7 CONSULTANT TEAM RESPONSIBILITIES

.1 Responsibilities of Consultant are as follows:

.1 Define the Basis of Design to meet the Owner's Project Requirements.

.2 Prepare the design documents outlining the project requirements.

.3 Review contractor's shop drawings submission to ensure that the equipment proposed comply with specifications requirements.

.4 Review contractor's submittals to ensure compliance with the specifications requirements.

.5 Monitor, check, inspect and report on the installation throughout the construction stages to ensure the equipment installation is as approved and the installation method, workmanship, procedures will follow the approved submission and method statement.

.6 Inspect the systems installation and issue deficiencies reports. Ensure deficiencies are corrected and certify installation of systems.

.7 Review operating and maintenance manuals, balancing and test reports and as-built for accuracy.

.8 Witness tests, note any deficiencies and provide progress report.

.9 Review contractor's progress draws against actual construction progress on site and incorporate CxA comments as part of the payment certification process.

1.8 COMMISSIONING AUTHORITY RESPONSIBILITIES

.1 Construction Phase:

.1 Coordinate and direct the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communication and consultations with all necessary parties, update timelines and schedules.

.2 Develop and maintain the commissioning plan.

.3 Review contractor's shop drawing submission for commissioning related issues.

.4 Prepare commissioning plan based on the contractor's schedule and installation method statement. Provide all required pre-functional, start-up and functional performance checklists.

.5 Monitor, check and inspect the installation throughout the construction stages.

.6 Co-ordinate with the GC/CM to have commissioning activities integrated into the project schedule. Include durations and dates for key milestone commissioning activities to be completed.

.7 Issue deficiencies reports noting any issues that may have an impact on the commissioning of the equipment or system. Maintain an ongoing commissioning issues log. Issues log is to include any concerns with meeting the milestone commissioning dates.

.8 Attend construction site meetings as required to discuss commissioning related items and any impact on project schedule.

.9 Set-up and chair commissioning meetings.

.10 .Perform review of pre-functional checklists.

.11 .Witness and validate tests and note deficiencies.

.12 .Work with the commissioning team to expeditiously resolve any problems that may arise due to site conditions, or commissioning deficiencies.

.13 .Prepare Systems Manual.

.14 .Direct functional verification testing. Record all testing results. Contractor shall operate the equipment during functional performance testing.

.15 .Direct integrated system testing as required.

.16 .Assist the GC/CM in the co-ordination of owner training. Participate in training sessions as required to verify that information has been adequately provided to the owner.

.17 Provide a review of the construction draws from a commissioning perspective and provide recommendations to the Prime Consultant and the University. The chart below will be utilized by the CxA to evaluate the construction draws. Refer also to Section 01 29 00.1 – Payment Procedures for further details.

Carry 1% of overall contract value for cx'ing paperwork only. Validation of the cx'ing process is tied to progress draws and in particular Schedule of Values using the following chart. For example, fans cannot invoice more than 75%, if the pre-functional verifications are not complete, or more than 95% if the equipment start-up checklists & execution and functional performance testing is not complete.

	Schedule of Values % Complete					
	10%	**25%**	**75%**	**95%**	**97%**	**99%**
Cx'ing Tasks to be Completed by these Milestone Percentages	* Cx'ing Kick Off Meeting Held	* Shop Drawing Submittal Review Process Complete	* Pre-functional Verifications Complete	* Equipment Start-up Checklists & Execution Complete	* As-built Drawings and O&M Manuals Submitted	* All Items on the Cx'ing Issues Log have been Addressed
	* Contractors Name Their Cx Agent (Designated Representative)	* Project Schedule has Incorporated Cx'ing Tasks		* Functional Performance Testing Complete	* Owner Training Complete	

.2 Post-Construction Phase:

.1 Prepare final report on commissioning, identifying any deficiencies that may be outstanding.

.2 Direct deferred functional verification testing.

.3 Review commissioning issues with the commissioning team prior to the end of warranty.

1.9 CONTRACTOR RESPONSIBILITIES

.1 .1 General Contractor:

.1 Provide a designated representative to attend commissioning meetings.

.2 Provide a copy of the project schedule to the CxA. Work with the CxA to coordinate commissioning activities and integrate them into the overall project schedule.

.3 Coordinate the resolution of deficiencies identified through the commissioning process with the sub-trades.

.4 Coordinate scheduling of owner training with the sub-trades.

.5 Return to site approximately 10 months after the start of the warrantee period to review system operation and to address operational issues.

.6 Include the CxA in the distribution of construction draws for their review.

.2 Mechanical Contractor:

.1 Attend initial commissioning coordination meeting.

.2 Provide a complete set of all submittals for mechanical equipment for the CxA.

.3 Provide complete equipment and systems start-up including personnel and tools, as required for safe, proper and complete start-up of all mechanical equipment.

.4 Perform pre-functional, start-up and complete required documentation as directed by CxA.

.5 Correct all deficiencies found during pre-functional, start-up and TAB to ensure that all equipment and systems are fully functional and ready for functional performance testing.

.6 Prepare O&M manuals and supplementary information on all equipment as directed by CxA and assemble in binders tabbed and indexed. Supplementary information may include, but is not limited to, such items as power/control field wiring diagrams, equipment maintenance schedule, vendor and maintenance contact lists. Submit to CxA when requested.

.7 Prepare preliminary schedule for O&M manuals submission, owner training, pipe and duct system testing, flushing and cleaning, equipment start-up, and TAB for use by the CxA. Update schedule throughout the construction period.

.8 Notify CxA a minimum of two weeks in advance of equipment and system start-up and/or pre-functional testing.

.9 Set-up and schedule vendors and contractors required to participate in the owner training sessions for all equipment and systems.

.10 .Provide a complete set of as-built record drawings and schematics, include a copy to the CxA.

.11 .Return to site with the GC/CM, owner and CxA approximately 10 months after the start of the warrantee period to review system operation and to address operational issues.

.12 .Provide a designated representative to attend commissioning meetings and coordinate the completion of commissioning deliverables according to this specification.

.3 TAB Contractor(s)

.1 Attend commissioning coordination meetings.

.2 Submit TAB procedures to CxA and consultant team for review and acceptance.

.3 Provide a preliminary TAB report showing that the system is complete and capable of being balanced. Provide an additional copy of the preliminary report labelled “For CxA”.

.4 Attend TAB review meeting scheduled by the CxA. Be prepared to discuss procedures that shall be followed in TAB and findings of preliminary TAB.

.5 Submittal of final TAB report showing all flows, pressures, motor speeds, voltages and amperages etc., as required for a full and complete balancing report on all systems. Provide an additional copy of the TAB final report labelled “For CxA”, and include as-built distribution systems schematics.

.6 Participate in verification of the TAB report, which includes of repeating selected measurement contained in the TAB report where required by the CxA for verification or diagnostic purposes.

.7 Provide a designated representative to attend commissioning meetings and coordinate the completion of commissioning deliverables according to this specification.

.4 Building Controls and Automation System Contractor(s)

.1 Attend initial commissioning coordination meeting.

.2 Attend Sequence of Operation and Graphics review meeting scheduled by the CxA. Be prepared to discuss all sequences including all changes; provide a schematic for each proposed graphic.

.3 Provide the following submittals to the CxA at time of FPT. (Note: The following shall be updated to as-built conditions).

.1 Hardware and software submittals and shop drawings.

.2 Narrative description of each control sequence for each piece of equipment or system controlled.

.3 Point-to-point and sensor calibration verification checklists.

.4 As-built diagrams showing all control points, sensor locations, point names, actuators, controllers and, where necessary, points of access, superimposed on diagrams of the physical equipment.
.5 Printout of panel layouts including all analog input, analog output, digital input, and digital output connections. Provide a separate list for each stand-alone control unit.
.6 Printout of final control programming algorithms, include current values of all parameters for each system point.
.7 Owners operation and maintenance manuals.

.4 Provide complete training to operating personnel on hardware, operation and programming, and the application program for the system.

.5 Demonstrate system performance to CxA. including all modes of system operation. (e.g. normal, abnormal, emergency).

.6 Provide control system technician to operate systems as required by and under the direction of the CxA during system verification and functional performance testing.

.7 Provide support and coordination with TAB contractor on all interfaces between their scopes of work. Provide all devices, such as portable operators' terminals, for TAB use in completing TAB procedures.

.8 Provide any trend logs as may be required by the CxA.

.9 Return to site with the GC/CM, owner and CxA approximately 10 months after the start of the warrantee period to review system operation and to address operational issues.

.10 .Provide a designated representative to attend commissioning meetings and coordinate the completion of commissioning deliverables according to this specification.

.5 Electrical Contractor

.1 Attend commissioning meetings scheduled by the CxA.

.2 Provide a complete set of all submittals for electrical equipment to the CxA

.3 Provide a copy of the electrical Coordination Study.

.4 Correct all deficiencies found during Pre-functional inspection, start-up, TAB and FPT to ensure all equipment and systems are fully functional and in complete and proper working order.

.5 Prior to occupancy, but following the completion of all changes, certify that all protection devices have been checked and reset to conform to the Coordination Study settings.

.6 Participate in the verification of all protective device settings.

.7 Prepare O&M manuals and supplementary information on all equipment as directed by CxA and assemble in binders tabbed and indexed. Supplementary information may include, but is not limited to, such items as power/control field wiring diagrams, equipment maintenance schedule, vendor and maintenance contact lists. Submit to CxA when requested.

.8 Provide electrical system technicians to assist during system verification and functional performance testing as required by the CxA.

.9 Provide a complete set of as-built record drawings and schematics with a copy to the CxA.

.10 .Return to site with the GC and CxA approximately 10 months after the start of the warrantee period to review system operation and to address operational issues.

.11 .Provide a designated representative to attend commissioning meetings and coordinate the completion of commissioning deliverables according to this specification.

1.10 EQUIPMENT/SYSTEMS TO BE COMMISSIONED

.1 Mechanical Systems

.1 Fire Protection Systems
- .1 Wall Hydrants
- .2 Fire Dampers
- .3 Fire Extinguisher Cabinets
- .4 Automatic Sprinkler System
- .5 Backflow Preventer

.2 Ventilation Systems
- .1 Fans
- .2 Motor Operated Dampers
- .3 Roof Hoods
- .4 Variable Air Volume Boxes
- .5 Silencers
- .6 Fan Powered Variable Air Volume Boxes
- .7 Grilles, Registers, and Diffusers
- .8 In-line Disposable Filters
- .9 Airflow Measurement Systems

.3 Domestic Water System
- .1 Pumps:
- .2 Variable Frequency Drives
- .3 Circulators:
- .4 Piping
- .5 Domestic Hot Water Heater
- .6 Mixing Valve for DHWH
- .7 Pressure Reducing Valves – listing location, number and type
- .8 Control Valves
- .9 Controls
- .10 Meters - monitored
- .11 Air Separators
- .12 Backflow Preventer

.4 Heating System
- .1 Energy Recovery Unit:
- .2 Pumps
- .3 Variable Frequency Drives
- .4 Piping
- .5 Air Separators
- .6 Control Valves
- .7 Air Handling Units
- .8 Centrifugal Fans
- .9 Silencers
- .10 Thermostats
- .11 Controls
- .12 Meters - monitored
- .13 Chemical Treatment
- .14 Free Cooling Loop
- .15 Backflow Preventer

.5 Steam Systems
- .1 Steam Strainers
- .2 Expansion Joints for Steam & Condensate Lines
- .3 Expansion Tanks
- .4 Backflow Preventers
- .5 Steam Meter - monitored
- .6 Steam Traps
- .7 Steam Pressure Reducing Valves - listing location, number and type
- .8 Flash Tank
- .9 Safety Relief Valves
- .10 Condensate Receiver and Pumps
- .11 Steam Heat Exchanges Skid Packages
- .12 Heat Exchangers:
- .13 Humidifiers

.6 Hydronic System
- .1 Radiant Panels
- .2 Wall Fin Convector:
- .3 Radiant Unit Heaters
- .4 Fan Coils
- .5 Glycol Feeder
- .6 Pumps
- .7 Variable Frequency Drives
- .8 Piping
- .9 Control Valves
- .10 Air Separators
- .11 Backflow Preventer

.7 Plumbing System
- .1 Roof Drains
- .2 Floor Drains
- .3 Cleanouts
- .4 Plumbing Fixtures
- .5 Fixture Carriers
- .6 Solids Interceptor
- .7 Dual Flush Valves
- .8 Mixing Valve for Hose Reels
- .9 Pipe Filters
- .10 Pot Feeder
- .11 Primed Traps
- .12 Backflow Preventer

.8 Packaged Units
- .1 Radiant Unit Heaters
- .2 Horizontal Unit Heaters
- .3 Fan Coil Units
- .4 Glycol Feeder
- .5 Packaged Dehumidifiers

.2 Integrated Automation

.1 Central Building Automation System,
- .1 Controllers
- .2 Field Devices
- .3 Sequences
- .4 Network
- .5 Operator Workstation
- .6 Operator Interface

.3 Electrical Systems

.1 Lighting
- .1 Light Fixtures
- .2 Emergency/Normal Power
- .3 Addressable Ballasts'
- .4 Daylight Sensors
- .5 Occupancy Sensors
- .6 Lighting Control System
- .7 Sequences
- .8 Schedules
- .9 Interface
- .10 Meters - monitored

.2 Power Distribution System
- .1 Meters - monitored
- .2 Transformers
- .3 Electrical Switchboards and Panelboards
- .4 Splitters (SPI & SPXI)
- .5 Motor Control Centres
- .6 Low Voltage Control Equipment

.3 Fire Alarm System
- .1 Devices – set up in a listing
- .2 Fire Panels
- .3 Network

.4 Telecommunications Systems
- .1 Devices
- .2 Network

.5 7. Intercom (paging) Systems
- .1 Devices
- .2 Network

.6 Data System
- .1 Devices
- .2 Network

.7 Security System
- .1 Devices
- .2 Network

.4 Integrated Systems

.1 Verification of integrated systems is to be included in the commissioning. This would include integrated black-out testing and integrated fire alarm testing as well as additional integrated systems as required.

1.11 COORDINATION

.1 Management: Contractors shall cooperate fully with the CxA who will be the Owner's representative for commissioning during all commissioning activities. Contractors shall work together and with the other members of the commissioning team as required to fulfil their contracted responsibilities and meet the objectives of commissioning.

.2 Scheduling: The GC/CM will work with the CxA to schedule the commissioning activities required of contractors and subcontractors. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

The CxA will provide the initial schedule of milestone commissioning activities and proposed durations and dates at the commissioning scoping meeting. As construction progresses more detailed schedules may be developed by the GC/CM. The GC/CM is responsible for incorporating these activities into the project schedule and ensuring that work is complete on time to meet the milestone dates. The GC/CM shall be responsible for ensuring that the mechanical, electrical, and controls sub-contractors will return to the building approximately 10 months after the start of the warrantee period to review system operation and to address operational issues.

PART 2- PRODUCTS

2.1 TEST EQUIPMENT

.1 All standard testing equipment required to perform start-up and pre-functional and required functional performance testing shall be provided by the division contractor for the equipment being tested.

.2 Special test equipment, tools or instruments required by the contract documents shall be provided for commissioning and shall be left on site.

.3 All testing equipment shall have had a certified calibration, traceable to a national standard, performed within the past year. If not otherwise noted, temperature sensors and digital thermometers shall have an accuracy of ± 0.1°F, pressure sensors shall have an accuracy of ± 1.0% for each range available on the instrument (not the full range of the meter). All equipment shall be re-calibrated when dropped or damaged.

PART 3 - EXECUTION

3.1 MEETINGS

.1 Commissioning Meetings: Soon after construction commences, the CxA will conduct an initial commissioning scope meeting with the entire commissioning team in attendance. Commissioning requirements, procedures, responsibilities and schedule will be reviewed. Other commissioning meetings will be conducted as required throughout construction. These meetings will cover coordination, deficiency resolution and planning issues with particular Contractors and Subs.

3.2 SUBMITTALS

.1 Mechanical and Electrical Contractors shall supply one (1) copy of all shop drawings marked “for CxA” to the CxA at the same time as provided to other designers for review, including all controls and shop drawings and narrative description of each control sequence for each piece of equipment or system controlled (Refer to section 01 33 00 – Submittal Procedures).

.2 Contractors and Subs shall comply with specific requests for submittal documentation from the CxA in a timely fashion to ensure commissioning work continues as scheduled. At a minimum, the request will include the manufacturer’s printed installation and start-up procedures, O&M data and manuals, final shop drawings, power and control field wiring drawings, sequences of operation, and results of required tests.

.3 Final completion of the O&M manuals including all required submittals is the responsibility of the Contractor. The CxA will review and forward comments to the engineer of record for follow-up. Refer to Section 01 77 00 – Closeout Procedures.

.4 TAB contractor shall supply an extra copy of the preliminary and the final TAB report marked “for CxA” for review. The CxA will review and forward comments to the engineer of record for follow-up.

.5 Contractor shall provide an extra set of O&M manuals, as built drawings and field power wiring diagrams to the CxA. The CxA will review and forward comments to the engineer of record for follow-up. Refer to section 01 77 00 – Closeout Procedures.

3.3 START-UP AND PRE-FUNCTIONAL CHECKS

.1 The installing contractor or sub-contractor shall be responsible for performing and documenting start-up based on manufacturer’s requirements and/or good industry practice. They shall perform all required procedures and checks and document the results. Start-up documents as requested by the CxA shall be provided.

.2 Controls and sensor point-to-point checks. Control system point-to-point checks and calibration checks for all sensors shall be included as part of pre-functional. The results shall be documented and provided to CxA.

.3 Execution of Start-up and Pre-functional checklists

.1 Pre-functional and start-up checklists shall be developed and provided by CxA. Where appropriate manufacturers checklists and procedures shall be combined or accepted in lieu of CxAs checklists.

.2 The contractor, sub-contractor, manufacturer’s rep or supplier shall perform pre-functional and start-up checks. They shall complete the checklist on each piece of equipment. Checklists shall be successfully completed prior to any functional performance testing (FPT).

.3 At his sole discretion the CxA shall observe, recheck or verify the pre-functional and start-up documentation of any or all equipment. The contractor shall cooperate with and provide support to the CxA as requested.

.4 Only individuals with direct knowledge of and who personally witnessed any pre-functional or start-up activity shall sign off the checklists.

.5 It will be the responsibility of the contractor to remedy all deficiencies found. Retesting by the contractor may be required to demonstrate corrections have been made.

.4 Deficiencies, non-conformance and approval of pre-functional and start-up checklists.

.1 Dates for remedy of deficiencies shall be provided to the CxA with the initial pre-functional and start-up documents.

.2 The CxA will work with all parties as required to affect proper corrective measures, correct and retest deficiencies or uncompleted items. The GC/CM shall coordinate the correction of deficiencies.

.3 Items left incomplete or not properly corrected, causing delays or multiple call-backs for retest may result in back-charges to the party at fault.

3.4 TESTING, ADJUSTING AND BALANCING (TAB)

.1 A preliminary TAB balancing shall be done prior to final balancing. System deficiencies requiring correction prior to final TAB shall be documented.

.2 All deficiencies shall be corrected by the contractor prior to final balancing.

.3 Participate in repeating selected measurement as required by the CxA for verification or diagnostic purposes.

3.5 FUNCTIONAL PERFORMANCE TESTING (FPT)

.1 In general, functional performance testing is conducted after pre-functional and start-up checks have been satisfactorily completed, the control system is fully operational, and TAB is complete.

.2 The installing contractor or sub-contractor, under the direction of the CxA, shall execute all FPT and shall maintain responsibility for all equipment tested.

.3 In general, each system shall be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part-load, full-load). Proper responses to such modes and emergency conditions (e.g., power failure, freeze condition, no flow, equipment failure, etc.) shall be verified.

.4 FPT verification may be achieved by manual testing (persons manipulate the equipment and observe performance) or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by stand-alone data loggers. The CxA will determine which method is most appropriate.

.5 The CxA will schedule FPTs through the GC/CM and affected Contractors and Subs.

.6 Corrections of minor deficiencies identified during FPT may be made by the Contractor or Sub during the tests.

.7 Where a deficiency cannot be corrected immediately, the contractor or sub-contractor shall provide a reasonable timeline for correction. The CxA shall document the deficiency and reschedule the FPT.

.8 Where there is a dispute regarding whether a problem is a deficiency or who is responsible, the deficiency shall be documented and resolution attempted by parties in attendance. Final acceptance of proposed resolution lies with the Owner or designated representative.

.9 The burden of responsibility to solve and correct deficiencies lies with the design consultants, manufacturers, vendors, GC/CM, contractors, and sub-contractors. The CxA may recommend solutions to problems in consultation with these parties. Ultimately, the GC/CM shall coordinate the successful resolution of deficiencies.

.10 Cost of Retesting:

.1 If the contractor or sub-contractor is responsible for a deficiency then they shall carry the cost to rework the deficiency and complete the FPT.

.2 The CxA will direct the first retesting of the equipment at no charge.

.3 If corrections of deficiencies have been reported to be successfully completed but are determined during testing to be faulty or otherwise incomplete, the time for the CxA to direct second or subsequent retests will be charged back.

3.6 TRAINING OF OWNER PERSONNEL

.1 The contractor supplying each piece of equipment shall be responsible for providing complete and satisfactory training on that piece of equipment. Training may be performed by the contractor, supplier, manufacturer or others as the contractor may decide best able to provide that training.

.2 Owner personnel shall be provided with completed O&M Manuals at least ten (10) working days prior to training. In addition, one hardcopy and one electronic copy (searchable PDF file format) of the related maintenance booklet and wiring as-builts shall be provided to owner personnel for the purpose of training.

.3 The GC shall be responsible for training coordination and scheduling and ultimately for ensuring that training is completed. The CxA shall be responsible for overseeing and approving the content and adequacy of training for all commissioned equipment.

.4 Basic training for each piece of equipment shall include the following items at a minimum:

.1 General description of the system and its operation (Design Intent)

.2 Detailed itemization and identification of major components and access to same

.3 Detailed itemization and identification of operating controls and safeties including normal and abnormal sensor readings

.4 Review of the O&M manuals for identification of service requirements, procedures, wiring diagrams, parts identification, safety procedures, etc.

.5 Review of system drawings and schematics

.6 Review of control drawings and schematics

.7 Operational review for
- .1 Start-up
- .2 Normal operation
- .3 Shut down
- .4 Unoccupied operation
- .5 Seasonal changeover
- .6 Manual operation
- .7 Controls set-up and programming
- .8 Troubleshooting and alarms

.8 Interactions with other systems

.9 Adjustments and optimizing methods for energy conservation

.10 Health and safety issues

.11 Regular maintenance requirements including frequency, parts and equipment, and tools needed, replacement parts sources

.12 Special maintenance needs

.13 Tenant interaction issues

.14 Discussion of environmentally responsible system features

.15 Identification of contacts for service support and maintenance parts

3.7 DEFERRED TESTING

.1 If any check or test cannot be completed due to weather conditions, the building structure, required occupancy condition or other deficiency, execution of pre-functional checks and/or FPT may be delayed upon approval of the owner.

3.8 POST-OCCUPANCY REVIEW

.1 The CxA, GC/CM, mechanical, electrical, and controls sub-contractors shall return to the building approximately 10 months after the start of the warranty period to review system operation, owner concerns, unresolved deficiencies or warranty issues and to address any outstanding operational issues.

.2 The exact date and time of this meeting is to be coordinated by the CxA.

.3 CxA will provide site report to the consultants and owner for review, acceptance and formal issue to the appropriate parties.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 This Section includes the following:
- .1 Demolition and removal of site improvements adjacent to a building or structure being demolished
- .2 Removing below grade construction
- .3 Disconnecting, capping or sealing, and removing site utilities

1.2 RELATED REQUIREMENTS

.1 Section 02 41 13 - Selective Site Demolition

.2 Section 31 00 00.01 - Earthwork

1.3 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)
- .1 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

.2 National Fire Protection Association (NFPA)
- .1 NFPA 241 - 96, Standard for Safeguarding Construction, Alteration, and Demolition Operations

.3 National Research Council Canada (NRC)
- .1 National Building Code of Canada 2015 (NBC).
- .2 National Fire Code of Canada 2015 (NFC).

.2 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S660-08, Standard for Nonmetallic Underground Piping for Flammable and Combustible Liquids
- .2 ULC/ORD-C58.15-1992, Overfill Protection Devices for Flammable Liquid Storage Tanks
- .3 ULC/ORD-C58.19-1992, Spill Containment Devices for Underground Flammable Liquid Storage Tanks

.3 U.S. Environmental Protection Agency (EPA)/Office of Water
- .1 EPA CFR 86.098-10, Emission standards for 1998 and later model year Otto-cycle heavy-duty engines and vehicles
- .2 EPA CFR 86.098-11, Emission standards for 1998 and later model year diesel heavy-duty engines and vehicles
- .3 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.4 DEFINITIONS

.1 Demolition: rapid destruction of building following removal of hazardous materials.

.2 Waste Management Coordinator (WMC): Contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

.3 Construction Waste Management Plan (CWM Plan): Written plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19 - Construction Waste Management and Disposal.

.4 Construction Waste Management Report (CWM Report): Written report identifying actual materials that formed CWM Plan for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19 - Construction Waste Management and Disposal

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate with the University of Guelph for the material ownership including but not limited to:

- .1 Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the University of Guelph 's property, demolished materials shall become the Contractor's property and shall be removed from Project site.
- .2 Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to the University of Guelph that may be encountered during demolition remain the University of Guelph 's property.

.2 Pre-Demolition Meetings:

- .1 Convene pre-installation meeting 1 week prior to beginning demolition work and on-site installations, with the Contractor University of Guelph and J.L. Richards in accordance with Section 01 31 19 - Project Meetings.

.3 Scheduling:

- .1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion.
- .2 In event of unforeseen delay notify the University of Guelph in writing.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Action Submittals: Provide the following submittals before starting any work of this Section:

- .1 Shop Drawings: Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario as follows:
- .2 Submit in accordance with Section 01 33 00 - Submittal Procedures and 01 74 19 - Construction Waste Management and Disposal.
- .3 Schedule of Demolition Activities: Coordinate with Section 01 32 16.06 - Construction Progress Schedule.

.2 Sustainable Design Submittals:

.1 Erosion and Sedimentation Control: submit erosion and sedimentation control plan in accordance with EPA 832/R92-005 and the City of Guelph Linear Infrastructure Standards.

.2 Construction Waste Management:

.3 Submit project Waste Management Plan highlighting recycling and salvage requirements.

1.7 QUALITY ASSURANCE

.1 Regulatory Requirements: Ensure Work is performed in compliance with CEPA, OPSS and City of Guelph regulations.

.2 Comply with hauling and disposal regulations of the University of Guelph and the City of Guelph.

.3 Standards: Comply with ANSI A10.6 and NFPA 241.

1.8 SITE CONDITIONS

.1 If material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous is encountered, stop work, take preventative measures, and notify the University of Guelph and J.L. Richards immediately.

.1 Proceed only after receipt of written instructions have been received from J.L. Richards.

.2 Notify the University of Guelph and J.L. Richards before disrupting Building 046 access or services.

.3 Environmental protection:

.1 Ensure Work is done in accordance with Section 01 35 43 - Environmental Procedures.

1.9 EXISTING CONDITIONS

.1 Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Equipment and heavy machinery:

.2 Machinery shall be run only while in use, except where extreme temperatures prohibit shutting machinery down.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Survey existing conditions and correlate with requirements indicated to determine extent of demolition required.

.2 Review Project Record Documents of existing construction provided by the University of Guelph.

.3 The University of Guelph does not guarantee that existing conditions are the same as those indicated in Project Record Documents.

.4 Inventory and record the condition of items being removed and salvaged.

.5 When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element.

.6 Promptly submit a written report to Consultant.

.7 Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during demolition operations.

3.2 PREPARATION

.1 Temporary Erosion and Sedimentation Control:
- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to: the City of Guelph and civil drawings.

.2 Protection of In-Place Conditions:
- .1 Prevent movement, settlement, or damage to adjacent structures, utilities landscaping features and parts of building to remain in place. Provide bracing and shoring if required.
- .2 Keep noise, dust, and inconvenience to occupants to minimum.
- .3 Protect building systems, services and equipment.
- .4 Provide temporary dust screens, covers, railings, supports and other protection as required.
- .5 Do Work in accordance with Section 01 35 29 - Health and Safety Requirements.

.3 Demolition/Removal:
- .1 Demolish structures as indicated.
- .2 Removal of pavements, curbs and gutters:
  - .1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by J.L. Richards.
  - .2 Protect underlying and adjacent granular materials.
- .3 At end of each day's work, leave Work in safe and stable condition.
- .4 Protect interiors of parts not to be demolished from exterior elements at all times.
- .5 Demolish to minimize dusting. Keep materials wetted as directed by J.L. Richards. Only dispose of material specified by selected alternative disposal option as directed by University of Guelph.

.4 Remove the following materials and equipment, store, protect, and leave ready for reinstallation by other sections of Work:
- .1 Parking Meters
- .2 Pay and Display parking sign

.5 Remove the following materials and equipment and store in the designated laydown area:
- .1 Concrete sidewalk
- .2 Concrete curb and gutter
- .3 Asphalt pavement
- .4 Native soil
- .5 Bicycle lock-ups

3.3 SITE RESTORATION & REPAIRS

.1 Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes.

.2 Provide a smooth transition between adjacent existing grades and new grades.

.3 General: Promptly repair damage to adjacent construction caused by demolition operations.

.4 Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

.5 Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Refer to demolition drawings and specifications for items to be salvaged for reuse.

.4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

.1 Section includes descriptions for demolishing, salvaging, recycling and removing site work items identified for removal in whole or in part, and for backfilling trenches and excavations resulting from site demolition activities.

1.2 RELATED REQUIREMENTS

.1 Section 02 41 00.08 Demolition for Minor Works.

1.3 REFERENCE STANDARDS

.1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.2 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.

1.4 DEFINITIONS

.1 Demolition: rapid destruction of building following removal of hazardous materials.

.2 Waste Audit (WA): detailed inventory of materials in building. Indicates quantities of reuse, recycling and landfill.

.1 Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project.

.2 Indicates quantities of reuse, recycling and landfill.

.3 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Site Meetings.

.2 Convene pre-demolition meeting one week prior to beginning demolition work in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart to:

.1 Verify project requirements.

.2 Review installation and site conditions.

.3 Co-ordination with other building subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

.3 Arrange for site visit with the University of Guelph and J.L. Richards to examine existing site conditions adjacent to demolition work, prior to start of Work.

.4 Ensure key personnel regularly attend project meetings as required.

.5 Reporting Requirements: WMC to complete.

.6 The contractor must provide written and verbal reports on status of waste diversion activity to J.L. Richards.

.1 Scheduling: meet project time lines without compromising specified minimum rates of material diversion.

.2 Notify the University of Guelph and J.L. Richards in writing when unforeseen delays occur.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.

.2 Submit for approval drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning, where required by authorities having jurisdiction.

.3 Hazardous Materials:

.1 Provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.

.4 Waste Reduction Workplan:

.1 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal and indicate:

.1 Descriptions of and anticipated quantities of materials to be salvaged reused, recycled and landfilled.

.2 Schedule of selective demolition.

.3 Number and location of dumpsters.

.4 Anticipated frequency of tippage.

.5 Name and address of haulers, and waste facilities.

.5 Certificates:

.1 Submit copies of certified receipts from authorized disposal sites and reuse and recycling facilities for material removed from site upon request of the University of Guelph or J.L. Richards.

1.7 QUALITY ASSURANCE

.1 Regulatory Requirements: ensure Work is performed in compliance with CEPA, the City of Guelph, and all applicable Provincial regulations.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Store and manage hazardous materials in accordance with Section 01 35 43 - Environmental Procedures.

.2 Storage and Protection.

.1 Protect in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.2 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of the University of Guelph or J.L. Richards and at no cost to the University of Guelph or J.L. Richards.

.3 Remove and store materials to be salvaged in manner to prevent damage.

.4 Store and protect in accordance with requirements for maximum preservation of material.

.5 Handle salvaged materials as new materials.

.3 Packaging Waste Management: remove for reuse by manufacturer of pallets, crates, padding, and packaging materials as specified in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.9 SITE CONDITIONS

.1 Site Environmental Requirements.

.1 Perform work in accordance with Section 01 35 43 - Environmental Procedures.

.2 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.3 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.

.1 Ensure proper disposal procedures are maintained throughout the project.

.4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.

.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with the City of Guelph as directed by the University of Guelph.

.6 Protect trees, plants and foliage on site and adjacent properties where indicated.

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Leave machinery running only while in use, except where extreme temperatures prohibit shutting

PART 3 - EXECUTION

3.1 PREPARATION

.1 Inspect site with the University of Guelph and J.L. Richards and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

.3 Notify and obtain approval of utility companies before starting demolition.

.4 Disconnect and cap designated mechanical services.

.1 Water Lines: remove as indicated in drawings in accordance with the City of Guelph as directed by J.L. Richards and securely plug to form watertight seal.

3.2 REMOVAL OPERATIONS

.1 Remove items as indicated on drawings.

.2 Do not disturb items designated to remain in place.

.3 Removal of pavements, curbs and gutters:

.1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by J.L. Richards.

.2 Protect underlying and adjacent granular materials.

.3 Prevent contamination with base course aggregates, when removing asphalt pavement for subsequent incorporation into hot mix asphalt concrete paving,

.4 Excavate at least 300 mm below pipe invert, when removing pipes under existing or future pavement area.

.5 Stockpile topsoil for final grading and landscaping:

.4 Provide erosion control and seeding if not immediately used.

.5 Disposal of Material:

.1 Dispose of materials not designated for salvage or reuse on site as instructed by the University of Guelph at the appropriate facilities .

.2 Trim disposal areas to approval of The University of Guelph.

.6 Backfill:

.1 Backfill in areas as indicated and in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3.3 STOCKPILING

.1 Label stockpiles, indicating material type and quantity.

.2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.

.3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.

.4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

3.4 REMOVAL FROM SITE

.1 Remove stockpiled material as directed by J.L. Richards, when it interferes with operations of project.

.2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.

.3 Transport material designated for alternate disposal using approved haulers to appropriate facilities and in accordance with applicable regulations.

3.5 RESTORATION

.1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work.

.2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.6 FIELD QUALITY CONTROL

.1 Verification requirements include:

- .1 Materials and resources.
- .2 Storage and collection of recyclables.
- .3 Construction waste management.
- .4 Resource reuse.
- .5 Recycled content.
- .6 Local/regional materials.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

- .1 Leave Work area clean at end of each day.
- .2 Remove debris, trim surfaces and leave work site clean, upon completion of Work
- .3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

- .1 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.8 PROTECTION

.1 Repair damage to adjacent materials or property caused by selective site demolition.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 Section includes descriptions for demolishing, salvaging, recycling and removing of asphalt paving identified in whole or in part, and for backfilling trenches and excavations resulting from site demolition activities a required by scope of work.

1.2 RELATED REQUIREMENTS

.1 Section 02 41 13 - Selective Site Demolition

.2 Section 02 41 00 - Demolition for Minor Works

1.3 REFERENCE STANDARDS

.1 U.S. Environmental Protection Agency (EPA) / Office of Water

.2 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.4 DEFINITIONS

.1 Demolish: Detach items from existing construction and legally dispose of them off site, unless indicated to be removed and salvaged or removed and reinstalled.

.2 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed, removed and salvaged, or removed and reinstalled

.3 Draft Construction Waste Management Plan (Draft CWM Plan): Detailed inventory of materials in building indicating estimated quantities of reuse, recycling and landfill, prepared in accordance with Section 01 74 19 - Construction Waste Management and Disposal and as follows:

.1 Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project.

.4 Waste Management Coordinator (WMC): Contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

.5 Construction Waste Management Plan (CWM Plan): Written plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

.6 Construction Waste Management Report (CWM Report): Written report identifying actual materials that formed CWM Plan for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate requirements for Waste Management and Disposal for materials being re used or recycled in accordance with Section 01 74 21 – Construction Demolition Waste Management and Disposal.

- .1 Divert excess materials from landfill.
- .2 Separate materials identified for recycling place in identified areas in accordance with Waste Management Plan.
- .3 Label location of salvaged material's storage areas and provide barriers and security devices.
- .4 Remove materials that cannot be salvaged for re use or recycling and dispose of in accordance with applicable codes at licensed facilities.

.2 Pre-Construction Meeting: Arrange a pre construction meeting in accordance with Section 01 31 19 - Project Meetings; attended by the University of Guelph Contractor's key personnel and Consultant to discuss the following:

- .1 Verify project requirements.
- .2 Review site conditions.
- .3 Coordination with other Subcontractors affected by work of this Section.
- .4 Examine existing site conditions adjacent to demolition work, prior to start of Work.
- .5 Waste reporting requirements.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Action Submittals: Provide following submittals before starting work of this Section:

.2 Shop Drawings: Submit shop drawings indicating diagrams or details showing sequence of demolition work.

.3 Informational Submittals: Provide following submittals during course of work:

.4 Certificates: Submit copies of certified weigh bills, bills of lading or receipts from authorized disposal sites and reuse and recycling facilities for material removed from site on a regular basis.

1.7 QUALITY ASSURANCE

.1 Regulatory Requirements: ensure Work is performed in compliance with CEPA, the City of Guelph and all applicable Provincial regulations.

.2 Comply with hauling and disposal regulations of Authority Having Jurisdiction.

1.8 SITE CONDITIONS

.1 Protect existing site features to remain or identified for salvage or re use; make repairs and restore to a similar condition to existing where damage to these items occurs as directed by Consultant and at no cost to Owner:

- .1 Remove and store salvaged materials to prevent contamination.
- .2 Store and protect salvaged materials as required for maximum preservation of material.
- .3 Handle salvaged materials same as new materials.

.2 Perform pavement removal work to prevent adverse effects to adjacent watercourses, groundwater and wildlife, and to prevent excess air and noise pollution:

.1 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.

.2 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with Authorities Having Jurisdiction.

.3 Protect existing site features and structures, trees, plants and foliage on site and adjacent properties.

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Use cold milling, planning or grinding equipment with automatic grade controls capable of operating from stringline, and capable of removing part of pavement surface to depths or grades indicated.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Verify extent and location of asphalt identified for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Locate and protect utilities, preserve active utilities traversing site in operating condition.

.3 Temporary Erosion and Sedimentation Control:

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control drawings.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

.4 Prior to beginning removal operation, inspect and verify with J.L. Richards areas, depths and lines of asphalt pavement to be removed.

.5 Protection: protect existing pavement not designated for removal, light units and structures from damage. In event of damage, immediately replace or make repairs to approval of The University of Guelph or J.L. Richards at no additional cost.

3.2 REMOVAL

.1 Remove existing asphalt pavement to lines and grades as indicated

.2 Demolition of pavements, curbs and gutters:

.1 Square up adjacent surfaces to remain in place by saw cutting or other method acceptable to the consultant.

.2 Protect adjacent joints and load transfer devices.

.3 Protect underlying and adjacent granular materials where they are exposed and identified to remain.

.4 Prevent contamination with base course aggregates, when removing asphalt pavement for subsequent incorporation into hot mix asphalt concrete paving.

.3 Use equipment and methods of removal and hauling which do not damage or disturb underlying pavement.

.4 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.

.5 Suppress dust generated by removal process.

3.3 FINISH TOLERANCES

.1 Finished surfaces in areas where asphalt pavement has been removed within +/-5 mm of grade specified but not uniformly high or low.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Sweep remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooming as required.

.4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.2 Removed asphalt pavement which is to be recycled in hot mix asphalt concrete under this contract may be stockpiled at designated asphalt plant site.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 CSA International

.1 CSA W47.1-09 (R2014), Certification of companies for fusion welding of steel, Includes Update No. 3 (2011), Update No. 5 (2012), Update No. 6 (2013).

.2 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding), Includes Update No. 1 (2004).

.3 CSA S350-M1980, Code of Practice of Safety in Demolition of Structures.

1.2 QUALITY ASSURANCE

.1 Comply with the requirements of the Ontario Building Code, Ontario Occupational Health and Safety Act Canada and all other Standards and Regulations noted.

.2 All Work performed and materials used shall be of the same standard of quality as that of the existing finished building as a minimum.

.3 Any welding shall be performed by Welders certified in accordance with CSA W47.1, and shall conform to CSA W59.

.4 Patch and extend work using only skilled mechanics capable of matching the existing quality or workmanship and as otherwise indicated. The quality of patched or extended Work to be performed as specified in the sections of the product and execution Specifications that follow these General Requirements.

.5 Pre Installation Meetings: convene pre-installation meeting one (1) week prior to beginning work of this Section and on-site installation, with contractor's representative and Consultant in accordance with Section 01 31 19 - Project Meetings.

1.3 SECURITY

.1 Make provision to maintain building security in a manner acceptable to the Owner during construction and after normal working hours.

1.4 ENVIRONMENTAL REQUIREMENTS

.1 Suppress all dust and dirt. Prevent occurrence of unsanitary conditions, flooding or leaking.

.2 Do not allow dirt, debris or discarded materials accumulate on site. Remove promptly each day.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction Demolition Waste Management & Disposal.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 EXISTING CONDITIONS

.1 Examine areas to be selectively demolished or dismantled, and confirm that their condition is substantially the same as the date on which bids closed, and as indicated in the Contract Documents. Advise the Consultant of any conditions that vary from this.

.2 Be familiar with structural system of the building, and the elements being demolished or dismantled.

.3 Inspect site and verify with Consultant items designated for removal and items to remain. Protect existing items designated to remain and materials designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Consultant and at no cost to Owner.

.4 Demolition of spray or trowel-applied asbestos can be hazardous to health. Should material resembling spray or trowel-applied asbestos be encountered in the course of demolition work stop work and notify the Consultant immediately. Do not proceed until written instructions have been received from the Consultant.

.5 Demolition of applied asbestos materials can be hazardous to health. Should material resembling asbestos be encountered in the course of demolition work, stop work and notify the Consultant immediately. Do not proceed until written instructions have been received from the Consultant.

3.2 EXTENT OF DEMOLITION

.1 Drawings showing extent of selective demolition are intended to be schematic and do not indicate full extent of all selective demolition work. Examine all documents to determine complete scope of selective demolition, removals and re-instatement, repair and make good required to complete Work.

3.3 SAFETY

.1 Comply with all applicable legislation.

3.4 ALTERATIONS, CUTTING AND PROTECTION

.1 Extent:

.1 Perform cutting and removal work so as not to cut or remove more than is necessary and so as not to damage adjacent Work.

.2 Responsibility and Assignment of Trades:

.1 Assign Work of moving, removal, cutting and patching and repair to trades under his/her supervision so as to cause the least damage to each type of Work encountered, and so as to return the building as much as possible to the appearance of new Work.

.2 Assigned only skilled tradesmen to perform patching and finishing Work.

.3 Protection:

.1 Protect remaining finishes, equipment and adjacent Work from damage caused by cutting, moving, removal and patching operations. Protect surfaces to remain as part of the finished Work.

.2 Prevent movement, settlement or damage of existing structures, services, walks, paving, trees, landscaping, adjacent grades and parts of existing building to remain.

.3 Provide bracing, shoring and underpinning as required. Make good damage caused by demolition.

.4 Take precautions to support affected structures and, if safety of building being demolished appears to be endangered, cease operations and notify Consultant.

.5 Prevent debris from blocking surface drainage system, elevators, mechanical and electrical systems which must remain in operation.

.6 Provide bracing, shoring, or needling as required to support portions of existing structure or building to remain, where demolition or dismantling, cutting out, or partial removal of any elements, as specified in other Sections degrades the structural integrity of the structure to a point where it will not support all imposed loads. All bracing, shoring, and needling shall be designed to cause no damage to existing surfaces upon which the bracing, shoring or needling bears.

.7 Shoring, bracing, or needling of structural items shall be designed by a Professional Engineer registered in the Province of Ontario, and drawings shall bear the seal of this Engineer. Submit drawings of shoring, bracing, or needling to the Consultant prior to installing.

.8 Maintain temporary supports in place until permanent structure is able to fully support all imposed loads.

.9 Make good damage to existing elements to remain caused by demolition.

.10 Prevent debris from blocking surface drainage system, and obstructing mechanical and electrical systems which must remain in operation.

.11 Protect salvaged elements from damage. Provide protective coverings and storage.

.4 Debris:

.1 Remove debris promptly from the site each day. Removed material, except that listed or marked by Consultant for retention, becomes the property of the Contractor. Load removed material directly on trucks for removal from site. Dispose of removed material legally. Do not burn on site. Do not allow debris to enter sewers. Refer to Section 01 74 21 – Construction Demolition Waste Management & Disposal.

.2 Do not let piled material endanger structure.

.3 Suppress dust. Prevent occurrence of unsanitary conditions, dirt or debris on the site and neighbouring property.

.4 As directed by Owner, deliver and store and/or dispose of, any salvaged items left over after completion of the Work.

.5 Repair and make good any damage found subsequent to submission of inventory, which in the opinion of the Consultant is the result of the Work, and which is not documented in the inventory submitted to the Owner and Consultant to Owner. Repairs shall return damaged elements to their condition prior to start of work. Where work increases extent of existing damage, repair shall return element to match previous damaged condition. Refer to CCDC 2 – 2008, GC 9.1

.6 Where repairs cannot, in the opinion of the Consultant, be expediently implemented the Consultant shall ascertain the value to be deducted from the amounts due the Contractor in the manner permitted under CCDC 2 – 2008, GC 2.4

3.5 DISMANTLING AND DEMOLITION

.1 Do all work in a manner to prevent endangering safety of building or occupants.

.2 Selectively dismantle parts of the building as required to suit installation of new work and remedial work. Salvage and reinstall elements unless otherwise indicated. Make good disturbed surfaces.

.3 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as work progresses.

.4 Do not disturb adjacent items designated to remain in place.

.5 At end of each day's work, leave work in safe condition so that no part is in danger of toppling or falling. Protect interiors of parts not to be demolished from exterior elements at all times.

.6 Demolish to minimize dusting. Keep materials wetted as directed by Consultant.

.7 Do not throw or allow debris to fall uncontrolled from heights. Use chutes and other controls.

.8 Temporarily re-route service lines entering building or on the building in accordance with authorities having jurisdiction, and to suit the Work of this Contract. Post warning signs on electrical lines and equipment that must remain energized during period of work.

.9 Do not disrupt active or energized utilities designated to remain undisturbed, without Consultant's consent.

3.6 PATCHING, EXTENDING AND MATCHING

.1 Patching:

.1 In areas where any portion of an existing finished surface is damaged, lifted, stained, peeling, cracked, or otherwise made or found to be imperfect, patch or replace imperfect surfaces with matching material.

.2 Do not incorporate salvaged material in new Work unless otherwise noted or approved by Consultant in writing.

.3 Provide adequate support or substrate for patching and finishing.

.4 For painted and/or coated imperfect surfaces, remove loose material, patch, sand, and repaint or recoat the patched portion to obtain a uniform colour and texture over the entire surface.

.5 Repaint or recoat entire surface where surrounding and/or adjacent surfaces cannot be matched.

.2 Quality:

.1 In the sections of the Specifications which follow these general requirements, no concerted attempt has been made to describe each of the various existing products that must be used to patch, match, extend or replace existing Work. Obtain all such products in time to complete the Work on Schedule. Such products shall be provided in quality, which is in no way inferior to the existing products.

.2 The quality of the products that exist in the building, as apparent during pre-bid site visits, shall serve as the minimum specification requirement for strength, appearance and other characteristics.

.3 Transitions:

.1 Where new Work abuts or finishes flush with existing Work, make the transition as smooth and workmanlike as possible. Perform patching Work to match existing adjacent Work in texture and appearance so as to make the patch or transition invisible to the eye at a distance of one (1) metre.

.2 In cases of extreme change of level such as 50mm or more, obtain instructions from Consultant as to method of making transition. Provide stepping, bulkheading, encasement, ramping, sloping or change of transition line, or any combination of these as directed in each case by Consultant.

.4 Matching:

.1 Restore existing Work that is damaged during construction to a condition equal to its condition at the time of the start of such Work.

.5 Overall requirement that the Work be complete:

.1 Where a product type of construction occurs in the existing building, and is not specified as a part of the new Work, provide such products or types of construction as needed to patch, extend or match the existing Work.

.2 These Specifications are not intended to describe existing products or standards of execution, nor will they enumerate products, which are not part of the new construction. The existing product is its own Specification.

.3 The presence of any product or type of construction in old Work shall cause its patching, extending or matching to be performed as necessary to make new Work complete and consistent, to identical standards of quality.

3.7 REPAIR

.1 Replace work damaged in the course of alterations, except at areas approved by Consultant in writing.

.2 Where full removal of extensive amounts Work would be required to replace damaged portions, then filling, straightening and similar repair techniques, followed by full painting or other finishing, will be permitted.

.3 If the repaired Work is not brought up to the standard for new Work, Consultant will direct that it be removed and replaced with new Work at no additional cost to the Owner.

.4 Upon completion of work, remove debris, trim surfaces and leave work site clean.

.5 Reinstate areas and existing works outside areas of demolition to conditions that existed prior to commencement of work.

3.8 CLEANING

.1 Clean in accordance with Section 01 74 11 – Cleaning.

.2 Each Successive Trade:

.1 Clean Work area and make Work surfaces ready for the Work of the succeeding trades as each trade finishes its Work on each part of the alterations Work and related new Work.

.2 Clean or remedied immediately spillage, overspray, collections of dust or debris, damage to Owner-occupied spaces made by any responsible trade.

.3 Each Area as it is Completed:

.1 Clean up all surfaces, remove equipment, salvage and debris and return in condition suitable for use by the Owner as quickly as possible as soon as Work in each area of the alterations is complete.

.2 Review final cleaning with Consultant prior to final acceptance.

.3 Reinstate areas and existing works outside areas of demolition to conditions that existed prior to commencement of work.

END OF SECTION

PART 1 GENERAL

1.1 General and Related Work

.1 Read this section in conjunction with all other sections so as to comply with the requirements of Division 1 and the General Conditions of the Contract.

.2 Related Work Specified Elsewhere

Division 13,	Section 02 83 11	Lead-Based Paint Abatement
Division 13,	Section 02 84 10	PCB Packaging and Disposal
Division 13,	Section 02 84 11	Mercury Packaging and Disposal
Division 13,	Section 02 87 00	Biohazard Remediation

.3 The site conditions identify the location and condition of all known asbestos-containing materials (ACM) to be disturbed by the work of this section. The specification fulfils the requirements of the report required by Ontario Regulation 278/05.

.4 Unless otherwise shown or specified it is the intent that work performed as per this section will result in the removal and disposal or decontamination of all ACM included in work of this section and all materials which have been contaminated by ACM either during or prior to work of this section.

1.2 Site Conditions

.1 The following reports are provided for reference. Pinchin relied solely on these reports for type of ACM present, locations and quantities of ACM, as required for the development of these specifications.

.1 "*Designated Substance Survey and Perchlorate Detection in Fume Hoods, OVC-Former VMI Building, University of Guelph-Physical Resource Dept.*" dated June 20, 2018. Prepared by Lex Scientific Solutions, File No. 01180066

.2 "*Spray-Applied Beam Insulation Inspection, OVC-Former VMI Building, University of Guelph-Physical Resource Dept.*" dated August 30, 2018. Prepared by Lex Scientific Solutions, File No. 01180066-B"

1.3 Outline of Work

.1 Refer to contract drawings for the extent of construction work and the Asbestos Work Areas.

.2 Quantities provided in the specifications are approximate, it is the contractor's responsibility to confirm all quantities provided and to verify all site conditions.

.3 Coordinate the following items with the Contractor and the Consultant, which are to be included in the lump sum bid of the Abatement Contractor, including but not limited to: electrical isolations, GFI connection, water connections, hoarding walls, bin placement, hours of work, schedule, etc.

.4 Within Wing C of the building, IT cables must be protected, cleaned and left in place during and after work. Coordinate with The Contractor and The Consultant to ensure this is completed properly.

.5 Using Type 3 procedures, remove and dispose of the following within Corridors C201 and C202:

.1 Sprayed fireproofing and overspray.

.2 If sprayed prior to wall installation, remove top 6" of walls or partitions as required to access asbestos-containing sprayed fireproofing. Cut in clean straight line.

.3 Asbestos-containing mechanical insulations.

.4 Ceiling tiles, grid, supports and hangers.

.5 Clean and protect non-asbestos mechanical insulations.

.6 Column enclosures and check behind columns.

.7 Check at base of all wall cavities for ACM debris.

.8 All ductwork present, including flexible ducts, diffusers, VAV and mixing boxes, etc.

.9 Exit signs.

.10 Light fixtures, lamps and non-PCB ballasts.

.1 Package PCB ballasts as per Section 02 84 10.

.11 All electrical services including but not limited to conduit, bx cable, junction boxes, telephone cord, computer cable, etc.

.1 NOTE: Within Wing C of the building, IT cables must be protected, cleaned and left in place during and after work. Coordinate with the Contractor and the Consultant to ensure this is completed properly.

.12 Remove rigid ducts as required to clean the interior of all ductwork.

.6 Using Type 3 procedures, remove and dispose of the following throughout the building:

.1 All ductwork present, including flexible ducts, diffusers, VAV and mixing boxes, etc.

.2 Ceiling tiles, grid, supports and hangers as necessary to access and remove ductwork.

.1 NOTE: Within Wing C of the building, IT cables must be protected, cleaned and left in place during and after work. Coordinate with the Contractor and the Consultant to ensure this is completed properly.

.7 Using Type 3 procedures, remove and dispose of the following asbestos-containing materials:

.1 Parging cement present on pipe fittings in the following locations: Rooms 128, 130, 132, 133, 135, 138, 138A, 138B, 139, 139A, 140, 140A, Washroom 130, Washroom 117, 177A, 117B, 119, Sewage Room 120A, 123, 125A, 125B, 126, 126A, 126E, 127, Washroom 116, 116, 109, 109A, 109B, 102, 128, 124, 133A, Corridor 102, Corridor 103, 203, 204B, 206B, 206C, 209, 209A, 223, Corridor 201 and Penthouse Mechanical Room 222 (Approximately 411 fittings).

.2 Parging cement present on pipe fittings in inaccessible ceiling hatches in the following locations: Rooms 129, 132A, 132B, 132C, 117A, 117B, 121, 126D, Washroom 202, 201, Atrium 202, Corridor 100 and all stairwells (Unknown amount of fittings)

.1 Remove ceiling and fixtures as necessary to access these fittings.

.3 Vinyl floor tiles and mastic present in the following locations:

.1 9”x9” Olive tiles with white streaks: Rooms 138A, 138B, 215, 215A, 215B, 215C, 215D, 216, 112, and C201 (approximately 256 square feet);

.2 9”x9” Brown tiles with white streaks: Rooms 123A, 221, Penthouse Mechanical Room 222 (bottom of stairs), 209, 209A, 210, 210A, 210B and 210C (approximately 612 square feet);

.3 9”x9” Grey tiles with white streaks: Rooms 128, 117A, 117B, 125B, 125A, 125, 126B, 126D, 214A, 214B, 215, 215A, 215B, 111, 203, 203A, 206A, 206B and 206C (approximately 2,223 square feet);

.4 Green/Blue tiles: Room 126 (approximately 270 square feet);

.5 9”x9” white tiles with green streaks: Rooms 132B and 126D (approximately 160 square feet);

.6 9”x9” teal tiles with white: Rooms 119 (approximately 96 square feet);

.7 9”x9” grey tiles with black: Rooms 123 and 124 (approximately 432 square feet);

.8 Black tiles with white streaks: Rooms 204B (approximately 40 square feet);

.9 9”x9” brown tiles with multicolour streaks: Rooms 203, 208, 210, 210A, 210B and 210C (approximately 912 square feet);

.10 9”x9” blue tiles with white streaks: Rooms 215, 215A, 215B, 215c, 215d, 216, 223, 204B, 213, 213A, 213B and 213C (approximately 839 square feet);

.11 9”x9” white tiles with brown streaks: Rooms 215C, 215D, 216, 219A. 219B, 220, 102, 203B, 207 and 207B (approximately 1,489 square feet);

.12 9”x9” red tiles with white streaks: Rooms 219, 219A, 219B, 219C, 128, 209, 209A and C201 (approximately 700 square feet);

.13 Army green tiles with white streaks: Rooms 213, 213A, 213B and 213C (approximately 170 square feet); and

.14 Black mastic adhesive below floor tiles: Found throughout the building except where there is terrazzo flooring and concrete flooring (approximately 18,000 square feet).

.4 Presumed asbestos-containing gold antisweat mastic adhesive on the underside of sinks present in Rooms 209 and 209A (2 units).

.5 Presumed asbestos-containing parged pipe and/or tank wrapping in the mechanical room 222 and Sewage Room 120A (approximately 6,000 square feet).

.6 Presumed asbestos-containing transite board in Room 138 (approximately 70 square feet).

.7 Presumed asbestos-containing fireproofing within two exterior column enclosures.

1.4 Schedule

.1 Coordinate all work with the Consultant.

.1 A schedule is to be provided to the Consultant.

.1 The Contractor and the Consultant will provide advance notice to the University of Guelph – Physical Resources Dept. who will inform the school administration when work will be performed.

.2 Perform the following work during Quiet Hours:

.1 Waste transfer.

1.5 Definitions

.1 Asbestos: Any of the fibrous silicates defined in Regulation 278/05 including actinolite, amosite, anthophyllite, chrysotile, crocidolite and tremolite.

.2 Asbestos Abatement Consultant: Owner's Representative providing inspection and air monitoring.

.3 Asbestos Abatement Contractor: Contractor or sub-contractor performing work of this section.

.4 Asbestos-Containing Material(s) (ACM): Material(s) identified under Site Conditions including debris, fallen material and settled dust.

.5 Asbestos Work Area: Area where work takes place which will, or may, disturb ACM.

.6 Authorized Visitors: Prime Contractor, Building Owner or Representatives, Asbestos Abatement Consultant, and persons representing regulatory agencies.

.7 Competent Worker: A worker who is qualified because of knowledge, training and experience to perform the work, is familiar with Regulation 278/05 and the Occupational Health and Safety Act, and has knowledge of the potential or actual danger to health and safety in the work.

.8 DOP Testing (or HEPA Integrity Test): Testing performed on HEPA Filtered Negative Pressure Machines and HEPA vacuums using DOP or equivalent. Testing shall ensure that total penetration from the unit does not exceed 0.03%, or 99.97% efficient of airborne particulate removal. DOP Testing must be in compliance with ASME N510-1989 (1995) and must be performed using a Temporary Mixing Chamber with installed baffles to allow uniform mixing of challenge aerosol.

.9 Fitting: Section of pipe other than straight uninterrupted sections including elbows, valves, tees, hangers, nipples, union or ends.

.10 Friable Material: means a material when dry can be crumbled, pulverized or powdered by hand pressure or is crumbled, pulverized or powdered.

.11 HEPA Filter: High Efficiency Particulate Arresting filter that is at least 99.97 percent efficient in collecting a 0.3 micrometre aerosol.

.12 Polyethylene: Either polyethylene sheeting or rip-proof polyethylene sheeting (as specified) with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide a continuous polyethylene membrane to protect underlying surfaces from damage, and to prevent escape of asbestos fibres through sheeting into Occupied Areas.

.13 PCM: Phase Contrast Microscopy

.14 Personnel: All contractors' employees, sub-contractors employees, supervisors.

.15 Occupied Area: Any area of the building outside the Asbestos Work Area.

.16 Remove: Remove means remove and dispose of (as applicable type of waste) unless followed by other instruction (e.g. remove and turn over to Owner).

.17 TEM: Transmission Electron Microscopy

1.6 Submittals

.1 Submit prior to starting work:

.1 Schedule.

.2 Workplace Safety and Insurance Board Clearance Certificate.

.3 Insurance certificates.

.4 Copy of Company Health and Safety Policy and applicable Programs.

.5 Ministry of Labour Notice of Project form.

.6 Copy of Certificate of Approval for transportation of asbestos waste and location of landfill.

.7 Pre-removal survey of damage in all areas where asbestos abatement will take place or waste will be transported.

.2 Submit the following information regarding personnel prior to starting work:

.1 Resumes of the supervisory personnel.

.2 Proof in the form of a certificate that supervisory personnel have been certified as supervisors under the Ministry of Training, Colleges and Universities course 253S.

.3 Proof in the form of a certificate that workers have been certified under the Ministry of Training, Colleges and Universities course 253W.

.4 WHMIS training certificates for all personnel.

.5 Certificate proving that each worker or supervisor on site has been fit tested for the respirator appropriate for the work being performed.

.3 Submit the following information regarding HEPA filtered devices prior to construction of enclosure or asbestos abatement:

.1 Performance data on HEPA filtered vacuums including DOP tests no more than 3 months old.

.2 Performance data on negative air units including DOP tests which must be no more than 3 months old if the unit is vented outdoors or which must be performed on site immediately prior to initial usage and when HEPA filters are changed or the unit is vented indoors.

.3 DOP tests to be performed by an independent testing company.

.1 DOP testing company is required to submit a detailed technical report of testing protocol, including Introduction, Methodology, Results, Conclusions, and Recommendations, including results of the Air-Aerosol Mixing Uniformity test as per ASME N510-1989 (1995).

.2 DOP testing company must also provide calibration certificates from an independent calibration firm or from the manufacturer of the testing equipment for both the aerosol photometer and the pressure gauge on the aerosol generator dated within 1 calendar year from the on-site testing date.

.3 DOP testing company must also provide the National Sanitation Foundation (NSF) certification name and number of the on-site technician performing the testing.

.4 Submit the following prior to isolating the work area:

.1 Written statement that the Ground Fault Interrupter Panels use CSA approved parts and have been inspected by the Electrical Safety Authority.

.2 Material Safety Data Sheets for chemicals or material used in the course of the Asbestos Abatement Project.

.5 Submit the following upon completion of the work.

.1 Manifests, waybills, bills of ladings etc. as applicable for each type of waste.

1.7 Regulations

.1 Comply with Federal, provincial, and local requirements, provided that in any case of conflict among those requirements or with these Specifications the more stringent requirements shall apply. Work shall be performed under regulations in effect at the time work is performed. Regulations include but are not limited to the following:

.2 Ministry of Labour Occupational Health and Safety Act Regulations for Construction Projects including Revised Statutes of Ontario 1990, Chapter 0.1 and Ontario Regulation 278/05.

.3 Ministry of Transportation Regulations for the transport of asbestos waste, including the Transportation of Dangerous Goods Act.

.4 Ministry of Environment Regulations for the disposal of asbestos waste, including R.R.O. 1990, Reg. 347 as amended.

1.8 Supervision

.1 Provide on-site, a supervisor, with authority to oversee all aspects of the work, including but not limited to, health and safety, methods, scheduling, labour and equipment requirements.

.2 The supervisor must be on site at all times during work at risk of disturbing ACM. Failure to comply with this requirement may result in a stoppage of work, at no cost to the Owner.

.3 Provide a minimum of one supervisor for every 10 workers.

.4 Replace supervisory personnel, with approved replacements, within 3 working days of a written request from the Asbestos Abatement Consultant. Asbestos Abatement Consultant reserves the right to request replacement of supervisory personnel without explanation.

.5 Do not replace supervisory personnel without written approval from the Asbestos Abatement Consultant.

1.9 Quality Assurance

.1 Ensure the removal and handling of ACM or asbestos contaminated materials is performed by persons experienced in the methods, procedures and industry practices of asbestos abatement.

.2 Complete work so that at no time airborne asbestos, visible solid residue, or water runoff contaminates areas outside Asbestos Work Area. Asbestos Abatement Consultant is empowered to order a shutdown of work when a leak has occurred or is likely to occur. Cost of additional work by Asbestos Abatement Contractor and/or Asbestos Abatement Consultant to rectify unsatisfactory conditions shall be charged to the Asbestos Abatement Contractor.

.3 Perform all work involving other trades such as electrical, mechanical, carpentry, glazing etc. using licensed persons experienced and qualified for the work required.

.4 The Asbestos Abatement Consultant will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs required for the Work in accordance with the applicable construction safety legislation, other regulations or general construction practice. The Asbestos Abatement Consultant will not be responsible for or have control or charge over the acts or omissions of the Asbestos Abatement Contractor, his Subcontractors or their agents, employees or other persons performing any of the Work.

1.10 Notification

.1 Before commencing work, notify orally and in writing, an inspector at the office of the Ontario Ministry of Labour nearest the project site.

.2 Notify Sanitary Landfill site as per Ontario Regulation 347 as amended.

.3 Inform all sub trades of the presence of ACM identified in the contract documents.

.4 Notify the Owner or Owners Representative, the Joint Occupational Health and Safety Committee and the Ontario Ministry of Labour, as required by Regulation 278/05, if friable materials not identified in the contract documents are discovered during the course of the work. Stop work in these areas immediately.

1.11 Insurance

.1 Maintain a Commercial General Liability Policy with an insurance company acceptable to Pinchin Ltd. and The University of Guelph – Physical Resources Dept The intent of this policy is to hold Pinchin Ltd. and The University of Guelph – Physical Resources Dept. harmless as it relates to claims for Bodily Injury or Property Damage or both, relating to the contract. Commercial General Liability insurance shall be provided on an "occurrence" basis to cover injury or damage (whether detected or not during the policy period) which happens during the policy period.

.2 Maintain an Automobile or Fleet Policy, and Non-owned Automobile Policy with an insurance company acceptable to Pinchin Ltd. and The University of Guelph – Physical Resources Dept. The intent of these policies is to hold Pinchin Ltd. and The University

of Guelph – Physical Resources Dept. harmless as it relates to claims for Bodily Injury or Property Damage or both, relating to the contract.

.3 Maintain a Pollution Liability Policy (or asbestos liability policy or specific coverage under the CGL for asbestos abatement) with an insurance company acceptable to Pinchin Ltd. and The University of Guelph – Physical Resources Dept. The intent of this policy is to hold Pinchin Ltd. and The University of Guelph – Physical Resources Dept. harmless as it relates to claims for Bodily Injury or Property Damage or both, relating to the contract. Pollution Liability shall be provided on an "occurrence" basis to cover injury or damage (whether detected or not during the policy period) which happens during the policy period. Without limiting the generality of the foregoing, the policy shall insure the operations of asbestos abatement and shall not contain any environmental and/or health hazard exclusions relating to remediation operations including asbestos abatement.

.4 Forward all certificates to Pinchin Ltd. and The University of Guelph – Physical Resources Dept. before work is commenced, showing Pinchin Ltd. and The University of Guelph – Physical Resources Dept. as additional insured as their interest may appear.

.5 The University of Guelph – Physical Resources Dept. may request a certified true copy of the policies.

.6 The limits will not be less than:

.1	Commercial General Liability	$5,000,000.00
.2	Automobile	$2,000,000.00
.3	Pollution Policy (Asbestos Liability)	$5,000,000.00

1.12 Personal Protection

.1 Protect all personnel at all times when possibility of disturbance of ACM exists.

.2 Provide the following respiratory protection to all personnel:

.1 Full Face Powered Air Purifying Respirators with P100 high efficiency (HEPA) cartridge filters during projects when performing wet abatement of sprayed fireproofing or texture coat containing chrysotile asbestos, or wet abatement of other non-surfacing asbestos-containing material specified in this section.

.2 Non-powered half-face respirators with P100 high efficiency (HEPA) cartridge filters for dismantling of Type 3 enclosures, using Type 2 Procedures.

.3 Respirators shall be:

.1 Certified by the National Institute of Occupational Safety and Health (NIOSH) or other testing agency acceptable to the Ministry of Labour.

.2 Fitted so that there is an effective seal between the respirator and the worker's face. Ensure that no person required to enter an Asbestos Work Area has facial hair which affects the seal between respirator and face.

.3 Assigned to a worker for their exclusive use.

.4 Maintained in accordance with manufacturer's specifications.

.5 Cleaned, disinfected and inspected by a competent person after use on each shift, or more often if required.

.6 Repaired or have damaged or deteriorated parts replaced.

.7 Stored in a clean and sanitary location.

.8 Provided with new filters as necessary, according to manufacturer's instructions.

.9 Worn by personnel who have been fit checked by qualitative or quantitative fit-testing. Instruction must be provided by a competent person as defined by the Occupational Health and Safety Act.

.4 Provide protective clothing, to all personnel which:

.1 Is made of a material that does not readily retain nor permit penetration of asbestos fibres.

.2 Consists of head covering and full body covering that fits snugly at the ankles, wrists and neck.

.3 Is replaced or repaired if torn or ripped.

.4 Is disposed of as ACM.

.5 Wear hard hats, safety shoes and other personal protective equipment required by applicable construction safety regulations.

.6 Provide site specific instruction to workers before allowing entry to Asbestos Work Area. Instruction shall include training on entry and exit from Asbestos Work Areas. Instruction must be provided by a competent person as defined by the Occupational Health and Safety Act.

.7 Provide soap, shampoo and towels for use by all personnel when leaving the Asbestos Work Area.

.8 Prohibit smoking, eating, drinking, chewing in the Asbestos Work Area and Decontamination Facilities.

1.13 Asbestos Abatement Work Area Entry Procedures

.1 Use the following procedure to enter contaminated Asbestos Work Area:

.1 Remove street clothes in Clean Change Room.

.2 Put on respirator with new or tested filters, and protective clothing in Clean Change Room or clean side of Shower Room.

.3 Store all street clothes, uncontaminated footwear, towels, etc. in the Clean Change Room.

1.14 Asbestos Abatement Work Area Exit Procedures

.1 Use the following procedure to exit contaminated Asbestos Work Area:

.1 Remove gross contamination from protective clothing using HEPA vacuum or by wet wiping.

.2 Proceed to Equipment and Access Room and remove all contaminated clothing and equipment except respirator.

.3 Store contaminated footwear, hard hats, etc. in Equipment and Access Room.

.4 Proceed naked to shower while still wearing respirator.

.5 Shower, cleaning outside of respirator with soap and water. Thoroughly wet body, head and hair, remove respirator and wash body, head and hair. Wet clean inside of respirator face piece.

.6 Remove filters for testing or dispose of in container provided for this purpose. Remove after leaving the Shower but prior to entering the Clean Change Room.

.7 Proceed to the Clean Change Room, dry off and dress in street clothing.

.8 Maintain and disinfect respirator.

1.15 Authorized Visitor Protection

.1 Provide clean protective clothing and equipment, and approved respirators to Authorized Visitors.

.2 Ensure Authorized Visitors have received required training prior to granting entry into Asbestos Work Area.

1.16 Air Monitoring

.1 Air monitoring will be performed following the National Institute for Occupational Safety and Health method 7400, Asbestos and other fibres by PCM (Phase Contrast Microscopy).

.2 Co-operate with the Asbestos Abatement Consultant in collection of air samples. Asbestos Abatement Contractor to exercise care with Asbestos Abatement Consultant's equipment. The Owner reserves the right to back-charge the Asbestos Abatement Contractor for further collection of samples damaged by tampering or abuse. In addition, the Asbestos Abatement Contractor will be responsible for the cost of testing equipment repairs resulting from the actions of the Asbestos Abatement Contractor's forces.

.3 PCM samples will be collected from within the Asbestos Work Area, after the site has passed a visual inspection and an acceptable coat of post removal sealant has been applied. These airborne fibre levels *must not exceed* 0.01 fibre/mL, after forced air monitoring and PCM analysis (Air Monitoring Clearance Inspection). If these results show fibre levels in excess of 0.01 fibre/mL:

.1 Maintain Asbestos Work Area isolation.

.2 Re-clean entire Asbestos Work Area.

.3 Apply another acceptable coat of post removal sealant to exposed surfaces throughout the Work area.

.4 Repeat above measures until visually inspected and air monitoring results are at a level equal to that specified.

.5 Alternate to items 2-4 above, the Asbestos Abatement Contractor can pay for analysis of samples by Transmission Electron Microscopy (TEM). Laboratory performing TEM analysis is to be NVLAP accredited.

.4 Cost of additional inspection and sampling performed as a result of elevated fibre levels may be charged to the Asbestos Abatement Contractor at the Owner’s discretion.

1.17 Inspection

.1 From commencement of work until completion of clean-up operations, the Asbestos Abatement Consultant will be present periodically on site both inside and outside the Asbestos Work Area.

.2 The following Milestone Inspections will take place, at the Owner's cost:

.1 Milestone Inspection A - Clean Site Preparation

.1 Inspection of preparations and set-up prior to contaminated work in the Asbestos Work Area.

.1 Milestone Inspection B - Contaminated Perimeter Preparation

.1 Inspection of preparations at perimeter of Asbestos Work Area.

.2 Milestone Inspection C - Before Bulk Removal

.1 Inspection of Asbestos Work Area prior to start of major ACM removal.

.3 Milestone Inspection D - Visual Clearance

.1 Inspection of Asbestos Work Area after removal of all asbestos, but prior to application of lock-down agent.

.4 Milestone Inspection E - Air Monitoring Clearance

.1 Inspection and air monitoring after the application of lock-down agent, but prior to removal of Polyethylene from within the Asbestos Work Area.

.5 Milestone Inspection F - Dismantling Inspection

.1 Inspection after removal of Polyethylene prior to dismantling perimeter seal and decontamination facility.

.3 Do not proceed with next phase of Work until written approval of each milestone is received from the Asbestos Abatement Consultant.

.4 In addition to the Milestone Inspections, inspection of the Asbestos Work Area may be performed to confirm the Asbestos Abatement Contractor's compliance with the requirements of the contract documents and governing authorities. Any deviations from these requirements that have not been approved in writing, may result in a stoppage of work, at no additional cost to the Owner.

.5 The Asbestos Abatement Consultant is empowered by the Owner to inspect for final cleanliness at completion. Additional labour or materials expended by the Asbestos Abatement Contractor to provide satisfactory performance to the level specified shall be at no additional cost.

.6 Inspection and air monitoring performed as a result of Asbestos Abatement Contractor's failure to perform satisfactorily regarding quality, safety, or schedule may be charged to the Asbestos Abatement Contractor at the Owner’s discretion.

1.18 Differential Pressure Monitoring

.1 Install differential pressure monitor at a location chosen by the Asbestos Abatement Consultant.

.2 Replace damaged or non-functional equipment at the request of the Asbestos Abatement Consultant.

.3 Co-operate with the Asbestos Abatement Consultant in collection of pressure monitoring data.

.4 Maintain specified differential pressure at monitoring location. Negative air pressure is to be -0.02 inches of water, relative to the area outside the enclosed area

.5 Record data at start and end of shift and maintain records on file.

.6 Stop contaminated work and take corrective action if pressure differential drops below the specified level. Notify Asbestos Abatement Consultant immediately.

PART 2 PRODUCTS AND FACILITIES

2.1 Materials and Equipment

.1 All materials and equipment brought to work site must be in good condition and free of asbestos, asbestos debris, and fibrous materials.

.2 Airless Sprayer: AC powered pressure washer that allows wetting agent to mix with water, uses no air or compressed air, and has a nozzle to regulate power and pressure.

.3 Amended Water: Water with wetting agent added for purpose of reducing surface tension to allow thorough wetting of ACM.

.4 Asbestos Waste Container: An impermeable container acceptable to disposal site and Ministry of the Environment comprised of one of the following:

.1 A 6 mil (0.15 mm) labelled yellow sealed polyethylene bag, inside a second clear 6 mil (0.15 mm) sealed polyethylene bag.

.2 A 6 mil (0.15 mm) sealed polyethylene bag, positioned inside or outside a rigid sealed container of sufficient strength to prevent perforation of the container during filling, transportation and disposal.

.3 Labelled containers as required by the Ontario Ministry of the Environment Reg. 347 as amended and Regulation 278/05.

.5 Differential Pressure Monitor: a high precision instrument for measuring and controlling pressure differences in the low range, between the Asbestos Work Area and occupied area. Acceptable Product: Magnehelic gauge (Cat. No. 2000-00) manufactured by Dwyer Instruments Inc. or equivalent. Calibrate regularly to manufacturer's instructions.

.6 Discharge Ducting: Polyethylene Tubing. Reinforced with wire. Diameter equal to negative pressure machine discharge. Not to be longer than required, or so long that negative pressure is compromised.

.7 Ground Fault Panel: Electrical panel as follows:

.1 Ground fault circuit interrupters of sufficient capacity to power temporary electrical equipment and lights in Asbestos Work Area.

.2 Interrupters to have a 5 mA ground fault protection.

.3 Necessary accessories including main switch disconnect, ground fault interrupter lights, test switch to ensure unit is working, and reset switch.

.4 Openings sealed to prevent moisture or dust penetration.

.5 Inspected by the Electrical Safety Authority.

.6 Panel uses CSA approved parts and been constructed, inspected and installed by a licensed electrician.

.8 HEPA Filtered Negative Pressure Machine: Portable air handling system which extracts air directly from the Asbestos Work Area and discharges the air to the exterior of the building. Equipped as follows:

.1 Prefilter and HEPA filter. Air must pass HEPA filter before discharge.

.2 Pressure differential gauge to monitor filter loading.

.3 Auto shut off and warning system for HEPA filter failure.

.4 Separate hold down clamps to retain HEPA filter in place during change of prefilter.

.9 HEPA Vacuum: High Efficiency Particulate Arresting (HEPA) filtered vacuum equipment with a filter system capable of collecting and retaining 0.3 micron spherical particles greater than 0.3 microns at 99.97% efficiency.

.10 Hose: Leak-proof, minimum busting strength of 200 PSI or greater if required, abrasion resistant covering, reinforcing, and machined-brass couplings. Maintained and tested. Hose to be temperature resistant if it is to carry domestic hot water.

.11 OSB: Oriented Strand Board.

.12 Polyethylene Sheeting: 6 mil (0.15 mm) minimum thickness unless otherwise specified in sheet size to minimize joints. New materials only.

.13 Post Removal Sealant (or Lockdown): Sealant that when applied to surfaces serves the function of trapping residual asbestos fibres or other dust. Product must have flame spread and smoke development ratings both less than 50. Product shall leave no stain when dry. Post Removal Sealant shall be compatible with replacement insulation or fireproofing where required and capable of withstanding service temperature of substrate. Apply to manufacturer's instructions.

.14 Protective Clothing: Disposable full body coveralls complete with hoods manufactured of a material which does not permit penetration of asbestos fibres. Coveralls to fit snugly at ankles, wrists and neck. Acceptable materials: Dupont Tyvek or Kimberly Clark Kleenguard.

.15 Rip-Proof Polyethylene Sheeting: Minimum requirements 8 mil (0.20 mm) fabric made up from 5 mil (0.13 mm) weave and 2 layers of 1.5 mil (0.05 mm) poly laminate or approved equal. In sheet size to minimize on-site seams and overlaps. New materials only.

.16 Shower Hose: Water lines for supply of hot & cold water to shower facilities to be rated for use at 200 PSI (1380 kPa) or twice the working pressure whichever is greater. Supply lines to be continuous and free of fittings, joints or couplings.

.17 Sprayer: Garden type portable manual sprayer or water hose with spray attachment if suitable.

.18 Tape: Duct tape or tape suitable for sealing polyethylene to surfaces under both dry and wet conditions in the presence of Amended Water.

.19 Wetting Agent: Non-sudsing surfactant added to water to reduce surface tension and increase wetting ability.

2.2 Hoarding Walls

.1 Type A Hoarding Wall: 38 mm x 89 mm wood or metal studs at 400 mm o/c with continuous sill and top plate, covered with one layer of rip-proof polyethylene sheeting on each side of wall.

.2 Type F Hoarding Wall: Upper perimeter hoarding wall - 38 mm x 89 mm wood or metal studs at 400 mm o/c with continuous sill and top plate, covered with 2 layers of polyethylene sheeting on Asbestos Work Area side. Anchor wall to underside of structure and extend down to top of ceiling or top of wall/hoarding wall below. Install wall under contaminated conditions.

.3 Windows: Install sufficient transparent windows in hoarding walls to allow observation of entire work area from outside the enclosure where existing solid walls do not make up the perimeter.

2.3 Decontamination Facilities

.1 Workers' Decontamination Facility: A decontamination facility comprised of three linked rooms, Contaminated Change Room, a Shower Room, and a Clean Change Room.

.1 Rooms, Occupied Areas and Asbestos Work Areas, shall be separated by curtained doorways at each door.

.2 Contaminated Change Room: Room between Shower Room and Asbestos Work Area.

.1 Locate on contaminated side of Shower Room.

.2 Install asbestos waste container for asbestos contaminated protective clothing.

.3 Install storage facilities for any personal protective equipment to be reused in Asbestos Work Area including boots, hard hats, etc., but excluding respirators.

.4 Install hooks and shelves as required for personal protective equipment.

.5 Minimum size of generally 2 m x 2 m. Increase size accordingly to accommodate number of workers.

.3 Shower Room: Room between Clean Change Room and Contaminated Change Room.

.1 Install one walk through shower unit for every six workers.

.2 Install constant supply of hot and cold water, controllable at each shower. Water supply must be sufficient to provide water at a minimum temperature of 40 degrees Celsius (maximum 50 degrees) in a volume required for all workers to properly decontaminate.

.1 Install individual hot and cold shut-off valves on water supply located on clean side of Shower Room. Connect shower to these valves.

.2 Install individual controls inside the shower to regulate water flow and temperature.

.3 Install rigid piping or Shower Hose with watertight connections for supply and drains.

.4 Install a sealed drip pan under and around the showers, 150 mm deep.

.5 Install sump pumps, sufficient for volume of waste shower water from showers and drip pan. Direct waste shower water to sanitary drains.

.6 Install ground fault protected power switch on clean side of shower for sump pumps, or timed for shut off.

.7 Provide adequate quantity of soap, shampoo, clean towels

.8 Install an Asbestos Waste Container for disposal of used respirator filters, on the contaminated side of the Shower Room.

.4 Clean Change Room: A room between the Shower Room and Occupied Areas.

.1 Install hooks and shelves on clean side of shower in clean Change Room for storage of respirators.

.2 Install lockers or hangers for workers' street clothes and personal belongings.

.3 Install vented wood door in wood frame at doorway to Occupied Area. Door must have locking passage set. Provide two keys to Asbestos Abatement Consultant and one to Owner.

.4 Install hose bib on domestic cold water pipe for connection on clean side of Asbestos Work Area.

.5 Install electric hot water heater/tank for showers in decontamination facility.

.6 Provide ground fault protected power supply to hot water tanks, sump pump, battery chargers.

.7 Install a fire extinguisher, mount to wall.

.8 Minimum size of generally 2m x 2m. Increase size accordingly to accommodate number of workers.

.5 Waste and Equipment Decontamination Facility: Waste and Equipment Decontamination Facility comprised of three linked rooms: a Container Cleaning Room, a Holding Room and a Transfer Room.

.1 Purpose of Waste and Equipment Decontamination Facility is to provide a means to decontaminate asbestos waste containers, scaffolding, vacuums, and other tools and equipment and materials required in the Asbestos Work Area.

.2 Rooms, Occupied Areas and Asbestos Work Areas, shall be separated by curtained doorways at each door.

.6 Container Cleaning Room: Room between Asbestos Work Area and Holding Room of sufficient size to allow proper washing of equipment and waste containers or double bagging of asbestos waste. All wash water shall be treated as asbestos contaminated waste.

.7 Holding Room: Room between Container Cleaning Room and Transfer Room, of sufficient size to accommodate at least two asbestos waste containers and two workers double bagging waste, or for largest item of equipment used.

.1 Install a fire extinguisher mounted to wall.

.8 Transfer Room: Room between Holding Room and Occupied Area, acting as an air lock for the transfer of waste.

.1 Install vented wood door in wood frame at doorway to Occupied Area. Door must have locking passage set. Provide two keys to Asbestos Abatement Consultant and one to Owner.

.9 Construction of Decontamination Facilities

.1 Install floor protection as follows:

.1 Install one layer of rip-proof polyethylene sheeting over two layers of 6 mil polyethylene sheeting beneath entire decontamination facility.

.2 Turn 600 mm of polyethylene up the sides of the decontamination facility and overlap with the polyethylene sheeting covering the walls.

.3 Install plywood with taped and caulked joints between layers of 6 mil polyethylene where required to protect surfaces from water damage (e.g. carpet).

.2 Install walls as follows:

.1 Around all rooms, between all rooms, at entrance to Asbestos Work Area and at entrance to Occupied Area.

.2 Install 38 x 89 mm wood framing at 610 mm o/c with continuous top and sill plates.

.3 Install one layer rip-proof polyethylene sheeting on interior walls of Decontamination Facility.

.4 Install one layer rip-proof polyethylene sheeting both sides on interior dividing walls of Decontamination Facility.

.5 Install one layer rip-proof polyethylene sheeting over one layer of 6 mil polyethylene sheeting on walls exposed to the Asbestos Work Area.

.6 Install one layer rip-proof polyethylene sheeting over one layer of 6 mil polyethylene sheeting on walls exposed to the Occupied Area.

.3 Install roof as follows:

.1 Install joists. Size of joists is to be determined by clear span. Consult Ontario building Code (Table A-1). For clear spans up to 2850 mm use SPF Select 38 x 140 mm wood joist at 400 mm o/c with continuous 38 x 140 mm wood headers, and install strapping beneath joists.

.2 At the Contaminated Change Room and where roof is exposed to the Asbestos Work Area, install 19 mm plywood or OSB over joists. Caulk and tape joints and install one layer rip-proof polyethylene sheeting over 2 layers of 6 mil polyethylene sheeting.

.3 Where roof is not exposed to the Asbestos Work Area, install one layer rip-proof polyethylene sheeting over joists.

.4 Turn 600 mm of polyethylene down the sides over polyethylene on the perimeter walls.

.5 At underside of joists in all rooms, install one layer of polyethylene sheeting.

.6 Minimum interior clear height 2000 mm to underside of joist.

.10 Curtained Doorways

.1 Construct as follows:

.1 Install two flap doors, full width and height of door opening at all doors between chambers, facilities and Asbestos Work Area.

.2 Construct each flap door of two layers of polyethylene sheeting with all edges reinforced with tape. Use wood strapping to securely fasten flap doors to head and alternate jambs.

.3 Install weights attached to bottom edge of each door flap.

.4 Provide direction arrows on flaps to indicate opening.

2.4 Signage

.1 Work Area Signs: Post signs in both official languages at access points to the Asbestos Work Area and on hoarding walls as follows:

.1 CAUTION.

.2 Asbestos Dust Hazard Area.

.3 Unauthorized Entry Prohibited.

.4 Wear Assigned Protective Equipment.

.5 Breathing Asbestos Dust May Cause Serious Bodily Harm.

.2 Vehicles, Bins and Asbestos Waste Containers: Post signs on both sides of every vehicle used for the transportation of asbestos waste and on every asbestos waste container. Signs must display thereon in large, easily legible letters that contrast in colour with the background the word "CAUTION" in letters not less than ten centimetres in height and the words:

.1 CONTAINS ASBESTOS FIBRES

.2 Avoid Creating Dust and Spillage

.3 Asbestos May be Harmful to Your Health

.4 Wear Approved Protective Equipment.

.3 Place placards in accordance with Transportation of Dangerous Goods Act.

PART 3 EXECUTION

3.1 Clean Site Preparation

.1 Perform pre-removal damage survey and submit to Asbestos Abatement Consultant.

.2 Moving of equipment, tools, supplies, and stored materials that can be performed without disturbing ACM will be performed by others.

.3 Remove visible dust and friable material from all surfaces in the work area including those to be worked on, using HEPA Vacuums or wet wiping using Type 2 Procedures as required by O. Reg. 278/05.

.4 Maintain emergency and fire exits from Asbestos Work Area, or establish alternative exits satisfactory to Provincial Fire Marshall and local authorities having jurisdiction. Maintain extra routes from occupied areas. Place emergency exit signs at locations to clearly mark exit route. Seal emergency exit doors so as not to impede use of door during emergency evacuation.

.5 Remove surface mounted fixtures specified to be reused or turned over to Owner.

.6 Install Hoarding Walls between Asbestos Work Area and Occupied Area.

.7 Install Worker Decontamination facility.

.8 Install Waste Decontamination facility.

.9 Install signage in clearly visible locations and in sufficient numbers to adequately warn of an asbestos dust hazard.

.10 Post Ministry of Labour Notice of Project.

.11 Install one layer of rip-proof polyethylene sheeting over two layers of 6 mil polyethylene sheeting so as to protect all equipment and finishes in the Asbestos Work Area that may be damaged. Items to remain include but are not limited to:

.1 Millwork.

.2 Doors.

.3 Bulkheads.

.4 Toilet Partitions.

.5 Plumbing fixtures.

.6 Electrical Equipment.

.7 Mechanical Equipment.

.8 Kitchen Equipment.

.9 Protect pneumatic control lines located in Asbestos Work Area. Notify Asbestos Abatement Consultant if lines are or become damaged.

.12 Seal openings (excepting electrical trenches) in floor using tape, caulking, polyethylene, etc. Openings in floor are to be sealed independently prior to installation of polyethylene sheeting on floor. Include floors of duct and service shafts.

.1 Large openings in floor to be covered. Construction to comply with loading requirements of Ontario building Code and secured in place. Surround with guard rails as per the Occupational Health and Safety Act. Install one layer of rip proof polyethylene over two layers of 6 mil polyethylene over cover. Mark as opening to below. No personnel are to walk or stand on covered opening unless constructed to support live and dead load.

.13 Seal openings in walls below ceiling level using polyethylene, tape, caulking, etc. including but not limited to windows, doors, vents, diffusers, etc.

.14 Seal openings in ceiling, using polyethylene, tape, caulking, etc. including diffusers, grills, etc.

.15 Establish negative pressure in Asbestos Work Areas as follows:

.1 Install HEPA Filtered Negative Pressure Machines sufficient to maintain pressure differential of -0.02 inches of water between contaminated Asbestos Work Area and Occupied Areas.

.2 Arrange HEPA Filtered Negative Pressure Machines to maximize differential pressure in Asbestos Work Area.

.3 Install weighted flaps in perimeter Hoarding Walls as necessary to provide make-up air.

.4 Operate HEPA Filtered Negative Pressure Machines continuously from first disturbance of ACM until completion of dismantling.

.5 Replace prefilters frequently to maintain specified flow rate.

.6 Replace HEPA filters as required to maintain flow rate and integrity of unit.

.7 Discharge HEPA filtered negative pressure machines as follows:

.1 To building exterior.

.1 Direct discharge away from building access points.

.2 Use polyethylene discharge ducting or metal reinforced polyethylene discharge ducting in locations where the ducting must be protected from damage or collapse.

.3 Install and make airtight all negative air discharge ducting.

.4 Discharge ducting is not to be longer than required, and to be straight, so that the length of the ducting does not reduce the flow from negative pressure machines.

.8 DOP test all HEPA Filtered Negative Pressure Machines.

.16 Provide one Ground Fault Panel for each 5,000 square feet (500 square metres) of Asbestos Work Area.

.1 Ground Fault Interrupter Panel to use CSA approved equipment and be inspected by the Electrical Safety Authority.

.2 Ensure safe installation by licensed electricians.

.3 Connect to building power at electrical panel outside Asbestos Work Area.

.4 Cable to be completely jacketed with no defects. Tag/mark cable as Live.

.5 All electrical equipment used during work shall be supplied power from a Ground Fault Panel.

.17 Install temporary lighting in all work areas at levels that will provide for a safe and efficient use of the work area.

.18 Isolate, at panel, and disconnect existing power supply to Asbestos Work Area. Power supply to remaining areas of building must not be disrupted during work of this section.

.1 Lock-out/tag-out power at electrical panels.

.2 Mark/tag any items within or passing through the Asbestos Work Area that are to remain live including but not limited to cable, conduit, wire, fixtures, equipment panels, etc.

.19 Install hose bib on domestic cold water pipe for connection of hoses for wetting.

.1 Install hoses with watertight connections and airless sprayers to wet asbestos-containing materials.

.20 Shut down HVAC systems serving the Asbestos Work Area.

.1 Leave induction units at building exterior walls on lowest supply setting when temperatures are below 0°C so windows and exterior walls do not ice.

.2 Disable any exhaust/return systems at induction units, washrooms, etc.

.3 Seal and protect induction units with one layer of 6 mil polyethylene sheeting.

.21 Perform clean demolition of non-asbestos materials as specified.

.22 Install one layer of rip-proof polyethylene sheeting over two layers of 6 mil polyethylene sheeting, on floor surfaces in Asbestos Work Area.

.1 Install additional layers of rip-proof polyethylene and/or plywood to protect carpeted floor surfaces.

.2 Extend floor protection a minimum of 300 mm up all vertical surfaces in the Asbestos Work Area.

.23 On walls within and forming the perimeter of the Asbestos Work Area install two layers of 6 mil polyethylene sheeting.

.1 At junction of floor and wall surface overlap floor polyethylene with wall polyethylene by a minimum of 300 mm at each layer. One layer of wall polyethylene must always overlap the top layer of floor polyethylene.

.24 Notify Asbestos Abatement Consultant at least 24 hours prior to the need for Milestone Inspection A (Clean Site Preparation). Obtain written approval for this Milestone Inspection before proceeding.

3.2 Contaminated Perimeter Preparation

.1 Perform the following using Type 3 procedures including using the required personal protective equipment specified.

.1 Perform preparation work at perimeter during Quiet Hours after shutting down HVAC systems affecting the Asbestos Work Area, or during normal hours if complete HVAC system is isolated.

.2 Remove ceiling including grids, support and channels, or other obstructions around perimeter of Asbestos Work Area. Remove ceilings in sections equal to the work that can be performed in one shift.

.3 To complete:

.1 Remove top course of block at masonry walls if ACM is present above wall. HEPA vacuum to remove any debris on top of wall and in cavity. Immediately install one layer of rip-proof polyethylene over one layer of 6 mil polyethylene sheeting extending from below ceiling to top of wall, and over top to cover cavity. Do not allow asbestos-containing material to fall down block cavities.

.2 Remove drywall from walls/partitions from deck to 12” below at perimeter stud walls. HEPA vacuum to remove any debris. Immediately install one layer of rip-proof polyethylene over one layer of 6 mil polyethylene sheeting extending from below ceiling to top of wall, and over top to cover cavity. . Remove top plate from deck. Do not allow asbestos-containing material to fall down wall cavities.

.3 Install a layer of 6 mil polyethylene on all drywall at upper perimeter, above ceiling after cleaning of overspray or dust from wall.

.4 Carefully wet asbestos-containing sprayed fireproofing and remove, from deck and beams along the upper perimeter of the Asbestos Work Area, a line of asbestos 300 mm wide to allow for installation of upper perimeter seal.

.5 Install Type F Hoarding Wall at upper perimeter of Asbestos Work Area from top of perimeter wall to deck.

.4 Seal any remaining holes in existing perimeter walls, columns, deck, etc. exposed by removal of tile at perimeter of Asbestos Work Area.

.5 Notify Asbestos Abatement Consultant at least 24 hours prior to the need for Milestone Inspection B (Contaminated Perimeter Preparation). Obtain written approval for this Milestone Inspection before proceeding.

3.3 Contaminated Site Preparation

.1 Perform the following using Type 3 procedures including using the required personal protective equipment specified.

.1 Perform preparation work at perimeter during Quiet Hours after shutting down HVAC systems affecting the Asbestos Work Area, or during normal hours if complete HVAC system is isolated.

.2 Remove lenses from light fixtures.

.3 Remove lamps from light fixtures. Lamps are to be recycled. Do not dispose of fluorescent lamps.

.4 Remove light fixtures and associated electrical supply cable back to the junction box.

.5 Remove heat shields from light fixtures.

.6 Remove PCB ballasts and handle as per Section 02 84 10.

.7 Remove non-PCB ballasts.

.8 Remove ceiling mounted items specified to be turned over to Owner and remove associated electrical supply cable back to the junction box.

.9 Remove remaining ceiling mounted items specified to be removed, and associated electrical supply cable back to the junction box.

.10 Remove remaining ceiling tiles, grid and hangers.

.11 Cut hangers as close to deck as possible.

.12 Reinstall temporary lighting previously supported by ceiling system.

.13 Temporarily support all existing electrical and mechanical services and items supported by the ceiling systems, that are not scheduled to be removed.

.14 Clean and protect electrical systems in the Asbestos Work Area with polyethylene and tape. Include all communication, coaxial, triaxial, fire and public address systems, wiring, conduit, speakers, heat and smoke detectors, alarms, exit lights, junction boxes, etc.

.1 Mark/tag any items within or passing through the Asbestos Work Area that are to remain live.

.15 Clean and seal holes or penetrations in deck, ducts, etc. when exposed by ceiling removal.

.16 Remove column enclosures to the extent specified.

.1 Caulk joint and any cracks in the slab at base of column with 2 hour fire rated caulking.

.2 Install layers of polyethylene sheeting to match floor adjacent.

.17 Remove and dispose of all ductwork present in worksite, including diffusers, flex ducting, rigid ducting, etc.; as specified to be removed. Ductwork to be cleaned, lockdown applied and once cleanliness visually inspected by Consultant, can be removed from site and sent to facility for recycling.

.18 Notify Asbestos Abatement Consultant at least 24 hours prior to the need for Milestone Inspection C (Before Bulk Removal). Obtain written approval of Milestone Inspection before proceeding.

3.4 Maintenance Of Contaminated Asbestos Work Area

.1 Inspect Asbestos Work Area perimeter Hoarding Walls and Upper Perimeter Seals at the beginning and end of each working period and once on each day work does not take place. Inspection must be performed by competent person.

.2 Inspect HEPA filtered negative pressure machines including discharge ducting at the beginning and end of each working period. Inspection must be performed by competent person.

.3 Perform Differential Pressure Monitoring on a frequent basis and record pressure at start and end of shift at a minimum.

.4 Inspect polyethylene sheeting and ensure it is effectively sealed and taped. Repair damage and remedy defects immediately.

.5 Inspect electrical panels and ensure locks and tags are on panels prior to entering the Asbestos Work Area.

.6 Maintain Asbestos Work Area in tidy condition.

.7 Remove waste and debris frequently.

.8 Remove standing water on polyethylene/floor at the end of every shift.

.9 Turn off water supply to hoses and reduce pressure in hose, prior to leaving the Asbestos Work Area at end of shift.

.10 Turn off water supply to showers, at the end of every shift.

.11 Ensure shower pans are pumped out at the end of every use and shift.

3.5 Wet Removal

.1 Do not use compressed air to clean or remove dust or debris.

.2 Remove and dispose of remaining non-asbestos items before, during or after wet removal.

.3 Spray asbestos-containing sprayed or trowelled material with Amended Water using airless spray equipment prior to removal. Saturate ACM to prevent release of airborne fibres during removal.

.4 Remove asbestos-containing sprayed or trowelled material specified to be removed, clean substrate.

.1 Fully saturated ACM may be scraped directly into waste containers or may be allowed to fall to floor.

.2 ACM cannot be allowed to fall from one level to the next.

.5 Spray asbestos-containing pipe insulations with Amended Water using airless spray equipment.

.6 Remove pipe insulations specified to be removed and clean substrate. Maintain exposed surfaces of insulation or lagging in a wet condition.

.1 Full saturation of insulation will not be required if material is immediately bagged and not allowed to fall to floor.

.2 ACM cannot be allowed to fall from one level to the next.

.7 Remove obstructions as required to remove the ACM.

.1 Notify asbestos abatement consultant if item is not specified to be removed and inhibits removal of ACM.

.2 Do not demolish any existing walls etc. that form the perimeter of the Asbestos Work Area without prior written permission from Asbestos Abatement Consultant.

.8 All dislodged ACM shall be maintained in wet state until placed in asbestos waste containers for disposal.

.9 As work progresses, and at regular intervals, place waste in asbestos waste containers and remove from the Asbestos Work Area.

.10 After completion of gross asbestos removal work, perform the following:

.1 Wet clean surfaces from which ACM has been removed with stiff bristle brushes, vacuums, wet-sponges etc. to remove all visible residue and asbestos-containing materials.

.2 Wet clean surfaces which ACM has fallen on using stiff bristle brushes, vacuums, wet-sponges etc. to remove all visible residue and asbestos-containing materials

.3 Wet clean other surfaces in the Asbestos Work Area, including the decontamination facilities, scaffolding, equipment, polyethylene sheeting on floor and walls surfaces etc., ducts and similar items not covered with polyethylene sheeting.

.4 Remove wash water as contaminated waste.

.5 Remove waste.

.6 Level of cleanliness must be acceptable to Asbestos Abatement Consultant.

.7 Remove and dispose of the pre-filters from all negative air units as asbestos-contaminated waste.

.11 Remove induction unit covers and:

.1 Clean entire induction unit with HEPA vacuum using Type 2 Procedures.

.2 Turn induction unit covers over to Owner.

.3 Cover induction units with one layer of 6 mil polyethylene sheeting.

.12 Notify Asbestos Abatement Consultant at least 24 hours prior to the need for Milestone Inspection D (Visual Clearance). Obtain written approval for this Milestone Inspection before proceeding.

3.6 Waste and Material Handling

.1 Waste bins must be placed on grade or in receiving.

.2 All bins must be covered and locked when waste transfer is not being performed.

.3 Ensure redundant non-ACM, rubble, debris, etc. which was not cleaned and which was removed during contaminated work are treated, packaged, transported and disposed of as asbestos waste.

.4 Fluorescent lamps contain mercury and are to be recycled. Do not dispose of fluorescent lamps.

.5 Clean, wash and apply Post Removal Sealant to metal waste prior to removal from Asbestos Work Area.

.1 Recycle metals or dispose of metals as clean waste.

.6 Clean, wash and apply Post Removal Sealant to non-porous materials prior to disposal as clean waste.

.1 Obtain prior written approval from the Asbestos Abatement Consultant for each individual type of material.

.7 Clean and wash equipment prior to removal from Asbestos Work Area if removed prior to completion.

.8 Place all equipment, tools and unused materials that cannot be cleaned in Asbestos Waste Containers.

.9 As work progresses, and at regular intervals, transport the sealed and labelled asbestos waste containers from the Asbestos Work Area to waste bin.

.10 Place items in bins according to waste classification. Place asbestos waste, metals, non-asbestos waste, etc. in separate bins.

.11 Removal of waste containers and decontaminated equipment and materials from the Asbestos Work Area shall be performed using the Waste and Equipment Decontamination Facility as follows:

.1 Prior to entering the Waste and Equipment Decontamination Facility Container Cleaning Room, the first worker (fully protected inside the Asbestos Work Area) shall remove any visible contamination from the surface of the item or waste container being removed from the Asbestos Work Area.

.2 The first worker then carries the item into the Container Cleaning Room and wet sponges the item prior to passing the item through the curtained doorway to a second worker in the Holding Room. (The second worker shall be fully protected

with respirator and disposable clothing and may only leave the decontamination facility via the Asbestos Work Area.)

.3 The second worker in the Holding Room double bags or wraps and seals the item. Without entering the Transfer Room, the second worker passes the item through the curtained doorway into the Transfer Room.

.4 A third worker enters the Transfer Room from the clean area. (The third worker must never enter the Holding Room.) The third worker removes the item from the Transfer Room and transports it to the disposal bin.

.12 Transport waste and materials via the predetermined routes and exits. Arrange waste transfer route with Owner. Use a closed, covered cart to transport through Occupied Areas.

.13 Limit transportation of waste and materials through Occupied Areas of the building to Quiet Hours.

.14 Provide workers transporting waste with means to access full personal protective equipment and all tools required to properly clean up spilled ACM in the case of a rupture of an Asbestos Waste Container.

.15 Bin loading area and waste routes shall be kept clean at all times. Use Type 2 asbestos abatement procedures if appropriate or requested by Owner's Representative.

.16 Pick-up and drop off of garbage bin shall be at pre-approved times, and must not interfere with the Owners operations.

.17 Transport asbestos contaminated waste to landfill licensed by Ontario Ministry of the Environment.

.18 Co-operate with Ministry of the Environment inspectors and immediately carry out instructions for remedial work at dump to maintain environment, at no additional cost to the Owner.

3.7 Application Of Post Removal Sealant

.1 Wet Removal

.1 Obtain Asbestos Abatement Consultant's written permission to proceed.

.2 Apply one coat of Post Removal Sealant with an airless sprayer, in accordance with Manufacturer’s Instructions, to cover all surfaces on all items in the Asbestos Work Area, including but not limited to polyethylene, ACM substrate, structural steel, and surfaces scheduled for demolition.

.1 Do not apply post removal sealant to materials that will be damaged by its application.

.3 Notify Asbestos Abatement Consultant at least 24 hours prior to the need for Milestone Inspection E (Air Monitoring Clearance). Obtain written approval of this Milestone Inspection before proceeding.

3.8 Air Clearance Monitoring

.1 Site must be dry prior to Air Clearance Monitoring.

.2 The number of Air Clearance Monitoring samples will be as follows:

.1 2 samples for less than 10 square metres.

.2 3 samples for 10 to 500 square metres.

.3 5 samples for more than 500 square metres.

.3 Prior to air clearance monitoring, install clean 20-inch fans for air circulation during Air Clearance Monitoring.

.1 At least one fan per 10,000 cubic feet of space in Asbestos Work Area.

.2 Install in centre of Asbestos Work Area and space evenly.

.3 The fan exhaust shall be directed upwards or toward the ceiling.

.4 The fans shall be operated on the lowest speed setting.

.4 Restrict access to Asbestos Work Area and operate negative air units for a 12 hour period prior to Milestone Inspection E.

.5 The HEPA filtered negative pressure machines shall be in operation during clearance air monitoring.

.6 In the presence of the Asbestos Abatement Consultant, immediately prior to air clearance monitoring, use a leaf blower to dislodge loose fibre.

.1 Direct leaf blower against walls, ceilings, floors, and other surfaces.

.2 Perform this for at least five minutes per 1,000 sq. ft. of Asbestos Work Area.

.7 PCM samples will be collected as per Air Monitoring Section.

3.9 Asbestos Work Area Dismantling

.1 Use Type 2 worker precautions during dismantling.

.2 Operate negative air units during dismantling.

.3 Polyethylene, tape, cleaning material, etc. to be treated as asbestos waste.

.4 Wash remaining equipment and tools used in contaminated Asbestos Work Area to remove all asbestos contamination, or place in Asbestos Waste Containers prior to being removed from Asbestos Work Area.

.5 Clean Asbestos Work Area, Equipment and Access area, washing/Showering Room.

.6 Remove upper seals, and seals over tops of walls, on deck, at columns, etc. within the Asbestos Work Area.

.7 Remove top layer of polyethylene sheeting from surfaces protected by two or more layers of polyethylene sheeting. The bottom layer of polyethylene will remain until all re-fireproofing is complete. Remove outer layer as follows:

.1 Remove asbestos contaminated Polyethylene by carefully rolling away from walls to centre of Asbestos Work Area.

.2 Cut the lower layer of polyethylene sheeting to expose the baseboards, window sills, cabinets, shelves and other horizontal surfaces that may be contaminated by fallen ACM.

.3 Remove visible fibres or residue found during removal of polyethylene using a HEPA vacuum.

.4 Remove polyethylene protection and hoarding walls where hoarding walls separate occupied areas from work area. Hoarding walls to remain are identified on asbestos demolition drawings.

.8 Remove top layer of polyethylene on walls, finishes, and equipment.

.9 Remove remaining polyethylene sheeting.

.10 Remove water hoses and shut off at source.

.11 Remove Signs, Hoarding Walls, Decontamination Facilities, Equipment Enclosures, Tunnels, Platforms.

.12 Seal vacuum hoses and fittings, flexible ductwork and all tools used in contaminated work site in 6 mil polyethylene bags prior to removal from Work Area.

.13 Remove temporary lights.

.14 Remove negative air unit prefilters. Dispose of as asbestos contaminated waste.

.15 Remove HEPA filtered negative pressure machines and discharge ducting.

.16 Immediately upon shutting down negative air units, seal air inlet grill and exhaust vent with polyethylene and tape.

.17 Notify Asbestos Abatement Consultant at least 24 hours prior to the need for Milestone Inspection F (Dismantling Inspection). Obtain written approval of this Milestone Inspection before proceeding.

3.10 Re-Establishment of Items

.1 Upon completion of work:

.1 Remove and disconnect Ground fault Panel, tags and locks from electrical panels and re-energize equipment and items.

.2 Remove hose bibs installed and repair pipe.

.3 Reinstall ducts removed to perform cleaning of ducts or to access ACM.

.4 Clean, mop and vacuum Asbestos Work Area and area beneath any Decontamination Facilities.

.5 Enable building air handling systems.

END OF SECTION

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Part 1 General

1.1 SUMMARY

.1 Comply with requirements of this Section when performing following Work:

.1 Manual demolition of lead-painted plaster walls or building components by striking wall with sledgehammer or similar tool.

1.2 RELATED REQUIREMENTS

.1	Division 13,	Section 02 82 12	Asbestos Abatement - Type 3
.2	Division 13,	Section 02 84 10	PCB Packaging and Disposal
.3	Division 13,	Section 02 84 11	Mercury Packaging and Disposal
.4	Division 13,	Section 02 87 00	Biohazard Remediation

1.3 SITE CONDITIONS

.1 The following reports are provided for reference. Pinchin relied solely on these reports for the development of these specifications.

.1 "*Designated Substance Survey and Perchlorate Detection in Fume Hoods, OVC-Former VMI Building, University of Guelph-Physical Resource Dept.*" dated June 20, 2018. Prepared by Lex Scientific Solutions, File No. 01180066

.2 "*Spray-Applied Beam Insulation Inspection, OVC-Former VMI Building, University of Guelph-Physical Resource Dept.*" dated August 30, 2018. Prepared by Lex Scientific Solutions, File No. 01180066-B"

1.4 REFERENCE STANDARDS

.1 Department of Justice Canada

.1 Canadian Environmental Protection Act, 1999 (CEPA).

.2 Health Canada

.1 Workplace Hazardous Materials Information System (WHMIS), Material Safety Data Sheets (MSDS).

.3 Human Resources and Social Development Canada (HRSDC)

.1 Canada Labour Code Part II, - SOR 86-304 - Occupational Health and Safety Regulations.

.4 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

.5 U.S. Environmental Protection Agency (EPA)

.1 EPA 747-R-95-007-[1995], Sampling House Dust for Lead.

.6 U.S. Department of Health and Human Services/Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (NIOSH)

.1 NIOSH 94-113 - NIOSH Manual of Analytical Methods (NMAM), 4th Edition (1994).

.7 U.S. Department of Labour - Occupational Safety and Health Administration (OSHA) - Toxic and Hazardous Substances

.1 Lead in Construction Regulation - 29 CFR 1926.62-[1993].

.8 Underwriters' Laboratories of Canada (ULC)

1.5 DEFINITIONS

.1 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.

.2 Authorized Visitors: Pinchin Ltd., University of Guelph – Physical Resources Dept. and representatives of regulatory agencies.

.3 Occupied Area: areas of building or work site that is outside Work Area.

.4 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must be appropriate capacity for scope of work.

.5 Airlock: ingress or egress system, without permitting air movement between contaminated area and uncontaminated area. Consisting of two curtained doorways at least 2 m apart.

.6 Curtained doorway: arrangement of closures to allow ingress and egress from one room to another. Typically constructed as follows:

.1 Place two overlapping polyethylene sheets over existing or temporarily framed doorway, securing each along top of doorway, securing vertical edge of one sheet along one vertical side of doorway, and secure other sheet along opposite vertical side of doorway.

.2 Reinforce free edges of polyethylene with duct tape and add weight to bottom edge to ensure proper closing.

.3 Overlap each polyethylene sheet at openings 1.5 m on each side.

.7 Action level: employee exposure, without regard to usage of respirators, to an airborne concentration of lead of 50 micrograms per cubic metre of air calculated as 8 hour time-weighted average (TWA). Intermediate precautions for lead abatement are based on airborne lead concentrations greater than 0.05 milligrams per cubic metre of air within Work Area.

.8 Competent person: Individuals capable of identifying existing lead hazards in workplace and taking corrective measures to eliminate them.

.9 Lead in Dust: wipe sampling on vertical and/or horizontal surfaces, dust and debris is considered to be lead contaminated if it contains more than 40 micrograms of lead in dust per square foot.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 02 82 12.

.2 Provide proof satisfactory to Pinchin Ltd. and the University of Guelph – Physical Resources Dept. that suitable arrangements have been made to dispose of lead based paint waste in accordance with requirements of authority having jurisdiction.

.3 Provide proof of Contractor's General and Environmental Liability Insurance.

.4 Quality Control:

.1 Provide Pinchin Ltd. and the University of Guelph – Physical Resources Dept. necessary permits for transportation and disposal of lead based paint waste and proof that it has been received and properly disposed.

.2 Provide proof satisfactory to Pinchin Ltd. and the University of Guelph – Physical Resources Dept. that employees have had instruction on hazards of lead exposure, respirator use, dress, entry and exit from Work Area, and aspects of work procedures and protective measures.

.3 Provide proof that supervisory personnel have attended lead abatement course, of not less than two days duration, approved by Pinchin Ltd. and the University of Guelph – Physical Resources Dept. Minimum of one supervisor for every ten workers.

.5 Product data:

.1 Provide documentation including test results, fire and flammability data, and Material Safety Data Sheets (MSDS) for chemicals or materials.

1.7 QUALITY ASSURANCE

.1 Regulatory Requirements: comply with Federal, Provincial/Territorial and local requirements pertaining to lead paint, in case of conflict among those requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at time work is performed.

.2 Health and Safety:

.1 Safety Requirements: worker and visitor protection.

.1 Protective equipment and clothing to be worn by workers and visitors in Work Area includes:

.1 Respirator NIOSH approved and equipped with filter cartridges with assigned protection factor of 50, acceptable to Authority having jurisdiction. Suitable for type of lead and level of lead dust exposure in Lead Work Area. Provide sufficient filters so workers can install new filters following disposal of used filters and before re-entering contaminated areas.

.2 Disposable type protective clothing that does not readily retain or permit skin contamination, consisting of full body covering including head covering with snug fitting cuffs at wrists, ankles, and neck.

.2 Requirements for workers:

.1 Remove street clothes in clean change room and put on respirator with new filters or reusable filters, clean coveralls and head covers before entering Equipment and Access Rooms or Work Area. Store street clothes, uncontaminated footwear,

towels, and similar uncontaminated articles in clean change room.

.2 Remove gross contamination from clothing before leaving work area. Place contaminated work suits in receptacles for disposal with other lead - contaminated materials. Leave reusable items except respirator in Equipment and Access Room. When not in use in Work Area, store work footwear in Equipment and Access Room. Upon completion of lead abatement, dispose of footwear as contaminated waste or clean thoroughly inside and out using soap and water before removing from Work Area or from Equipment and Access Room.

.3 Enter unloading room from outside dressed in clean coveralls to remove waste containers and equipment from Holding Room of Container and Equipment Decontamination Enclosure system. Workers not to use this system as means to leave or enter work area.

.3 Eating, drinking, chewing, and smoking are not permitted in Work Area.

.4 Ensure workers are fully protected with respirators and protective clothing during preparation of system of enclosures prior to commencing actual lead abatement.

.5 Ensure workers wash hands and face when leaving Work Area. Facilities for washing are located [as indicated on drawings].

.6 Provide and post in Clean Change Room and in Equipment and Access Room the procedures described in this Section, in both official languages.

.7 Ensure no person required to enter Work Area has facial hair that affects seal between respirator and face.

.8 Visitor Protection:

.1 Provide protective clothing and approved respirators to Authorized Visitors to Work Areas.

.2 Instruct Authorized Visitors in use of protective clothing, respirators and procedures.

.3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Work Area.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling or reuse.

.2 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.

.3 Disposal of lead waste generated by removal activities must comply with Provincial and Municipal regulations. Dispose of lead waste in sealed double thickness 6 ml bags or leak proof drums. Label containers with appropriate warning labels.

.4 Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

1.9 EXISTING CONDITIONS

.1 Reports and information pertaining to lead based paint to be handled, removed, or otherwise disturbed and disposed of during this Project are bound into this specification.

.2 Notify Pinchin Ltd. and the University of Guelph – Physical Resources Dept. of lead based paint discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Pinchin Ltd. and the University of Guelph – Physical Resources Dept.

1.10 SCHEDULING

.1 Not later than two days before beginning Work on this Project notify the following in writing, where appropriate:

.1 Appropriate Regional or Zone Director of Medical Services Branch, Health Canada.

.2 Provincial Ministry of Labour.

.3 Disposal Authority.

.2 Inform sub trades of presence of lead-containing materials identified in Existing Conditions.

.3 Provide Pinchin Ltd. and the University of Guelph – Physical Resources Dept. copy of notifications prior to start of Work.

.4 Coordinate all work with the Consultant.

.1 A schedule is to be provided to the Consultant.

.1 The Contractor and the Consultant will provide advance notice to the University of Guelph – Physical Resources Dept. who will inform the school administration when work will be performed.

.5 Perform the following work during Quiet Hours:

.1 Waste transfer.

Part 2 Products

2.1 MATERIALS

.1 Polyethylene: 0.15 mm unless otherwise specified; in sheet size to minimize joints.

.2 FR polyethylene: 0.15 mm woven fibre reinforced fabric bonded both sides with polyethylene.

.3 Tape: fibreglass - reinforced duct tape suitable for sealing polyethylene under dry conditions and wet conditions using amended water.

.4 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for trapping residual lead paint residue.

.5 Lead waste containers: metal type acceptable to dump operator with tightly fitting covers and 0.15 mm sealable polyethylene liners.

.1 Label containers with pre-printed bilingual cautionary Warning Lead clearly visible when ready for removal to disposal site.

Part 3 Execution

3.1 SUPERVISION

.1 Approved Supervisor must remain within Lead Work Area during disturbance, removal, or other handling of lead based paints.

3.2 PREPARATION

.1 Remove and wrap items to be salvaged or reused, and transport and store in area specified by The University of Guelph – Physical Resources Dept.

.2 Work Area:

.1 Shut off and isolate HVAC system to prevent dust dispersal into other building areas. Conduct smoke tests to ensure duct work is airtight.

.2 Pre-clean fixed casework, and equipment within work areas, using HEPA vacuum and cover with polyethylene sheeting sealed with tape.

.3 Clean work areas using HEPA vacuum. If not practicable, use wet cleaning method. Do not use methods that raise dust, such as dry sweeping, or vacuuming using other than HEPA vacuum.

.4 Seal off openings, corridors, doorways, windows, skylights, ducts, grilles, and diffusers, with polyethylene sheeting sealed with tape.

.5 Cover floor surfaces in work area from wall to wall with FR polyethylene drop sheets to protect existing floor during removal.

.6 Build airlocks at entrances and exits from work areas to ensure work areas are always closed off by one curtained doorway when workers enter or exit.

.7 At point of access to work areas install warning signs in both official languages in upper case "Helvetica Medium" letters reading as follows where number in parentheses indicates font size to be used:

.1 CAUTION LEAD HAZARD AREA (25 mm).

.2 NO UNAUTHORIZED ENTRY (19 mm).

.3 WEAR ASSIGNED PROTECTIVE EQUIPMENT AND RESPIRATOR (19 mm).

.4 BREATHING LEAD CONTAMINATED DUST CAUSES SERIOUS BODILY HARM (7 mm).

.8 Maintain emergency and fire exits from work areas, or establish alternative exits satisfactory to Authority having jurisdiction.

.9 Where water application is required for wetting lead containing materials, provide temporary water supply by use of appropriately sized hoses for application of water as required.

.10 Provide electrical power and shut off for operation of powered tools and equipment. Provide 24 volt safety lighting and ground fault interrupter circuits on power source for electrical tools, in accordance with applicable CSA Standard. Ensure safe installation of electrical lines and equipment.

.3 Worker Decontamination Enclosure System:

.1 Worker Decontamination Enclosure System includes Equipment and Access Room and Clean Room, as follows:

.1 Equipment and Access Room: construct between exit and work areas, with two curtained doorways, one to the rest of suite, and one to work area. Install waste receptor and storage facilities for workers' shoes and protective clothing to be re-worn in work areas. Build large enough to accommodate specified facilities, equipment needed, and at least one worker allowing sufficient space to change comfortably.

.2 Clean Room: construct with curtained doorway to outside of enclosures. Provide lockers or hangers and hooks for workers' street clothes and personal belongings. Provide storage for clean protective clothing and respiratory equipment. Install mirror to permit workers to fit respiratory equipment properly.

.4 Construction of Decontamination Enclosures:

.1 Construct framing for enclosures or use existing rooms. Line enclosure with polyethylene sheeting and seal with tape, apply two layers of FR polyethylene on floor.

.2 Construct curtain doorways between enclosures so when people move through or waste containers and equipment are moved through doorway, one of two closures comprising doorway always remains closed.

.5 Maintenance of Enclosures:

.1 Maintain enclosures in clean condition.

.2 Ensure barriers and polyethylene linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately.

.3 Visually inspect enclosures at beginning of each work day.

3.3 LEAD - BASE PAINT ABATEMENT

.1 Removal of lead based paint to be performed by manual demolition of lead-painted walls and ceilings and building components by striking a wall with sledgehammer or similar tool.

.2 Remove lead based paint in small sections and pack as it is being removed in sealable 0.15 mm plastic bags and place in labelled containers for transport.

.3 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to Staging Area. Clean external surfaces thoroughly again by wet sponging before moving containers to decontamination Washroom. Wash containers thoroughly in decontamination Washroom, and store in Holding Room pending removal to Unloading Room and outside. Ensure containers are removed from Holding Room by workers who have entered from uncontaminated areas dressed in clean coveralls.

.4 After completion of stripping work, wire brush and wet sponge surface from which lead based paint has been removed to remove visible material. During this work keep surfaces wet.

.5 After wire brushing and wet sponging to remove visible lead based paint, and after encapsulating lead containing material impossible to remove, wet clean work area

including equipment and access room, and equipment used in process. After inspection by Pinchin Ltd., apply continuous coat of slow drying sealer to surfaces. Do not disturb work for 8 hours with no entry, activity, ventilation or disturbance during this period.

.6 After enclosing lead painted surfaces, wet clean work area and equipment and access room. During settling period no entry, activity, or ventilation will be permitted.

3.4 INSPECTION

.1 Perform inspection to confirm compliance with specification and governing authority requirements. Deviations from these requirements not approved in writing by Pinchin Ltd. will result in work stoppage, at no cost to Owner.

.2 Pinchin Ltd. will inspect work for:

.1 Adherence to specific procedures and materials.

.2 Final cleanliness and completion.

.3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

.3 When lead dust leakage from Work Area occurs Pinchin Ltd. may order Work shutdown.

.1 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

3.5 FINAL CLEANUP

.1 Remove polyethylene sheet by rolling it away from walls to centre of work area. Vacuum visible lead containing particles observed during cleanup, immediately, using HEPA vacuum equipment.

.2 Place polyethylene seals, tape, cleaning material, clothing, and other contaminated waste in plastic bags and sealed labelled waste containers for transport.

.3 Clean-up Work Areas, Equipment and Access Room, and other contaminated enclosures.

.4 Clean-up sealed waste containers and equipment used in Work and remove from work areas, via Container and Equipment Decontamination Enclosure System, at appropriate time in cleaning sequence.

.5 Conduct final check to ensure no dust or debris remains on surfaces as result of dismantling operations.

3.6 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

.1 Repair or replace objects damaged in course of work to their original state or better, as directed by The University of Guelph – Physical Resources Dept.

END OF SECTION

PART 1 GENERAL

1.1 General and Related Work

.1 Read this section in conjunction with all other sections so as to comply with the requirements of Division 1 and the General Conditions of the Contract.

.2 Related Work Specified Elsewhere

Division 13,	Section 02 82 12	Asbestos Abatement – Type 3
Division 13,	Section 02 83 11	Lead-Based Paint Abatement
Division 13,	Section 02 84 11	Mercury Packaging and Disposal
Division 13,	Section 02 87 00	Biohazard Remediation

.3 Perform the following work practices for the handling, packaging, and transfer of materials containing polychlorinated biphenyls (PCB).

.4 Unless otherwise shown or specified it is the intent that work performed as per this section will result in the removal and disposal or decontamination of all PCB-containing materials and all materials which have been contaminated by PCBs either during or prior to work of this section.

1.2 Site Conditions

.1 The following reports are provided for reference. Pinchin relied solely on these reports for the development of these specifications.

.1 "*Designated Substance Survey and Perchlorate Detection in Fume Hoods, OVC-Former VMI Building, University of Guelph-Physical Resource Dept.*" dated June 20, 2018. Prepared by Lex Scientific Solutions, File No. 01180066

.2 "*Spray-Applied Beam Insulation Inspection, OVC-Former VMI Building, University of Guelph-Physical Resource Dept.*" dated August 30, 2018. Prepared by Lex Scientific Solutions, File No. 01180066-B"

1.3 Outline of Work

.1 Identify ballasts as either non-PCB or PCB containing.

.2 Remove and dispose of non-PCB ballasts, or recycle.

.3 Remove and package PCB-containing ballasts (approximately 578 units).

.4 Transport packaged PCB waste to a MOE (Ministry of the Environment) approved incineration facility and destroy. Contractor to assume all costs incurred including destruction, transport, permits, approvals and record keeping.

1.4 Schedule

.1 Coordinate all work with the Consultant.

.1 A schedule is to be provided to the Consultant.

.1 The Contractor and the Consultant will provide advance notice to the University of Guelph – Physical Resources Dept. who will inform the school administration when work will be performed.

.2 Perform the following work during Quiet Hours:

.1 Waste transfer.

1.5 Definitions

.1 Competent Worker: A worker who is qualified because of knowledge, training and experience to perform the work, is familiar with the Occupational Health and Safety Act and Environmental Protection Act, has knowledge of the potential or actual danger to health and safety in the work.

.2 Polyethylene: Either polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide a continuous polyethylene membrane to protect underlying surfaces from damage.

.3 PCBs: Monochlorinated or Polychlorinated Biphenyls (or any mixture of both).

.4 PCB Equipment: Equipment designed or manufactured to operate with PCB liquid or to which PCB liquid was added or drums and other containers used for the storage of PCB liquid.

.5 PCB Liquid: means liquid containing PCBs at a concentration of more than fifty milligrams per kilogram, or 50 parts per million.

.6 PCB Material: means material containing PCBs at a concentration of more than fifty milligrams per kilogram or 50 parts per million, whether the material is liquid or not.

.7 PCB Waste: PCB Equipment, PCB Material, PCB Liquids and materials or items contaminated with PCBs.

.8 Personnel: All contractors' employees, sub-contractors employees, supervisors.

.9 Work Area: Area of building from which PCB-containing items are being removed.

1.6 Submittals

.1 Prior to starting work, the Contractor performing work of this section shall submit:

.1 Workplace Safety and Insurance Board Clearance Certificate.

.2 Insurance certificates.

.3 Company Health and Safety Policy.

.4 Certificate of Approval for transportation of PCB waste and location of destruction facility.

.2 Prior to starting work, submit the following information regarding personnel:

.1 WHMIS training certificates for all personnel.

.2 Material Safety Data Sheets for chemicals or material used in the course of the Asbestos Abatement Project.

.3 Submit the following upon completion of the work.

.1 Manifests, waybills, certificate of destruction/recycling etc. as applicable for each type of waste.

1.7 Regulations

.1 Perform work in accordance with current applicable environmental and occupational health regulations and codes including but not limited to:

.1 PCB Regulations SOR/2008-273

.2 Regulations Respecting Mobile System for the Destruction and Treatment of Chlorobiphenyls that are Operated by or under Contract with Federal Institutions (SOR/90-5; amended SOR/93-231 and SOR/2000-105).

.3 Regulations Respecting the Import and Export of Hazardous Wastes (SOR/92-637; Amended 94-459; SOR 94-684; SOR/2000-103).

.4 Waste Management – PCBs, R.R.O. Regulation 362/90.

.5 Mobile PCB Destruction Facilities, R.R.O. Regulation 352/90.

.6 Regulation 347, General Waste, as amended.

1.8 Supervision

.1 Provide on site, a supervisor, with authority to oversee aspects of the work, including but not limited to, health and safety, methods, scheduling, labour and equipment requirements.

.2 A minimum of one supervisor for every 10 workers is required.

.3 Replace supervisory personnel, with approved replacements, within 3 working days of a written request.

1.9 Quality Assurance

.1 Ensure the removal and handling of PCBs is performed by persons experienced in the methods, procedures and industry practices.

.2 Complete work so that at no time do PCBs contaminate the building or environment.

1.10 Insurance

.1 Maintain a Comprehensive General Liability Policy with an insurance company acceptable to Pinchin Ltd. and The University of Guelph – Physical Resources Dept. The intent of this policy is to hold Pinchin Ltd. and The University of Guelph – Physical Resources Dept. harmless as it relates to claims for Bodily Injury or Property Damage or both, relating to the contract. Commercial General Liability insurance shall be provided on an "occurrence" basis to cover injury or damage (whether detected or not during the policy period) which happens during the policy period, even though a claim may not be presented for many years.

.2 Maintain an Automobile or Fleet Policy, and Non-owned Automobile Policy with an insurance company acceptable to Pinchin Ltd. and The University of Guelph – Physical Resources Dept. The intent of these policies is to hold Pinchin Ltd. and The University of Guelph – Physical Resources Dept. harmless as it relates to claims for Bodily Injury or Property Damage or both, relating to the contract.

.3 Maintain a Pollution Liability Policy (or asbestos liability policy or specific coverage under the CGL for asbestos abatement) with an insurance company acceptable to Pinchin Ltd. and The University of Guelph – Physical Resources Dept. The intent of this policy

is to hold Pinchin Ltd. and The University of Guelph – Physical Resources Dept. harmless as it relates to claims for Bodily Injury or Property Damage or both, relating to the contract. Pollution Liability shall be provided on an "occurrence" basis to cover injury or damage (whether detected or not during the policy period) which happens during the policy period, even though a claim may not be presented for many years. Without limiting the generality of the foregoing, the policy shall insure the operations of the work and shall not contain any environmental and/or health hazard exclusions relating to remediation operations.

.4 All certificates must be forwarded to Pinchin Ltd. and The University of Guelph – Physical Resources Dept. before work is commenced, showing THE OWNER as additional insured as their interest may appear.

.5 The University of Guelph – Physical Resources Dept. may request a certified true copy of the policies if he deems it necessary.

.6 The limits will not be less than:

.1	Commercial General Liability	$5,000,000.00
.2	Automobile	$2,000,000.00
.3	Pollution Policy	$5,000,000.00

.7 The University of Guelph – Physical Resources Dept. reserves the right to ask for higher limits of liability if the exposure so warrants. It is recommended that the policies in question be written with the same company.

1.11 Instruction and Training

.1 Instruction and training must be provided to all workers and supervisors. Instruction and training includes the following:

- .1 Hazards of PCBs.
- .2 Use, care and disposal of protective equipment (including but not limited to respirators and filters) and clothing that would be used and worn during work, including:
  - .1 Limitations of equipment.
  - .2 Inspection and maintenance of equipment.
  - .3 Proper fitting of equipment.
  - .4 Disinfecting and cleaning of equipment.
- .3 Personal hygiene to be observed when performing the work.
- .4 The measures and procedures prescribed by this section.
- .5 Instruction and training must be provided by a competent, qualified person.

1.12 Personal Protection

.1 During work involving PCBs, personnel are to wear the following personal protective equipment:

- .1 Gloves.
- .2 Aprons.

.3 Protective coveralls.

.4 Protective eyewear.

.2 Protective clothing shall be replaced or repaired if torn or ripped.

.3 Prior to leaving the Work Area, personnel shall decontaminate their clothing or protective clothing by using a HEPA Vacuum, or by damp wiping.

.4 Dispose of protective clothing not to be reused as PCB waste.

.5 Provide soap, towels and facilities for washing of hands and face, which shall be used by all personnel when leaving the Work Area.

.6 Prohibit smoking, eating, drinking, chewing in the Work Area.

.7 Use hard hats, safety shoes and other personal protective equipment required by applicable construction safety regulations.

.8 PCB liquids do not constitute an inhalation hazard when handled at room temperature. In the event of a fire or other heating of PCB Equipment, Material, Waste or Liquid, immediately vacate the area. Air purifying filter respirators DO NOT provide protection against PCB vapours.

.9 In the event of PCB ingestion, obtain medical assistance immediately.

PART 2 PRODUCTS

2.1 Materials

.1 Apron: Full body neoprene apron.

.2 Containment Drums: new, not used double bung 45 gallon No. 16 gauge cold rolled steel drums with removable steel lid, PCB resistant gasket, and 12 gauge compression type ring closure with 5/8" bolt and forged lug. Drums shall be newly painted inside and out with bright white rust-resistant enamel.

.3 Drum liners: clear polyethylene bag, 36" x 60", 6 mil thick. Open one 36" end.

.4 Face Shield: Full face shield to attach to hard hat to prevent splashes from Askarel Type Liquid from hitting skin.

.5 Gloves: Elbow length, of PCB resistant material (neoprene) and in good condition.

.6 Label: Number 4 Severe Hazard Label, completed as Health 3, Fire 1, Environment 4, and Reactivity 1. Available from Environment Canada Environmental Protection Service, 7th Floor, 25 St. Clair East, Toronto (966-5840).

.7 Polyethylene Sheeting: 6 mil (0.15 mm) minimum thickness unless otherwise specified, in sheet size to minimize joints. New materials only.

.8 Protective Coveralls: Disposable full body coveralls to prevent splashes to clothing, complete with hoods. Coveralls to fit snugly at ankles, wrists and neck. Acceptable materials: Tyvek. Tyvek material does not provide protection against PCB liquid if it soaks through.

.9 Vermiculite: pre-packed, Industrial grade 3, containing no asbestos.

PART 3 EXECUTION

3.1 PCB Packaging

.1 Wear personal protection at all times when disturbing PCB Equipment, Liquids, Material and Waste.

.2 Do not contaminate building surfaces with PCB-containing oil, tar etc.

.3 Install polyethylene sheeting to protect surfaces and finishes.

.4 Notify Owner's Representative of any PCB spills immediately.

.1 Any spills of PCBs are to be cleaned to the satisfaction of the Owner's Representative at the contractors cost. This includes removal and replacement of building materials as required.

.5 Place PCB waste including: ballasts on polyethylene sheeting immediately after removal.

.6 Do not drop PCB Equipment, Waste or Materials.

.7 Avoid rough handling of PCB Equipment and Materials. Do not throw into drum.

.8 Remove ballasts as specified.

.1 Remove bx cable for lights back to junction box.

.2 Pour 2" layer of vermiculite or absorbent in Containment Drum. Place polyethylene liner into Containment Drum. No further fill is required.

.3 Place ballasts on end in Containment Drum.

.9 When full:

.1 Seal liner bag with duct tape.

.2 Seal drum with lid, gasket and compression ring.

.3 Affix specified and completed label.

.4 Do not leave liner bags or drums open overnight.

.10 As filled drums accumulate, transfer to temporary storage area.

.11 Temporary storage facility to be a fully enclosed block wall room within the building complete with appropriate warning signs.

.12 Remove contaminated material, including gloves, aprons, rags, hoses, solvents, protective coveralls, polyethylene, etc. and package as per the above.

3.2 Transportation and Reporting

.1 Transport materials following Transportation of Dangerous Goods Act.

.1 Transport PCBs to approved incineration site for destruction and ensure materials are destroyed.

.2 The facility used to process the PCBs shall be approved by the Ministry of the Environment, and shall have valid Certificates of Approval to carry out the work outlined herein.

.1 The facility must issue a Certificate of Destruction identifying types and quantities of PCBs generated from the project.

.3 A typed and signed transfer document for each transfer of PCBs, is to be submitted to Owner's representative, giving following:

.1 Number of drums.

.2 Contents including ballast type, capacitor type, oil type, transformer type and approximate quantities.

.3 Approximate net weight of contents.

.4 Dates removal begun and completed (for each lot).

.5 Date drums transferred.

.4 Submit certificate(s) of destruction, certificate of recycling (as applicable) and waste manifests from **all** transfer points. Submit the above for waste **regardless** of single transport or as blended waste.

3.3 Fire and Explosion Response

.1 PCB liquids are relatively non-flammable. However, if exposed to flame or hot surfaces, a higher vapour concentration will result. At high temperatures PCBs may decompose and chemically rearrange to produce highly toxic gases, vapours, and soot.

.2 In the event of a fire involving PCBs, immediately stop work and report to the local Fire Marshall and Fire Department . Report specifically the presence of PCBs. The necessity to rapidly report the fire overrides any decontamination procedures.

.3 Cause all workers to evacuate the site. When leaving, shut down all water in use. Only personnel trained in use of, and wearing SCBA apparatus, will be allowed to re-enter site.

.4 Do not return to site until Owner's Representative and Ontario Ministry of the Environment representatives have declared the area for re-entry.

3.4 Re-Establishment of Items

.1 Upon completion of work:

.1 Remove tags and locks from electrical panels and re-energize equipment and items.

.2 Clean, mop and vacuum the Work Area.

END OF SECTION

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PART 1 GENERAL

1.1 General and Related Work

.1 Read this section in conjunction with all other sections so as to comply with the requirements of Division 1 and the General Conditions of the Contract.

.2 Related Work Specified Elsewhere

Division 13,	Section 02 82 12	Asbestos Abatement – Type 3
Division 13,	Section 02 83 11	Lead-Based Paint Abatement
Division 13,	Section 02 84 10	PCB Packaging and Disposal
Division 13,	Section 02 87 00	Biohazard Remediation

.3 Perform the following work practices for the handling, packaging, and transfer of Mercury Materials and Waste.

.4 Unless otherwise shown or specified it is the intent that work performed as per this section will result in the removal and disposal or decontamination of all mercury-containing materials and all materials which have been contaminated by mercury either during or prior to work of this section.

1.2 Site Conditions

.1 The following reports are provided for reference. Pinchin relied solely on these reports for the development of these specifications.

.1 "*Designated Substance Survey and Perchlorate Detection in Fume Hoods, OVC-Former VMI Building, University of Guelph-Physical Resource Dept.*" dated June 20, 2018. Prepared by Lex Scientific Solutions, File No. 01180066

.2 "*Spray-Applied Beam Insulation Inspection, OVC-Former VMI Building, University of Guelph-Physical Resource Dept.*" dated August 30, 2018. Prepared by Lex Scientific Solutions, File No. 01180066-B"

1.3 Outline of Work

.1 Remove fluorescent light bulbs (approximately 1,137 units).

.2 Package and recycle all mercury, mercury contaminated materials and mercury waste.

1.4 Schedule

.1 Coordinate all work with the Consultant.

.1 A schedule is to be provided to the Consultant.

.1 The Contractor and the Consultant will provide advance notice to the University of Guelph – Physical Resources Dept. who will inform the school administration when work will be performed.

.2 Perform the following work during Quiet Hours:

.1 Waste transfer.

1.5 Definitions

.1 Competent Worker: A worker who is qualified because of knowledge, training and experience to perform the work, is familiar with the Occupational Health and Safety Act and Environmental Protection Act, has knowledge of the potential or actual danger to health and safety in the work.

.2 Mercury Waste: Equipment, materials or items containing mercury or contaminated with mercury.

.3 Polyethylene: Either polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required providing a continuous polyethylene membrane to protect underlying surfaces from damage.

.4 Personnel: All contractors' employees, sub-contractors employees, supervisors.

.5 Work Area: Area of building from which mercury containing items are being removed.

1.6 Submittals

.1 Prior to starting work, the Contractor performing work of this section shall submit:

.1 Workplace Safety and Insurance Board Clearance Certificate.

.2 Insurance certificates.

.3 Company Health and Safety Policy.

.4 Certificate of Approval for transportation of mercury waste and location of recycling facility.

.2 Prior to starting work, submit the following information regarding personnel:

.1 WHMIS training certificates for all personnel.

.2 Material Safety Data Sheets for chemicals or material used in the course of the Asbestos Abatement Project.

.3 Submit the following upon completion of the work.

.1 Manifests, waybills, certificate of destruction/recycling etc. as applicable for each type of waste.

1.7 Regulations

.1 Perform work in accordance with current applicable environmental and occupational health regulations and codes including but not limited to:

.1 Regulation 347, General Waste, as amended.

.2 R.R.O. Regulation Mercury R.R.O. 1990, Regulation 844, Amended to O. Reg. 110/04, Designated Substance — Mercury.

1.8 Supervision

.1 Provide on site, a supervisor, with authority to oversee aspects of the work, including but not limited to, health and safety, methods, scheduling, labour and equipment requirements.

.2 A minimum of one supervisor for every 10 workers is required.

.3 Replace supervisory personnel, with approved replacements, within 3 working days of a written request.

1.9 Quality Assurance

.1 Ensure the removal and handling of Mercury is performed by persons experienced in the methods, procedures and industry practices.

.2 Complete work so that at no time does mercury contaminate the building or environment.

1.10 Insurance

.1 Maintain a Comprehensive General Liability Policy with an insurance company acceptable to Pinchin Ltd. and The University of Guelph – Physical Resources Dept. The intent of this policy is to hold Pinchin Ltd. and The University of Guelph – Physical Resources Dept. harmless as it relates to claims for Bodily Injury or Property Damage or both, relating to the contract. Commercial General Liability insurance shall be provided on an "occurrence" basis to cover injury or damage (whether detected or not during the policy period) which happens during the policy period, even though a claim may not be presented for many years.

.2 Maintain an Automobile or Fleet Policy, and Non-owned Automobile Policy with an insurance company acceptable to Pinchin Ltd. and The University of Guelph – Physical Resources Dept. The intent of these policies is to hold Pinchin Ltd. and The University of Guelph – Physical Resources Dept. harmless as it relates to claims for Bodily Injury or Property Damage or both, relating to the contract.

.3 Maintain a Pollution Liability Policy or specific coverage under the CGL for Mercury, with an insurance company acceptable to Pinchin Ltd. and The University of Guelph – Physical Resources Dept. The intent of this policy is to hold Pinchin Ltd. and The University of Guelph – Physical Resources Dept. harmless as it relates to claims for Bodily Injury or Property Damage or both, relating to the contract. Pollution Liability shall be provided on an "occurrence" basis to cover injury or damage (whether detected or not during the policy period) which happens during the policy period, even though a claim may not be presented for many years. Without limiting the generality of the foregoing, the policy shall insure the operations of the work and shall not contain any environmental and/or health hazard exclusions relating to remediation operations.

.4 All certificates must be forwarded to Pinchin Ltd. and The University of Guelph – Physical Resources Dept. before work is commenced, showing The University of Guelph – Physical Resources Dept. as additional insured as their interest may appear.

.5 The University of Guelph – Physical Resources Dept. may request a certified true copy of the policies if he deems it necessary.

.6 The limits will not be less than:

.1	Commercial General Liability	$5,000,000.00
.2	Automobile	$2,000,000.00
.3	Pollution Policy	$5,000,000.00

.7 The University of Guelph – Physical Resources Dept. reserves the right to ask for higher limits of liability if the exposure so warrants. It is recommended that the policies in question be written with the same company.

1.11 Instruction and Training

.1 Instruction and training must be provided to all workers and supervisors. Instruction and training includes the following:

.1 Hazards of Mercury.

.2 Use, care and disposal of protective equipment (including but not limited to respirators and filters) and clothing that would be used and worn during work, including:

.1 Limitations of equipment.

.2 Inspection and maintenance of equipment.

.3 Proper fitting of equipment.

.4 Disinfecting and cleaning of equipment.

.3 Personal hygiene to be observed when performing the work.

.4 The measures and procedures prescribed by this section.

.5 Instruction and training must be provided by a competent, qualified person.

1.12 Personal Protection

.1 During work involving mercury, personnel are to wear the following additional personal protective equipment:

.1 Non-powered half-face respirators with mercury vapour cartridges with life span indicators in the cartridge.

.2 Protective coveralls.

.3 Protective eyewear/face shield.

.4 Chemical resistant gloves and apron.

.2 Respiratory protection shall be certified by the National Institute of Occupational Safety and Health (NIOSH) or other testing agency acceptable to the Ministry of Labour.

.3 Respirators shall be:

.1 Fitted so that there is an effective seal between the respirator and the worker's face. Ensure that no person required to enter the Work Area has facial hair which affects the seal between respirator and face.

.2 Assigned to a worker for his exclusive use.

.3 Maintained in accordance with manufacturer's specifications.

.4 Cleaned, disinfected and inspected by a competent person after use on each shift, or more often if required.

.5 Repaired or have damaged or deteriorated parts replaced.

.6 Stored in a clean and sanitary location.

.4 Replace filters as necessary.

.5 Personnel must have respirators fit checked by qualitative or quantitative fit-testing. Instruction must be provided by a competent person as defined by the Occupational Health and Safety Act.

.6 Personnel shall wear and use the respirator provided.

.7 Protective clothing shall be replaced or repaired if torn or ripped.

.8 Prior to leaving the Work Area, personnel shall decontaminate their clothing or protective clothing by using a HEPA Vacuum, or by damp wiping.

.9 Dispose of protective clothing not to be reused as Mercury waste.

.10 Provide soap, towels and facilities for washing of hands and face, which shall be used by all personnel when leaving the Asbestos Work Area.

.11 Prohibit smoking, eating, drinking, chewing in the Work Area.

.12 Use hard hats, safety shoes and other personal protective equipment required by applicable construction safety regulations.

PART 2 PRODUCTS

2.1 Materials

.1 Containment Drums: new, not used double bung 45 gallon No. 16 gauge cold rolled steel drums with removable steel lid, chemical resistant gasket, and 12 gauge compression type ring closure with 5/8" bolt and forged lug. Drums shall be newly painted inside and out with bright white rust-resistant enamel.

.2 Drum liners: clear polyethylene bag, 36" x 60", 6 mils thick. Open one 36" end.

.3 Mercury Sponge: A plated metal-wool pad for the pick-up of mercury spills.

.4 Mercury Vacuum: Nilfisk VT Mercury Vacuum or equal. Vacuum used to collect liquid mercury and granular mercury compounds with an internal HEPA filter and an activated carbon adsorbent filter to purify exhaust air of mercury vapours.

.5 Neutralizing Agent: Mercon X or similar. Mercury neutralizing solution such as 20% sodium sulphide or sodium thiosulphate.

.6 Pipe and Drain Neutralizing Agent: MerconGel or similar solution that is designed to prevent the release of mercury vapour from traps, collection systems, pipes, drains and stand pipes.

.7 Polyethylene Sheeting: 6 mil (0.15 mm) minimum thickness unless otherwise specified, in sheet size to minimize joints. New materials only.

.8 Protective Coveralls: Disposable full body coveralls to prevent splashes to clothing, complete with hoods. Coveralls to fit snugly at ankles, wrists and neck. Acceptable materials: Tyvek.

.9 Vermiculite: pre-packed, Industrial grade 3, containing no asbestos.

PART 3 EXECUTION

3.1 Mercury Packaging

.1 Wear personal protection at all times when disturbing lamps, equipment and items that contain mercury.

.2 Do not drop mercury-containing materials.

.3 Do not contaminate building surfaces with mercury.

.4 Protect work area by installing polyethylene drop sheets or sealed polyethylene sheeting below, and at surrounding work area.

.5 Package lamps in cardboard boxes designed for lamps of that size. Do not break lamps.

3.2 Spill Containment

.1 For large mercury spills:

.1 Evacuate area. Only personnel using the specified PPE are to be in spill area.

.2 Deactivate air handling systems.

.3 Open windows or provide ventilation to area.

.4 Deactivate heat systems if they are adjacent and may aid in vaporization of mercury.

.5 Contact Owner's Representative immediately.

.6 If spill cannot be cleaned up immediately, apply neutralizing agent over mercury spill area.

.7 Collect mercury droplets together will a dust pan, squeegee or mercury vacuum.

.8 Clean-up bulk mercury using aspirator bulb or mercury vacuum. Clean remainder with a mercury sponge. Place mercury in closed container (plastic or glass).

.9 Porous surfaces are to be cleaned with Neutralizing Agent after clean-up of bulk mercury.

.10 If mercury spills into soil, carpet, through cracks, into drains etc. further removal of surface materials at contractor cost will be required. Do not proceed without approval from Owner's Representative.

.11 Place all cleaning materials including drop sheets or polyethylene sheeting in containment drums.

3.3 Transportation and Reporting

.1 Transport materials following Transportation of Dangerous Goods Act.

.1 Transport Mercury Materials and Waste to approved site for recycling, including mercury vapour in lamps, and ensure materials are recycled.

.2 The facility used to process and recycle the mercury shall be approved by the Ministry of the Environment, or local jurisdictional authority, and shall have valid Certificates of Approval to carry out the work outlined herein.

.1 The facility must issue a Certificate of Recycling identifying types and quantities of materials generated from the project. The facility must also provide a Certificate of Recycling for the mercury generated from the project. Any mercury contaminated materials not recycled are to be identified by a manifest.

.3 A typed and signed transfer document for each transfer of mercury is to be submitted to Owner's representative, giving following:

.1 Number of drums or boxes.

.2 Contents and approximate quantities.

.3 Approximate net weight of contents.

.4 Dates removal begun and completed (for each lot).

.5 Date transferred.

.4 Submit certificate(s) of certificate of recycling and waste manifests from **all** transfer points. Submit the above for waste **regardless** of single transport or as blended waste.

3.4 Re-Establishment of Items

.1 Upon completion of work:

.1 Clean, mop and vacuum the Work Area.

END OF SECTION

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Part 1 General

1.1 SUMMARY

.1 Comply with requirements of this Section when performing following Work:

.1 Removal and disposal of digester tanks with presumed biohazard on the interior of each tank.

1.2 RELATED REQUIREMENTS

.1	Division 13,	Section 02 82 12	Asbestos Abatement - Type 3
.2	Division 13,	Section 02 83 12	Lead-Based Paint Abatement
.3	Division 13,	Section 02 84 10	PCB Packaging and Disposal
.4	Division 13,	Section 02 84 11	Mercury Packaging and Disposal

1.3 SITE CONDITIONS

.1 The following reports are provided for reference. Pinchin relied solely on these reports for the development of these specifications.

.1 "*Designated Substance Survey and Perchlorate Detection in Fume Hoods, OVC-Former VMI Building, University of Guelph-Physical Resource Dept.*" dated June 20, 2018. Prepared by Lex Scientific Solutions, File No. 01180066

.2 "*Spray-Applied Beam Insulation Inspection, OVC-Former VMI Building, University of Guelph-Physical Resource Dept.*" dated August 30, 2018. Prepared by Lex Scientific Solutions, File No. 01180066-B"

1.4 REFERENCE STANDARDS

.1 Environmental Abatement Council of Ontario (EACO)

.1 EACO Mould Abatement Guidelines, Edition 3 (2015).

1.5 OUTLINE OF WORK

.1 Provide a separate price for the work outlined in this Section. Refer to Section 01 24 03 of the specification tender package for details.

.2 Refer to contract drawings for the extent of construction work.

.3 Quantities provided in the specifications are approximate, it is the contractor's responsibility to confirm all quantities provided and to verify all site conditions.

.4 Coordinate the following items with the Contractor and the Consultant, which are to be included in the lump sum bid of the Abatement Contractor, including but not limited to: electrical isolations, GFI connection, water connections, hoarding walls, bin placement, hours of work, schedule, etc.

.5 Remove and dispose of the following items utilizing procedures outlined in Appendix B and Appendix D of the attached EACO Mould Abatement Guidelines, Edition 3 (2015):

.1 Three digester tanks within Sewage Room 120A.

1.6 SCHEDULE

.1 Coordinate all work with the Consultant.

.1 A schedule is to be provided to the Consultant.

.1 The Contractor and the Consultant will provide advance notice to the University of Guelph – Physical Resources Dept. who will inform the school administration when work will be performed.

.2 Perform the following work during Quiet Hours:

.1 Waste transfer.

END OF SECTION

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PART 1 - GENERAL

1.1 STANDARDS

Standards listed below govern minimum quality of work required under this section:

.1 American Concrete Institute:

.1 ACI 301-15, "Specifications for Structural Concrete".

.2 ACI 303R-12, “Guide to Cast-in-Place Architectural Concrete Practice”.

.3 SP-4 8th edition, “Formwork for Concrete”.

.4 SP-66-04, “ACI Detailing Manual 2004”.

.2 ASTM International:

.1 ASTM A1064/A1064M-17, “Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed for Concrete”.

.2 ASTM A 1064/A 1064M-17, “Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete”.

.3 ASTM C33M-18, “Standard Specification for Concrete Aggregates”.

.4 ASTM C 260/C 260M-10a (2016), “Standard Specification for Air-Entraining Admixtures for Concrete”.

.5 ASTM C 309-11, “Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete”.

.6 ASTM C 494/C 494M-17, “Standard Specification for Chemical Admixtures for Concrete”.

.7 ASTM C 1017/C 1017M-13 e1, “Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete”.

.8 ASTM D 1751-04(2013) e1, “Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types)”.

.9 ASTM E 1155M-14, “Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers (Metric)”.

.3 Canadian General Standards Board (CGSB):

.1 CAN/CGSB 19.24-M90 (Withdrawn), “Multicomponent. Chemical-Curing Sealing Compound”.

.2 CAN/CGSB-25.20-95 Withdrawn), “Surface Sealer for Floors”.

.3 CAN/CGSB-51.34-M86 (Withdrawn), “Vapour Barrier, Polyethylene Sheet for Use in Building Construction”.

.4 CSA International:

.1 CAN/CSA A23.1-14, "Concrete Materials and Methods of Concrete Construction".

.2 CAN/CSA A23.2-14, "Methods of Test for Concrete".

.3 CAN/CSA-A23.3-14, “Design of Concrete Structures”.

.4 CAN/CSA A283-06(R2016), “Qualification Code for Concrete Testing Laboratories”.

.5 CAN/CSA A3000-13 “Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005)”.

.6 CAN/CSA G30.18-09(R2104), “Carbon Steel Bars for Concrete Reinforcement”.

.7 CAN/CSA O86-14, “Engineering Design in Wood”.

.8 CAN/CSA O121-17, “Douglas Fir Plywood”.

.9 CAN/CSA O151-17, “Canadian Softwood Plywood”.

.10 CAN/CSA O153-13(R2017), “Poplar Plywood”.

.11 CAN/CSA O325-16, “Construction Sheathing”.

.12 CAN/CSA S269.1-16, "Falsework and Formwork".

.13 CAN/CSA W186-M1990 (R2016), “Welding of Reinforcing Bars in Reinforced Concrete Construction”.

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS):

.1 Material Safety Data Sheets.

.6 Reinforcing Steel Institute of Canada (RSIC):

.1 RSIC “Reinforcing Steel Manual of Standard Practice”.

1.2 PERFORMANCE BASED SPECIFICATION

.1 The concrete materials supplied for this project will be provided by the Performance Based Specification. For each concrete element to be constructed the following criteria will be provided:

- Structural criteria including strength at age.
- Class of exposure of concrete.
- Any permeability requirements.
- Specific aggregate size to limit shrinkage and improve placement performance.
- Flatness and durability of finish.

1.3 QUALITY PLAN

.1 Develop and implement a Quality Plan that verifies the concrete work meets the project specifications. The Quality Plan shall be of sufficient detail to demonstrate the performance requirements of the project have been met. The completed steps of the Quality Plan shall be communicated to the Consultant in a manner and frequency to facilitate the Owner’s Quality Assurance Plan process.

.2 The Quality Plan shall describe, as a minimum, the following plans and procedures:

.1 Identify the personnel responsible for implementation and oversight of the quality control plan for this section in an organization chart. Describe the roles and responsibilities of each person listed.

.2 Provide samples of Contractor’s quality control inspection and data logging forms to be used on the project. The quality control forms shall, as a minimum, include the following:

.1 Shop Drawing Review and Sign Off.

.2 Formwork Inspection.

.3 Reinforcing Inspection.

.4 Inspection of Concrete Accessories, Inserts, and Openings.

.5 Concrete Placement Log.

.6 Curing Log.

.7 Concrete Cylinder Log.

.8 Waterproofing Log and Inspection.

.9 Final Concrete Inspection.

.3 Quality plan shall include procedural steps for review of shop drawings by the Contractor prior to submission to the Consultant.

.4 Describe quality control procedural steps related to:

.1 Formwork and Falsework.

.2 Reinforcing.

.3 Concrete Placement, Testing, Finishing and Curing.

.4 Hot and Cold Weather Work, including: methods of preparation, curing, heating, insulation, and temperature monitoring.

.5 Coordinating with the Owner's Quality Assurance Plan. Indicate anticipated timeframes for scheduling of general conformance reviews by Consultant.

.6 Coordination of Material Testing.

.7 Review of installation of proprietary systems by manufacturer's representative.

.8 Defective Concrete, including: identification, documentation, submission of proposed repair procedures, and follow-up inspection.

.5 Risk Management: list and describe any anticipated project specific risks associated with this section and outline proposed means of mitigation.

.3 The Quality Plan shall be prepared taking into account the specific requirements of this project. Generic quality plans that, in the Consultant's opinion, fail to address the specific requirements of this project will be returned 'Revise and Resubmit'.

.4 Submit Quality Plan in accordance with Section 01 33 00 – Submittal Procedures Division 1. Acceptance of the Quality Plan by the Consultant shall be considered a prerequisite for concrete placement. Failure of the Contractor to coordinate the timely submission of a complete Quality Plan, which ultimately results in the delay of the start of concrete work, shall not be at the risk of the Owner or Consultant for back charge.

1.4 EXAMINATION

.1 Prior to construction of forms and/or placement of concrete, carefully examine all Contract Documents and shop drawings which affect this work. Report any discrepancies to the Consultant for their direction.

1.5 SOIL INSPECTION

.1 Contractor is to appoint a Soils Consultant to test compaction of backfill material and to verify bearing capacity of foundation subgrade. Notify Soils Consultant a minimum of two (2) business days prior to placement of concrete or compacted backfill. Do not place concrete or compacted backfill until underlying subgrade material has been inspected and accepted.

.2 Soils Consultant will be paid from cash allowance carried in Division 1. Supply all necessary cooperation.

1.6 STORAGE AND HANDLING

.1 Deliver, store, and handle all materials in accordance with the Quality Plan. Ensure all concrete materials are handled in accordance with CSA A23.1.

1.7 FALSEWORK AND FORMWORK DESIGN AND REVIEW

.1 Design, construct, and dismantle falsework and formwork in accordance with the requirements of CAN/CSA A23.1, CSA S269.1, CSA 269.3, and ACI Standard SP4 unless more stringent tolerances are specified.

1.8 REINFORCING STEEL ACTION AND INFORMATION SUBMITTALS

.1 Submit reinforcing steel shop drawings in accordance with Division 1.

.2 Prepare reinforcing steel shop drawings that conform to the construction drawings with respect to placement, quantity and size of reinforcing steel bars. Reinforcing steel shop drawings shall be reviewed and accepted in accordance with the Quality Plan prior to forwarding on to the Consultant.

.3 Forwarded shop drawings shall be in a single, complete set in order that all details may be read in conjunction with plans, elevations and all other dependent details. Quantity and format of shop drawings are to be in accordance with Division 1. Reproduction of Contract Documents will not be acceptable as Shop Drawings.

.4 All materials, finishes and loadings shall be clearly illustrated. Submittals shall clearly define any abbreviations.

.5 Where shop drawings are re-submitted, clearly illustrate all revisions from previous submissions using revision marks and "bubbles".

.6 All details and sections to be to a scale of not less than 1:25.

.7 Provide elevation drawings of all walls, cross referenced to plan drawings. Provide drawings for each differing section of steel arrangement. Do not indicate various areas on one detail.

.8 Indicate placement of reinforcement at all openings, depressions, spandrels and sleeves. Show bar supports, hangers, inserts, water stops, anchor bolts, etc.

.9 Shop drawings shall correspond to each detail on drawing. Each wall, slab, etc. to be separately listed. Bar lists shall be reviewed only for general conformity, quantities are not checked in detail.

.10 Detail to requirements of CAN/CSA-A23.1 and RSIO "Reinforcing Steel Manual of Standard Practice". Ensure adjustments are made in detailing of reinforcing steel for splices and development lengths. Splice lengths are to be based on bar position within section (e.g. top bars) and reinforcement coating.

.11 The construction drawings show reinforcing steel placement for the project that shows the intent of reinforcing of concrete elements. These drawings can accomplish this description through the use of nomenclature such as similar and typical, indicating similar arrangements of reinforcing steel within concrete elements but potential variation of formed dimensions and lengths to accommodate the intended final construction.

.12 The reinforcing steel shop drawings shall be of sufficient detail to allow for a clear understanding of the fabrication limits, quantity and placement of all reinforcing steel on the project. Fabrication of reinforcing steel prior to acceptance through the Quality Plan shall not be at the risk of the Consultant for back charge if fabricated reinforcement is not suitable for the project due to modifications in the shop drawings.

1.9 CONCRETE MATERIALS ACTION AND INFORMATION SUBMITTALS

.1 Submit in accordance with Division 1.

.1 Concrete mix designs.

.2 Product and material samples as requested.

.3 Proposed curing methods.

1.10 COORDINATION OF QUALITY PLAN WITH WORK ON SITE

.1 Pre-construction Meeting: convene pre-construction meeting one week prior to beginning concrete work.

.1 Ensure key personnel, site supervisor, Consultant, specialty Contractor – finishing, forming, all attend.

.2 Prior to placement of concrete ensure all inspection processes and assembled documentation has been carried out to conform to the Quality Plan.

.3 Notify the Consultant at least 1 business day in advance of the proposed placement of concrete. Upon notification the Consultant may elect to review the contents of the Quality Plan to assess if the work is proceeding in general conformance with the contract documents. The Consultant may elect to review the work on site and prepare appropriate record of observations for the Owner.

1.11 PROPRIETARY PRODUCTS

.1 All proprietary products to be applied/installed in strict accordance with the manufacturer's published recommendations.

PART 2 - PRODUCTS

2.1 FORMWORK AND FALSE WORK

.1 For non-exposed concrete or concrete without special architectural features, use wood and wood product formwork materials to CSA-0121, CSA-086, CSA 0437 Series, and CSA-0153. Materials to bear grade marks, or to be accompanied by certificates, test reports, or other proof of conformity.

.2 For exposed concrete or concrete with special architectural features, use formwork materials to stricter requirements of CSA-A23.1/ A23.2 and ACI-303.

.1 Form liner to be new factory coated high density overlaid Douglas fir plywood to CSA 0121.

.3 Apply non-reactive form release agent prior to placing reinforcing.

2.2 FORM TIES

.1 Unexposed Concrete Surfaces - snap ties, coil ties or she-bolts to suit application.

.2 Exposed or Architectural Concrete - Plastic cone type snap ties or coil ties which break off or are removable 38 mm inside concrete surface. Non-shrink, non-metallic grout to be installed after removal of tie and plastic cone.

.3 Waterproof Structures - plastic cone type snap ties or coil ties which break off or are removable 50 mm inside concrete surface complete with fused water stop plastic washer to each wire strut in centre of tie to break surface continuity and prevent water seepage. Fill cone holes with waterproof expanding grout. Standard of Acceptance: products by National Concrete Accessories.

2.3 REINFORCEMENT

.1 Reinforcing Bars - to CSA G30.18, Grade 400 deformed billet steel. Provide Grade 400W where welding of reinforcing is required.

.2 Slab Bolsters and High Chairs - to suit application. For exposed concrete, chairs and bolsters to be plastic tipped or stainless steel.

.3 Mechanical splices subject to approval of Consultant. Standard of Acceptance: BAR LOCK by Dayton Superior, LENTON Couplers by ERICO.

.4 Form Saver Inserts – integral threaded cast-in inserts, to develop 125% of Yield Strength of reinforcing steel. Standard of Acceptance: products by Dayton Superior, LENTON Form Savers by ERICO.

2.4 CONCRETE

.1 All constituent materials shall conform to the requirements of CAN/CSA-A23.1.

.2 Concrete mix design shall comply with requirements of CAN/CSA-A23.1 based on Alternative No. 1 in Table 5. Ready-mix concrete to be proportioned mixed and delivered in accordance with CAN/CSA-A23.1.

.3 Submit acceptable recent records of tests to justify use of desired supplier. Recent records to include compressive strength, air content and air-void system tests. Where doubt exists as to quality of concrete provided by a proposed supplier, Consultant may, at their discretion, order Contractor to arrange for an alternative, acceptable source of supply at no extra cost or delay to Owner.

.4 Pump mix designs shall not be modified from normal concrete mix designs by the changing cement content or quantities of coarse and fine aggregate. Specifically fine aggregate contents shall not be increased, nor coarse aggregate contents reduced to accommodate pumping.

.5 Admixtures other than air entraining and water reducing agents are not permitted unless approved by Consultant. Calcium chloride shall not be used.

.6 Use 20 mm aggregate unless otherwise noted

.7 Minimum compressive strength and class of concrete to be used:

Use	Compressive Strength	Exposure	Water/Cement Ratio
Unshrinkable Concrete Fill	7 MPa	N	-
Mud Slabs/Lean Concrete	0.5 MPa	N	-
Housekeeping pads	25 MPa	N	0.55
Footings, interior piers, interior foundation walls, interior slabs-on-grade,	35 MPa	N	0.55
Exterior piers, exterior foundation walls	35 MPa	F-2	0.45
Sidewalks and curbs	35 MPa	C-1	0.45

2.5 ADMIXTURES

.1 Air Entraining Admixture: to ASTM C 260.

.2 Chemical Admixtures: to ASTM C 494. Consultant to approve accelerating or set retarding admixtures during cold and hot weather placing.

.3 Water Reducing Agent: to ASTM C 494, non-chloride.

.4 Retardation Agent: to ASTM C 494, non-chloride.

.5 Superplasticizer: to ASTM C 494, use only when approved by Consultant.

2.6 CURING COMPOUNDS

.1 Curing Compounds to CAN/CSA-A23.1 and to ASTM C 309.

.2 Consultant to approve use of curing compounds in all liquid retaining structures. If approved, use only potable water approved compounds for curing in liquid retaining structures.

2.7 FLOOR SEALERS

.1 Natural coloured floors (hardened or unhardened). Standard of Acceptance: Sealtight HIAC by W.R. Meadows. Florseal WB by Sika.

2.8 EXPANSION JOINT BOARD FILLER

.1 Expansion joint board filler to be expanded polystyrene board (EPS) Type 1 density.

2.9 ISOLATION JOINT FILLER

.1 For Isolation Joints: Standard of Acceptance: Deck-O-Foam by W.R. Meadows.

2.10 SAWCUT JOINT FILLER

.1 Sawcut Control Joints - self-levelling two component epoxy urethane filler. Standard of Acceptance: Loadflex by Sika, REZI-WELD FLEX by W.R. Meadows.

2.11 GROUT

.1 Nonshrink, Premixed Non-metallic Grout: Standard of Acceptance: CG-86 Grout by W.R. Meadows. Master Flow 713 Plus by BASF Building Systems, CPD non-shrink grout by CPD.

2.12 BONDING AGENT

.1 Latex Bonding Agent: Standard of Acceptance: Intralok by W.R. Meadows. CPD Latex Adhesive by CPD.

2.13 ANCHORS

.1 All proprietary anchoring products to be as specified on drawings and installed (including standard depth of embedment) as per manufacturer's published recommendations.

.2 Standard of Acceptance: Hilti (Canada) Products, Hilti Hit-HY 200 Adhesive Anchor System, AISI 316 stainless steel, unless noted on drawings. Minimum 400 MPa yield strength, 500 MPa ultimate strength.

2.14 WATERSTOPS

.1 Urethane PVC Waterstops to CGSB 41-GP-35M (Withdrawn), central bulb, ribbed profile, size as noted on drawings. Standard of Acceptance: PVC Waterstops by Southern Metal & Plastic Products, and PVC Waterstops by Sika Greenstreak. PVC Waterstops to be NSF61 approved.

2.15 REPAIR PRIMER

.1 Concrete Patch Repair Primer: Standard of Acceptance: SIKATOP Armtec 110 by Sika Canada.

2.16 SELF-LEVELING PATCHING MORTAR

.1 Self-leveling patching mortar for horizontal patching. Standard of Acceptance: SIKATOP III Plus by Sika Canada.

2.17 NON-SAG PATCHING MORTAR

.1 Non-sag patching mortar for vertical, overhead and other applications indicated. Standard of Acceptance: SIKATOP 123 Plus by Sika Canada, MEADOW-CRETE OV by W.R. Meadows.

PART 3 - EXECUTION

3.1 COLD WEATHER REQUIREMENTS

.1 Carry out cold weather concreting in accordance with the requirements of CAN/CSA A23.1 and the Contractor's Quality Plan.

.2 When the air temperature is at or below 5°C or there is a likelihood of it falling to that limit within 24 hours of placing, employ suitable means to maintain temperature of all concrete surfaces between 10°C and 21°C for at least 3 days after placing. Provide sufficient thermometers, in accordance with CAN/CSA A23/1.

.3 Remove or replace any portion of concrete allowed to freeze prior to reaching a compressive strength of at least 10 MPa. Do not place concrete on frozen surfaces.

.4 Provision shall be made for venting of all combustion products from gas-fired heaters. Repair any concrete damaged by carbonation.

3.2 HOT WEATHER REQUIREMENTS

.1 Carry out hot weather concreting in accordance with requirements of CAN/CSA A23.1 and the Contractor's Quality Plan.

.2 When the air temperature is above 27°C, curing shall be by water spray, wet sand or burlap and not by curing compounds.

.3 Do not place concrete with material temperature higher than 25°C. Concrete with temperature higher than 25°C on arrival at the site will be rejected.

3.3 FORMWORK

.1 Construct formwork strong, tight, braced and tied so as to maintain shape and position within tolerances specified in CAN/CSA A23.1. Top form ties shall not be located within 150 mm of the top of the concrete placement.

.2 Camber all formwork to compensate for anticipated deflections in formwork prior to hardening of concrete. Positive means of adjustment (wedges or jacks) or shores and struts to be provided and all settlement taken up during concrete placing operation.

.3 Provide temporary cleanout and inspection openings.

.4 Install 25 mm triangular wood chamfer strips in corners of forms for all corners of piers, foundation walls and equipment bases which will be exposed in the finished structure.

.5 All formwork shall be left in place until concrete has attained sufficient strength to support its own weight plus all likely construction loads.

.6 Minimum stripping time for vertical formed surfaces for elements not exceeding 3,000 mm in height and 400 mm in depth shall be 24 hours.

3.4 FINISH FOR FORMED SURFACES

.1 Non-exposed Concrete Finish:

.1 A "rough form finish" as defined by CAN/CSA-A23.1 will be acceptable for surfaces not exposed to view in finished structure.

.2 Exposed Concrete Finish:

.1 A "smooth-form finish" as defined by CAN/CSA-A23.1 will be required for all surfaces exposed to view in finished structure.

.2 Utilize only new sheets of plywood coated with release agent and cone-type ties, unless noted otherwise.

.3 Apply a sack-rubbed finish in accordance with CAN/CSA-A23.1 to all exposed concrete if required by Consultant to compensate for surfaces which do not meet the criteria for a "smooth form finish".

.4 Horizontal joints shall occur at same elevation on all visually related surfaces.

.3 Architectural Concrete Finish - where indicated on drawings:

.1 Follow recommendations of CAN/CSA-A23.1 and ACI 303.

.2 Form all recesses using dressed lumber.

.3 Form chamfers at all outside corners formed by intersection of a vertical and horizontal surface, using dressed lumber.

.4 Edges of plywood panels shall be milled to ensure tight contact with adjacent edges and surfaces. All edge joints shall be arranged symmetrically in any panel or surface.

.5 Horizontal joints shall occur at same elevation on all visually related surfaces.

.6 All joints and form tie patterns shall be arranged and approved by the Consultant before formwork is built.

3.5 REINFORCEMENT

.1 Detail, place and protect reinforcing steel in accordance with CAN/CSA-A23.1.

.2 Before placing, clean all reinforcement of any loose scale, dirt or any other coatings which would impair the bond.

.3 Place reinforcement accurately and secure in place by use of chairs, spacers and hangers.

.4 Specified cover to reinforcing steel as required in CSA/CAN-A23.1, except as noted below:

.1 Concrete deposited against and permanently exposed to earth surface. 75 mm

.2 Concrete deposited in forms but exposed to earth or weather. 50 mm

.3 Piers - 50 mm

.4 Slabs - interior 25 mm - exterior 30 mm

.5 Lap lengths and bar development lengths to be in accordance with CAN/CSA A23.3.

.6 Tension lap splices to be Class “B”.

.7 Provide corner bars to match longitudinal reinforcing at all intersections (including footings) unless otherwise indicated.

.8 Straightening or rebinding of reinforcing bars is not permitted. Discard bars with bends or kinks not shown on bar lists.

.9 Adequately support slab bars on continuous high chairs to resist against weight of workmen and equipment.

.10 Welding of reinforcing shall not be performed without prior approval of methods by Consultant. All welding shall conform to CSA Standard W186 and shall only be performed by welders certified by the Canadian Welding Bureau.

.11 Unless otherwise noted at all openings in slabs and walls provide additional reinforcing as noted below.

.12 Unless otherwise noted at all openings in slabs, reinforcement that is disrupted due to openings, additional reinforcement shall be placed on the sides to cover the disrupted reinforcement. Provide hooked ends at all reinforcing terminated at openings.

3.6 PLACING

.1 Place concrete in accordance with CAN/CSA-A23.1.

.2 Notify Consultant before concrete is placed, so that they may, at their discretion, review all preparations for conformance with requirements of the Quality Plan.

3.7 CONSTRUCTION JOINTS

.1 Locate construction joints as noted on drawings. Any additional construction joints shall be located so as not to impair the structural integrity of the finished structure and shall be reviewed and accepted by Consultant.

.2 Prepare all existing concrete surfaces in accordance with CAN/CSA-A23.1. All laitance and foreign matter shall be removed and the surface mechanically roughened to partially expose aggregate.

.3 Waterstops to be installed in all construction joints in below grade structures. Waterstops to be installed in accordance with manufacturer’s instructions.

3.8 INSERTS AND OPENINGS

.1 Set sleeves, ties, hangers, waterstops, anchor bolts and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 200 mm not indicated on structural drawings must be approved by Consultant.

.2 No sleeves, ducts, pipes or other openings shall pass through beams or columns, except where specifically detailed on structural drawings or reviewed by Consultant.

.3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of all modifications from Consultant before placing of concrete.

.4 Fully coordinate locations and sizes of sleeves and openings shown on structural drawings with architectural, mechanical and electrical drawings.

.5 Set all anchor bolts using templates provided by appropriate trade requiring same. Securely fasten anchor bolts in place to maintain correct position and alignment during concreting. Misplaced anchor bolts shall be considered defective concrete and shall be removed and replaced or otherwise corrected to Consultant's satisfaction.

3.9 FLOOR FINISHING

.1 Finish floors in accordance with CAN/CSA-A23.1 utilizing expert tradesmen whose only occupation is floor finishing.

.2 Slab and floor tolerance measurements shall be made in accordance with the Straightedge Method as specified in CAN/CSA-A23.1 and in accordance with the Contractor’s Quality Plan.

3.10 CURING

.1 Cure all concrete in accordance with the requirements of CAN/CSA-A23.1.

.2 Curing methods and materials to be in accordance with the Contractor’s Quality Plan.

.3 Cure vertical surfaces by leaving forms in place or with curing compounds.

.4 Cure concrete floor slabs using continuous sprinkling, and/or fabric kept continuously wet.

3.11 FORM GREASE REMOVAL

.1 All newly cast concrete to receive any proprietary waterproofing/sealing agent to be water blasted and/or prepared to manufacturer’s requirements. Consult manufacturer’s literature for requirements prior to applying any products to newly cast concrete.

3.12 PATCHING

.1 Remove all defective and honeycombed concrete down to sound concrete in accordance with the Quality Plan.

.2 Patch with expanding grout and latex bonding agent in accordance with CAN/CSA-A23.1 to match adjacent surfaces.

.3 Patch all cone tie holes with an approved non-metallic, non-shrink mortar except in exposed architectural concrete.

.4 Install grey plastic set back plugs in cone tie holes of exposed concrete after removal.

3.13 REPAIR OF TEMPERATURE AND SHRINKAGE INDUCED CRACKS

.1 Repair cracks in the completed structures in accordance with the Quality Plan, employing a suitable approved polyurethane injection technique to make such cracks completely watertight after repair.

.2 Remove surface injections materials following completion of work and finish affected areas to match surrounding concrete.

3.14 GROUTING

.1 Do all grouting around pipes, under equipment bases, under base plates, etc. as indicated in accordance with the manufacturer's instructions, with an approved non- metallic, non-shrink mortar.

.2 Void under structural steel base plates to be completely filled with an approved non-shrink grout. Exercise extreme care to ensure that no voids are left under base plates and that full bearing of base plate on supporting concrete is attained.

3.15 SLABS-ON-GRADE

.1 Prior to placing concrete, verify that subgrade has been compacted and accepted by Soils Consultant.

.2 Fill all saw cut joints with an approved control joint sealant.

.3 Unless noted otherwise place reinforcement or welded wire fabric mesh 50 mm below top surface of concrete slabs-on-grade. Support reinforcement or mesh on precast concrete chairs with embedded tie wires.

3.16 EXTERIOR SLABS

.1 Broom finish all exterior slabs. Seal with two (2) coats approved sealer.

.2 On exterior slabs-on-grade provide control joint pattern at 1200 mm on centre each way unless otherwise detailed and install 13 mm premoulded joint filler every second joint.

3.17 EQUIPMENT BASES

.1 Carefully examine the architectural, mechanical, and electrical drawings, specifications and shop drawings for requirements. This work is not necessarily shown on structural drawings.

.2 Layout of all concrete bases, curbs, pits, etc., for architectural, mechanical, and electrical work to be responsibility of trades responsible for Work of those sections.

.3 Unless otherwise indicated, bases shall rest on the concrete floor slab.

.4 Provide all reinforcing for bases, curbs, pits, etc. Set all anchor bolts, sleeves and other miscellaneous metal items which are required to be embedded or attached to concrete. Anchor bolts, sleeves and other miscellaneous metal items, including setting templates for same, shall be supplied by Contractors requiring same. Reinforcing for bases shall be 15M @ 300 mm each way top and bottom plus 1-15M perimeter bar top and bottom, unless noted otherwise.

.5 Finish exposed parts of the bases and curbs with cement mortar. Fill voids, trowel smooth, level edges and corners to provide a neat appearance to the Consultant's approval. Harden exposed faces of curbs and bases in accordance with the requirements of this section.

.6 Provide grouting approximately 25 mm thick between equipment base plates and concrete. The space between base plates and concrete shall be completely filled with grout. Grout shall consist of non-shrinking type and be premixed. Clean surface of concrete and wet same prior to grouting. Do not remove levelling wedges before grout attains its final set. Fill voids left by removal of wedges with grout and finish exposed surface of grout to make neat appearance.

3.18 ALTERATIONS TO EXISTING CONCRETE

.1 Remove existing concrete as designated via saw cutting or chipping. Where existing reinforcing is to be incorporated into new construction, removal shall be via chipping only.

.2 Existing concrete surfaces to be roughened and existing reinforcing thoroughly cleaned prior to casting new concrete. Provide additional dowelled reinforcing as noted.

.3 Apply approved bonding agent at interfaces between new and existing concrete.

.4 Fill existing small openings with non-shrink concrete mortar as approved by Consultant.

.5 Where new openings expose existing reinforcing apply migrating corrosion inhibitor to all cut surfaces. Apply non-sag cementitious patching mortar to uniform 25 mm thickness to provide a smooth finished surface.

3.19 ANCHORING SYSTEMS

.1 Contractor to have proprietary anchoring system manufacturer’s representative on site for initial application of all proprietary anchoring systems.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International Inc.:

.1 ASTM A36/A36M-14, Standard Specification for Carbon Structural Steel.

.2 ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

.3 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.

.4 ASTM A580/A580M-15, Standard Specification for Stainless Steel Wire.

.5 ASTM A641/A641M-09a (2014), Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

.6 ASTM-A666-15, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

.7 ASTM C 73-14, Standard Specification for Calcium Silicate Brick (Sand-Lime Brick).

.8 ASTM C 207 Standard Specification for Hydrated Lime for Masonry Purposes

.9 ASTM C 270 Standard Specification for Mortar for Unit Masonry

.10 ASTM C 216-15, Standard Specification for, Facing Brick (Solid Masonry Units Made of Clay or Shale).

.11 ASTM D 2240-05 (2010), Standard Test Method for Rubber Property - Durometer Hardness.

.12 ASTM D1056-14, Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.

.13 ASTM E 336-14, Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings.

.2 Brick Industry Association (BIA):

.1 Technical Note No. 20-2006, Cleaning Brick Work.

.3 Canadian Standards Association (CSA International):

.1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

.2 CAN/CSA A82-14, Fired Masonry Brick Made From Clay or Shale).

.3 CAN/CSA-A165 SERIES-14, Standards on Concrete Masonry Units.

.4 CAN/CSA-A179-04(R2014), Mortar and Grout for Unit Masonry.

.5 CSA-A370-14, Connectors for Masonry.

.6 CAN/CSA A371-04, Masonry Construction for Buildings.

.7 CSA S304.1-14, Design of Masonry Structures.

.8 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.9 CSA-A3000-13, Cementitious materials compendium (Consists of A3001, A3002, A3003, A3004 and A3005), Includes Update No. 1 (2014), Update No. 2 (2014), Update No. 3 (2014).

.10 CSA W186-M 1990 (R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.4 International Masonry Industry All-Weather Council (IMIAC):

.1 Recommended Practices and Guide Specification for Hot and Cold Weather Masonry Construction.

.5 Reinforcing Steel Institute of Canada (RSIC):

.1 Reinforcing Steel Manual of Standard Practice, 2004.

.6 Documents from the Institut de la Maçonnerie du Québec (IMQ)

.1 Masonry work for buildings

.2 Technical bulletins No. 7-8R

.7 Institute for Research in Construction (CNRC-NRC)

.1 Construction Technology Update No. 68

1.2 QUALITY PLAN

.1 Develop/ implement a Quality Plan that verifies the masonry work meets the project specifications.

.2 The Quality Plan shall describe, as a minimum, the following plans and procedures:

.1 Identify the personnel responsible for implementation and oversight of the quality control plan for this section in an organization chart. Describe the roles and responsibilities of each person listed.

.2 Provide samples of the Contractor's quality control inspection forms to be used on the project. The quality control forms shall, as a minimum, include the following:

.1 Shop Drawing and Sample review and sign off.

.2 Inspection of reinforcing steel, masonry accessories, inserts, and lintels.

.3 Material testing logs.

.4 Final inspection of completed work.

.5 Shop Drawing and Sample review and sign off.

.6 Inspection of reinforcing steel, masonry accessories, inserts, and lintels.

.7 Material testing logs.

.8 Final inspection of completed work.

.3 Describe quality control procedural steps related to:

.1 Preparation.

.2 Reinforcing installation.

.3 General construction of masonry work.

.4 Anticipated timeframes for schedule of general conformance reviews by the Consultant.

.5 Coordination of material testing.

.6 Defective work, including: identification, documentation, submission of proposed repair procedures, and follow-up inspection.

.4 The Quality Plan shall be prepared taking into account the specific requirements of this project. Generic quality plans that, in the Consultant's reasonable opinion, fail to address the specific requirements of this section will be returned 'Revise and Resubmit'.

.5 The Quality Plan shall be submitted to the Consultant for review at least 10 business days before the scheduled commencement of work under this section. Acceptance of the Quality Plan by the Consultant shall be considered a prerequisite for commencement of masonry work. Failure of the Contractor to coordinate the timely submission of a complete Quality Plan, which ultimately results in the delay of the start of masonry work, shall not be at risk to the Owner or Consultant for back charge.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation meetings: comply with Section 01 31 19 - Project Meetings. Conduct pre-installation meeting one week prior to commencing on-site installation to:

- .1 Verify project requirements, including mock-up requirements.
- .2 Verify substrate conditions.
- .3 Coordinate products, installation methods and techniques.
- .4 Sequence work of related sections.
- .5 Coordinate with other building subtrades.
- .6 Review manufacturer's installation instructions.
- .7 Review masonry cutting operations, methods and tools and determine worker safety and protection from dust during cutting operations.
- .8 Review warranty requirements.

.2 Sequencing: sequence with other work in accordance with Section 01 32 16 - Construction Progress Schedules - Bar (GANTT) Chart. Comply with manufacturer's written recommendations for sequencing construction operations.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

- .1 Submit copy of manufacturer's instructions, printed product literature and data sheets for masonry mortar and grout, masonry horizontal reinforcement, and masonry accessories and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit copy of Workplace Hazardous Materials Information System (WHMIS) - Material Safety Data Sheets (MSDS) in accordance with Section 01 35 29 - Health and Safety Requirements and Section 01 35 43 - Environmental Procedures.

.3 Shop Drawings:

- .1 Indicate horizontal and vertical spacing of wall reinforcement and ties to suit application.
- .2 Shop drawings consist of bar bending details, lists and placing drawings.
- .3 On placement drawings, indicate sizes, spacing, location and quantities of reinforcement and connectors.

.4 Samples:

- .1 Provide samples as follows:
  - .1 Two (2) cured, and coloured samples of mortar, illustrating mortar colour and colour range, supplemented with specific requirements. The samples must be presented in the U-shaped plastic extrusions measuring 10 mm X 10 mm X 100 mm in length. The samples must be correctly identified.

.2 Two (2) flashing material samples, illustrating colour and colour range, size, shape, and profile. Include as specified:
  .1 Sheet metal flashings.
  .2 Composite flashings.
  .3 Plastic and rubber flashings.

1.5 WALL MOCK-UP

.1 For brick re-pointing, provide mock-up in two areas as directed by consultant..

.2 The wall mock-up should display what the final colour and texture of the joint will look like and blending into existing mortar joints.

.3 The wall mock-up must form an integral part of the works.

.4 Do not start work until the wall mock-up have been approved by the architect.

1.6 CLOSEOUT SUBMITTALS

.1 Provide manufacturer's instructions for care, cleaning and maintenance of prefaced masonry units for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.7 QUALITY AYSSURANCE

.1 Mock-ups:
  .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
  .2 Construct mock-up panel of exterior masonry wall construction 1200 x 1800 mm showing masonry colours and textures, use of reinforcement, ties, through-wall flashing, weep holes, jointing, coursing, mortar and workmanship.
  .3 Mock-up used:
    .1 To judge workmanship, substrate preparation, operation of equipment and material application.
  .4 Allow forty-eight (48) hours for review 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 to the approval of the Consultant.

1.8 QUALITY TESTING OF MORTAR AND GROUT

.1 The testing of mortar and grout shall be included as part of the Quality Plan.

.2 Testing company services will be paid for by the Contractor from a cash allowance carried Division 1.

.3 Test mortar and grout in accordance with requirements outlined in CSA-A179-14.

.4 Prior to beginning masonry work prepare mortar and grout mixes on site under the supervision of the Consultant, and Material Testing Firm appointed by the Contractor. Samples of mortar materials are to be taken by Material Testing Firm to determine a site-control value for the ratio of aggregate to cementitious material. Samples of mortar and grout mixes to also be taken for compressive strength testing. The results of these tests will serve as a control values for the remainder of the testing.

.5 During masonry construction, Material Testing Firm to take mortar samples to determine the ratio of aggregate to cementitious material and mortar and grout samples for compressive strength testing. The frequency of this testing to be in accordance with the requirements outlined in CSA-A179-14. Notify the Consultant and Material Testing Firm when these tests are required. Provide a minimum of 2 business days' notice.

.6 The results of the Quality Control testing shall be communicated to the Consultant in a manner and frequency to facilitate the Owner's Quality Assurance Plan process.

1.9 FIELD MEASUREMENTS

.1 Make field measurements necessary to ensure proper fit of members.

1.10 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Storage and Handling Protection:

.1 Store materials in dry location and in accordance with manufacturer's recommendations.

.2 Store and protect material from nicks, scratches, and blemishes.

.3 Keep materials dry until use except where wetting of bricks is specified.

.4 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

.5 Replace defective or damaged materials with new.

1.11 SITE CONDITIONS

.1 Weather Requirements: to CSA-A371.

.2 Cold Weather Requirements:

.1 To 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 Ambient Conditions: maintain materials and surrounding air temperature to:

.1 Minimum 5 degrees C prior to, during, and 48 hours after completion of masonry work.

.2 Maximum 32 degrees C prior to, during, and 48 hours after completion of masonry work.

.3 Maintain temperature of masonry above 0 degrees C for minimum of 3 days, after mortar is installed.

.4 Preheat unheated wall sections in enclosure for minimum 72 hours above 10 degrees C, before applying mortar.

.3 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.

.3 Spray mortar surface at intervals and keep moist for maximum of three days after installation.

PART 2 - PRODUCTS

2.1 MANUFACTURED BRICK UNITS

.1 Face Brick (Existing):

.1 Burned clay brick: to CAN/CSA A82.06, ASTM C261.

.1 At locations where existing brick façade is being removed, contractor to clean and store existing brick for re-instatement at areas of re-pointing, and where indicated on drawings.

.2 If salvageable brick quantities are insufficient, contractor to provide new brick to match existing as per below.

.2 Face Brick:

.1 Burned clay brick: to CAN/CSA A82.06, ASTM C261.

.1 Type: FBX.

.2 Grade: SW.

.3 Size: to match existing.

.4 Colour and texture: to match existing, colour to the satisfaction of the consultant from manufacturer's complete colour range.

.5 Acceptable manufacturers: Hanson Brick, Brampton Brick, or approved alternate.

2.2 CONCRETE BLOCK

.1 Standard concrete block units: to CAN/CSA-A165 Series (CAN/CSA-A165.1).

.1 Classification: H/15/A/M.

.2 Size: metric modular as indicated.

.3 Special shapes: Provide bull-nosed units at all exposed corners, sills, and tops of walls. Provide purpose-made shapes for lintels, beams, and bond beams. Provide additional special shapes as indicated.

.2 Exposed Faces: Uniform texture, free of imperfections, indentations, and surface cracks impairing finish or appearance.

.3 Special fire resistant concrete block units: to CAN/CSA-A165 Series (CAN/CSA-A165.1) as modified below.

.1 Classification: H/15/B/M except as modified by fire resistance requirements specified below.

.2 Fire resistant characteristics: aggregate used in units and equivalent thickness of units to National Building Code of Canada 2010, for fire-resistance ratings indicated.

.3 Size: Standard metric modular as indicated.

.4 Special shapes: provide square, bull-nosed units at all exposed corner, sills and tops of walls s. Provide purpose-made shapes for lintels and bond beams and provide additional shapes as indicated.

2.3 MORTAR AND GROUT

.1 Use same brands of materials and source of aggregate for entire project.

.2 Mortar and Grout: to CAN/CSA A179.

.3 All mortar and grout must be manufactured in a plant where processes are certified ISO 9001:2008.

.4 Aggregate: supplied by one supplier, passing 1.18mm sieve where 6mm / ¼" thick joints are indicated.

.5 Mortar for interior/exterior masonry above grade:

.1 Loadbearing: Type S based on Proportion specifications

.2 Non-Loadbearing: Type S based on Proportion specifications

.6 Following applies regardless of mortar types and uses specified above:

.1 Mortar for new pointing: Type N based on Proportion specifications.

.2 Repointing: Use a Type O Mortar on Proportion Specifications.

.3 Replacing masonry Unit: Use a hydraulic-lime-based mortar or a Pozzolanic-lime-based mortar.

.7 Coloured mortar: use colouring admixture not exceeding 10% of cement content by mass or integrally coloured masonry cement, to produce coloured mortar to match approved sample.

.1 Manufacturer: Solomon Colours, King Packaged materials or approved equal.

.2 Mortar pigments: SGS Concentrated A, H, and X Series Mortar Colours.

.1 Colour: To match existing as later approved by Consultant. Custom colour matching were manufacturers standard colour range is not a satisfactory match to the Consultant. Contractor to allow for up to three (3) custom colours.

.2 Incorporate colour and admixtures into mixes in accordance with manufacturer's instructions.

.3 Material: Natural and synthetic, milled, blended iron oxides.

.4 Carbon added for darker colours shall not exceed 4 percent.

.5 Produce uniform and consistent colour.

.6 Inert, stable to atmospheric conditions, sunfast, weather resistant, alkali resistant, water insoluble, lime proof, and nonbleeding.

.7 Free of deleterious fillers and extenders.

.8 Use any type of additive to alter the setting time, workability or any other property of the plastic or cured mortar is not permitted.

.9 Particle Size: 95 to 99 percent minus 325 mesh.

.10 pH: 6.5 to 9.0.

.11 Compliance: ASTM C 979.

.12 Tests: ASTM C 91 and ASTM C 270. Exceed 1,800 psi (12.4 kPa) at 28 days strength requirement.

.8 Non-Staining Mortar: use non-staining masonry cement for cementitious portion of specified mortar type.

.9 Parging Mortar: Type N to CSA A179.

.10 Water: clean and potable.

.11 Lime:

.1 Quick Lime: to CAN/CSA A179, Type N, S, based on application.

.2 Hydrated Lime: to CAN/CSA A179, Type S.

.12 Bonding Agent: latex type.

.13 Polymer Latex: organic polymer latex admixture of butadiene-styrene type non-emulsifiable bonding admixture.

2.4 MORTAR MIXES

.1 Pointing Mortar: 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 hour or more than 2 hours then remix with sufficient water to produce mortar of proper consistency for pointing.

.2 Stain Resistant Pointing Mortar: one part Portland cement, 1/8 part hydrated lime, and two parts graded (80 mesh) aggregate, proportioned by volume. Add aluminum tristearate, calcium stearate, or ammonium stearate to 2 percent of Portland cement by weight.

2.5 ANCHORAGE AND REINFORCING

.1 Bar Reinforcement: Steel to CAN/CSA A371 and CAN/CSA G30.18, Grade 400

.2 Wire Reinforcement: to CSA-A371 and CSA G30.14, ladder type.

.3 Connectors: to CAN/CSA A370 and CSA-S304.

.4 Material: high tensile strength steel wire meeting ASTM A82/A82M.

.1 Acceptable material: Fero, Blok-Lok, Hohmann & Barnard Inc., or approved alternate.

.5 Finish Schedule: Provide minimum level of corrosion protection for masonry connectors as outlined in CSA A370 and as follows:

.1 Interior Masonry – (not subjected to moisture) unprotected carbon steel or with minimal zinc coating (mill galvanized).

.2 Interior Masonry – (subject to moisture), and above grade exterior masonry in buildings less than 13 metres/42’ in height (measured from the floor level of the first storey) – hot dipped zinc galvanized after fabrication with minimum zinc coating in accordance to ASTM A153/A153M Class B wire ties/reinforcing 458 g/sq.m. and ASTM A123/A123M plates/strips/sheets 610 g/sq.m. (on each face).

.6 Horizontal reinforcement: Horizontal joint reinforcement for masonry block walls: Ladder Type Reinforcement. Heavy Duty (4.76 mm side rods and 9 gauge cross rods at 400 centres). Refer to details on structural drawings. Reinforcement to be hot-dipped galvanized to ASTM A153. Provide prefabricated corners and tees at intersecting walls. Reinforcement to be 50 mm narrower than wall. Standard of Acceptance: BL 10 Ladder Reinforcement by Blok-Lok.

.7 Veneer ties – existing block back-up:

.1 1.52 mm (16 ga) stainless steel angle tie with 4.76 mm stainless steel wire tie. Size angle tie to suit total cavity thickness. Install ties on 400 x 400 grid, and no more than 200 mm from any opening. Acceptable Products: BL-5407 Masonry Fastener Assembly (BL-407 Veneer Anchor and BL-523 Brass Expansion Bolt) and Flex-O-Lok® Ties.by Blok-Lok, Heavy Duty Rap-Tie by Fero.

.2 Secure ties with one 6.4 mm Hex Head, Type 304, stainless steel sleeve anchor. Embedment, hole size and installation to manufacturer's recommendations. Blow hole clear after drilling. Acceptable Products: Sleeve Anchor HLC-HX304SS by Hilti, Dynabolt SHN-1413 by ITW, Sleeve-all Stainless Steel by Simpson, or anchors recommended by tie manufacturer.

.3 Corrosion Protection: as a minimum to CSA-S304.1, galvanized and CAN/CSA A370.

2.6 REINFORMENT FABRICATION

.1 Fabricate reinforcing in accordance with CAN/CSA-A23.1 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Fabricate connectors in accordance with CAN/CSA A370.

.3 Upon approval of Consultant, weld reinforcement in accordance with CSA W186.

.4 Ship reinforcement and connectors, clearly identified in accordance with drawings.

2.7 REINFORCEMENT SOURCE QUALITY CONTROL

.1 Upon request, provide Consultant with certified copy of mill test report of reinforcement steel and connectors, showing physical and chemical analysis.

.2 Upon request inform Consultant of proposed source of material to be supplied.

2.8 MASONRY ACCESSORIES

.1 Control joint filler: closed cell neoprene sponge with tear strip, purpose-made for horizontal and vertical applications conforming to ASTM D1056, size and shape to suit application.

.1 Acceptable material: 'NS Neoprene Sponge', by Blok-Lok or approved alternate.

.2 Lap adhesive: recommended by masonry flashing manufacturer.

.3 Weep hole vents: Polyester compressible mesh sized to suit masonry unit and mortar joint, colour to match mortar or as approved by Consultant.

.1 Acceptable material: 'Weep Vent', by Mortar Net Solutions, or approved alternate.

.4 Premanufactured Drip Plates: 75 mm / 3" 38 mm / 1½" wide smooth, factory-formed with 45° hemmed edge, complete with inside outside corners, Type 316 stainless steel finish.

.1 Acceptable product: 'Drip Plate by Blok-Lok / Hohmann & Barnard Inc., or approved alternate.

2.9 MOISTURE CONTROL

.1 Weep Hole Protector:

.1 Pre-manufactured high density nylon or polyethylene open mesh, 250 mm (10") high, thickness to suit cavity.

.1 Acceptable material: 'Mortar Net' by Mortar Net Ltd.

.2 Grout Screens: 6 mm square monofilament screen fabricated from high-strength, non-corrosive polypropylene polymers to isolate flow of grout in designated areas.

.1 Size: to suit application.

.2 Acceptable material: '#MGS – Mortar/Grout Screen' by Hohmann & Barnard, Inc., or approved alternate.

2.10 FLASHINGS

.1 Flashings: Refer to Section 07 26 00 Vapour Retarders, 07 27 00 - Vapour Barriers, and 07 28 00 Air/Vapour Barriers.

.2 Prefinished Metal Flashings: Refer to Section 07 62 00 – Sheet Metal Flashing and Trim.

.3 Aluminum Flashings: Refer to Section 07 62 00 – Sheet Metal Flashing and Trim.

2.11 JOINT SEALANTS AND BACKER RODS

.1 Non-staining type, as specified in Section 07 92 00 - Joint Sealants.

2.12 CLEANING COMPOUNDS

.1 Cleaning Compounds:

.1 Compatible with substrate and acceptable to masonry manufacturer for use on products.

.2 Cleaning compounds compatible with brick masonry units and in accordance with manufacturer's written recommendations and instructions.

2.13 TOLERANCES

.1 Tolerances for standard concrete unit masonry tolerances in accordance with CAN/CSA A165.1, supplemented as follows:

.1 Maximum variation between units within specific job lot not to exceed 2 mm.

.2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.

.3 Out of square tolerance not to exceed 2 mm.

.2 Tolerances for architectural concrete masonry units in accordance with CAN/CSA A165.1, supplemented as follows:

.1 Maximum variation in length or height between units within specific job lot for specified dimension not to exceed 2 mm.

.2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.

.3 Out of square tolerance not to exceed 2 mm.

.4 Maximum variation in width between units within specific job lot for specified dimension not to exceed 2 mm.

PART 3 - EXECUTION

3.1 INSTALLERS

.1 Experienced and qualified masons to carry out erection, assembly and installation of masonry work.

3.2 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.

3.3 EXAMINATION

.1 Examine conditions, substrates and work to receive work of this Section.

- .1 Coordinate with Section 01 71 00 - Examination and Preparation.
- .2 Identify the structural weaknesses that might cause problems and report them before commencing work.
- .3 Examine the joint profiles and the methods to reproduce them before repointing.
- .4 Examine the vertical and horizontal joints in order to determine which were done first and if they all have the same profile; also keep in mind the other execution details that define the authenticity of the original work.

.2 Examine openings to receive masonry units. Verify opening size, location, and that opening is square and plumb, and ready to receive work of this Section.

- .1 Visually inspect substrate prior to commencing with Work of this section.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

.3 Verification of Conditions:

- .1 Verify that:
  - .1 Substrate conditions which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation of masonry.
  - .2 Field conditions are acceptable and are ready to receive work.
  - .3 Built-in items are in proper location, and ready for roughing into masonry work.
- .2 Commencing installation means acceptance of existing substrates.

3.4 PREPARATION

.1 General:

- .1 Surface Preparation: prepare surface in accordance with manufacturer's written recommendations and coordinate with Section 01 71 00 - Examination and Preparation.
- .2 Establish and protect lines, levels, and coursing.
- .3 Protect adjacent materials from damage and disfiguration.

.2 Restoration and repointing:

.1 The cutting depth of the joints to be redone must be around 25 mm (from 2 to 2½ times the thickness of a 10 mm joint), or until you reach the mortar that is sound looking. During the work described hereafter, the contractor-mason must be very diligent to prevent any damage to the stone, the biscuit or the edge of the brick.

.2 Verify the state of the joints and remove deteriorated mortar using one of the following methods:

.1 Using a cold chisel, either by hand or attached to a compressed air cannon, apply a light pressure so as not to damage the masonry unit.

.2 Using a radial saw (with a 100 mm diameter diamond blade) for the horizontal joints. However, this can only be done by experienced workers who are recognized for their ability to do this kind of work. If this is the case, then only drill at the centre of the joint and finish the job using a chisel.

.3 Remove the waterproofing product around the edge of the openings (doors, windows, etc.) in order to be able to re-point as much of the surface as possible.

.4 Determine whether or not the voids need to be refilled.

.5 Before repointing, the contractor must inform the architect if he/she finds any voids that are not specified on the plans and are structurally abnormal.

3.5 MASONRY 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, respecting construction tolerances permitted by CSA-A371.

.3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

.4 Install bullnose concrete block to all exposed interior corners unless otherwise indicated.

3.6 BRICK INSTALLATION

.1 Bond: to match existing.

.2 Coursing height: 200 mm / 8” for three/two bricks and four/three joints as indicated.

.3 Jointing: concave, raked where exposed or where paint or similar thin finish coating is specified.

.1 Mixing and blending: mix units within each pallet and with other pallets to ensure uniform blend of colour and texture.

.2 Clean unglazed clay masonry as work progresses.

3.7 CONCRETE BLOCK INSTALLATION

.1 Concrete block units:

.1 Bond: running.

.2 Coursing height: 200 mm for one block and one joint.

.3 Jointing: concave to all interior locations from floor level to one course above ceiling height and to underside of deck in exposed structure locations.

.2 Special Shapes:

.1 Install bullnose block to the following locations unless otherwise indicated:

.1 All exposed interior wall corners, including interior face of exposed exterior wall corners, returns, offsets, reveals and indents without cut ends being exposed and without losing bond or module.

.2 All exposed partial height wall caps.

.3 Window sills.

.4 Exposed concrete block at window and door jambs exceeding 100mm in depth.

.2 Install reinforced concrete block lintels over openings in masonry where steel or reinforced concrete lintels are not indicated.

.3 End bearing: not less than 200 mm as indicated on drawings.

.4 Install special site cut shaped units.

3.8 CONSTRUCTION

.1 Build in miscellaneous items such as bearing plates, steel angles, bolts, anchors, inserts, sleeves, and conduits.

.2 Construct masonry walls using running bond unless otherwise noted.

.3 Build around frames previously set and braced. Fill behind hollow frames within masonry walls with mortar or grout and embed anchors.

.4 Fit masonry closely against electrical and plumbing outlets so collars, plates, and covers overlap and conceal cuts.

.5 Install movement joints and keep free of mortar where indicated.

.6 Hollow Units: spread mortar setting bed from outside edge of face shells. Gauge amount of mortar on top and end of unit to create full joints, equivalent to shell thickness. Avoid excess mortar.

.7 Solid Units: apply mortar over entire vertical and horizontal surfaces. Avoid bridging of airspace between brick veneer and backup wall with mortar.

.8 Ensure compacted head joints. Use full or face-shell joint as indicated.

.9 Tamp units firmly into place.

.10 Do not adjust masonry units after mortar has set. Where resetting of masonry is required, remove, clean, and reset units in new mortar.

.11 After mortar has achieved initial set up, tool joints.

.12 Do not interrupt bond below or above openings.

.13 Apply parging in uniform coating not less than total 10 mm thick to exposed concrete, piers, walls, foundation walls, light standards and where indicated.

.14 Exposed masonry:

.1 Remove chipped, cracked, and otherwise damaged units, in accordance with CSA A-165, in exposed masonry and replace with undamaged units.

.15 Jointing:

.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.

.2 Strike flush joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.

.16 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.

.17 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.

.18 Provision for Movement:

.1 Unless otherwise indicated, leave 3 mm space below shelf angles.

.2 Unless otherwise indicated, leave 10 mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges.

.3 Built masonry to tie in with stabilizers, with provision for vertical movement.

.19 Loose Steel Lintels:

.1 Install loose steel lintels. Centre over opening width.

.20 Interface with other work:

.1 Cut openings in existing work as indicated.

.2 Make good existing work. Use materials to match existing

.21 Brick Removals

.1 Turned brick coursings embedded into concrete block walls are to be trimmed where possible. Fill openings with mortar.

.2 Grout solid around left over opening in concrete block where full brick coursing must be removed.

3.9 REPAIR/RESTORATION

.1 Upon completion of masonry, fill holes and cracks, remove loose mortar, and repair defective work.

.2 For surfaces to receive air/vapour barrier membranes, ensure substrates are smooth, sound, and free of voids, spalled areas, and loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone, and debris. Use repair materials and methods that are acceptable to air/vapour barrier membrane manufacturer.

3.10 MORTAR AND GROUT MIXING

.1 Clean all mixing boards and mechanical mixing machine to be free of dried mortar, traces of rust and other contaminants; do not thaw equipment with salt or other anti-freeze agents. Clean between batches.

.2 Mortar must be weaker than the units it is binding.

.3 Contractor to appoint one individual to mix mortar, for duration of project. In the event that this individual must be changed, mortar mixing must cease until the new individual is trained, and mortar mix is tested.

.4 Mix the repointing mortar until consistency is firm enough to form a ball with hands.

.5 The total mixing time should be between 3 and 5 minutes. Coloured mortar should be mixed between 8 and 10 minutes.

.6 If using 30-kg bags of coloured or non-coloured mortar, Contractor must not mix less than one bag at a time.

3.11 MORTAR PLACEMENT

.1 Install mortar to requirements of CAN/CSA A179.

.2 Remove excess mortar from grout spaces.

.3 Unless otherwise specified, if room temperature is equal to or greater than 25°C, mortar must be placed in under 1.5 hours after mixing. If room temperature is less than 25°C, mortar must be placed in under 2.5 hours after mixing.

3.12 GROUT PLACEMENT

.1 Install grout in accordance with manufacturer's instructions.

.2 Install grout in accordance with CAN/CSA A179.

.3 Unless otherwise specified grout must be places within 1.5 hours of mizing.

.4 Work grout into masonry cores and cavities to eliminate voids.

.5 Do not install grout in lifts greater than 400 mm, without consolidating grout by rodding.

.6 Do not displace reinforcement while placing grout.

.7 Grout masonry in accordance with CSA-S304.1, CAN/CSA A371 and CAN/CSA A179 and as indicated.

.8 Install building paper below voids to be filled with grout; keep paper 25 mm back from faces of units.

3.13 PLACEMENT CONDITIONS

.1 Unless otherwise recommended by the manufacturer, cold weather placement:

.1 When the temperature during the day ranges from:

.1 0°C to 4°C: The sand or mixing water must be heated to a temperature between 20°C and 70°C.

.2 0°C to -4°C: The sand and the mixing water must be heated to a temperature between 20 and 70 °C.

.3 -4°C to -7°C:

.1 The sand and mixing water must be heated to a temperature between 20°C and 70 °C.

.2 Both sides of the walls under construction must be heated.

.3 Windbreakers must be used when wind speed exceeds 25 km/h.

.2 -7°C and lower:

.1 The sand and the mixing water must be heated to a temperature between 20°C and 70°C.

.2 Enclosures and supplementary heating must be planned for in order to maintain air temperature above 0 °C.

.3 The temperature of the masonry unit at the time of placement cannot be less than 7°C.

.3 Hot Weather Placement:

.1 Cover the opening with a waterproof tarpaulin to prevent it from drying too quickly. Make sure to use a tarpaulin that does not stain.

.2 Mortar shall never be directly exposed to the sun or to high wind for a long period.

3.14 REPOINTING

.1 Use potable water to wash off all dust and residue from the exposed joints, but leave a bit of moisture in the existing joints to prevent water from absorbing too quickly into the old and pre-existing mortar.

.2 Apply a first layer of mortar in the joints in a manner to obtain a uniform depth (+ 25 mm) using a pointing trowel to fill in the joints; once this layer has cured (24 hours), apply successive layers of 6 mm. Make sure each layer is well compacted to prevent air pockets, and allow each layer to lightly cure before applying the next one, until you are level with the wall surface. Finish the new joints in the same way as the original ones.

3.15 COLOUR UNIFORMITY

.1 In order to ensure colour uniformity of the mortar, the contractor must:

.1 Use the same supplier for all mortar and grout.

.2 Ensure that the quantity of water in the mortar joints remains the same while smoothing them.

.3 Always use a clean mixer.

3.16 CURING

.1 Curing is essential to optimize the physical properties of mortar.

.2 Curing must be done using a moist cure starting with the initial setting of the mortar.

.3 During working hours, spray the mortar lightly with water using a sprayer.

.1 After working hours and on weekends, create a system whereby the mortar is enclosed with a jute, which is in turn enclosed by polyethylene, and constantly wet it so that it remains humid creating a greenhouse effect.

.2 The jute and polyethylene should never come in direct contact with the mortar. Leave a minimum space of 4 inches between the jute and the wall surface to allow air to circulate.

.3 Minimum cure times: as recommended by the manufacturer.

3.17 BONDING AND TYING

.1 Tie masonry veneer to backing in accordance with NBC, CSA-S304.1, CSA-A371 and as indicated.

3.18 VERTICAL/HORIZONTAL REINFORCING

.1 Vertical reinforcing to be one piece from top of floor to underside of floor above. Reinforcing to be visible prior to grouting wall. Use suitable dowels between floors.

.2 Where vertical reinforcement must be spliced between floors, follow a construction procedure that ensures specified lap lengths. Procedure to be approved by Consultant.

.3 Where low-lift grouting is necessary and approved by the Consultant, comply with the height limitations of CSA A370, while ensuring specified lap lengths.

.4 Notch bond beam blocks each side of openings if vertical jamb passes through lintel bearing.

.5 Unless noted otherwise, install standard ladder-type horizontal joint reinforcement in all walls at 400 mm /16” centres.

.6 Unless noted otherwise, install full height vertical 20M bar in grouted cores on both sides of all openings.

3.19 REINFORCED LINTELS AND BOND BEAMS

.1 Reinforce masonry beams, masonry lintels and bond beams as indicated.

.2 Place and grout reinforcement in accordance with CSA-S304.1, CAN/CSA A371, and CAN/CSA A179.

.3 Support and position reinforcing bars in accordance with CAN/CSA A371.

.4 A “bond beam” course is to be formed from standard stretcher and pier blocks, with webs notched to receive the horizontal reinforcing or from purpose-made blocks over web knock-outs. Reinforcing to have 20 mm clear cover to top of masonry unit.

.5 Where the course below the bond beam is not required to be grouted, install hardware cloth to retain the grout. Discontinue hardware cloth at vertically grouted cores.

.6 Standard bond beam reinforcing, unless noted otherwise: 2-15M

.7 Bond beam reinforcing to be continuous unless noted otherwise, lapped with Class B splices.

.8 At intersecting walls, provide 1-20 M corner bar at all bond beams, unless noted otherwise. Corner bar legs to provide Class B splices with horizontal reinforcement. Knock out face shells of blocks at intersection of bond beams to allow free-flow of grout between walls.

.9 Unless otherwise detailed, the first course above an opening greater than 400 mm in a concrete block wall is to be formed from “bond beam” blocks with a solid bottom. Horizontal reinforcement is to be placed in the bottom of the block with spacers to maintain 20 mm below the bar.

.10 Reinforcing to be continuous over the opening and to extend 200 mm each side, unless noted otherwise.

3.20 ANCHORS

.1 Supply and install metal anchors in accordance with CAN/CSA A370 and CAN/CSA A371.

3.21 LATERAL SUPPORT AND ANCHORAGE

.1 Supply and install lateral support and anchorage in accordance with CSA-S304.1 and as indicated.

3.22 MOVEMENT/CONTROL JOINTS

.1 Control Joints:

.1 Construct continuous vertical control joints for every 7.62m of wall. Continuous horizontal control joints not to exceed 2.5 times the vertical control joint spacing. Location of control joints to be approved by consultant prior to installation.

.2 Install continuous control joint fillers in control joints.

.3 Apply joint sealant in control joint, in accordance with Section 07 92 00 – Joint Sealants.

.1 Joint sealant colour to match motor colour.

.2 Tool joint sealant to a smooth finish to match motor joint.

.2 Movement Joints:

.1 Build-in continuous movement joints in accordance with CSA – A371.

.3 Reinforcement will not be continuous across movement joints unless otherwise indicated.

3.23 REINFORCEMENT FIELD BENDING

.1 Do not field bend reinforcement and connectors except where indicated or authorized by Consultant.

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.

.3 Replace bars and connectors which develop cracks or splits.

3.24 INSTALLATION: MATERIALS

.1 Install continuous movement joint fillers in movement joints at locations indicated on drawings.

.2 Lap adhesive: apply adhesive to flashing lap joints.

.3 Mechanical fasteners: install fasteners to suit application and in accordance with manufacturer's written installation instructions.

.4 Reglets: install reglets at locations indicated on drawings.

3.25 INSTALLATION: MOISTURE CONTROL

.1 Install weep hole vents in vertical joints immediately over flashings, in exterior wythes of cavity wall and masonry veneer wall construction, at maximum horizontal spacing of 600 mm on centre.

.2 Weep hole protector: install purpose made diverters in cavities where indicated and as directed, size and shape to suit purpose and function.

.3 Grout Screens: install purpose made diverters in cavities where indicated and as directed, size and shape to suit purpose and function.

3.26 INSTALLATION: FLASHINGS

.1 Build in flashings in masonry in accordance with CAN/CSA A371.

- .1 Install drip plates and flashings under exterior masonry bearing on foundation walls, slabs, shelf angles, and steel angles over openings, and at base of cavity wall and where cavity is interrupted by horizontal members or supports and as shown on drawings. Install flashings under weep hole courses and as indicated.
- .2 In cavity walls and veneered walls, carry flashings over horizontal face of drip plates of exterior masonry, under outer wythe, then up backing not less than 150 mm and as follows:
  - .1 For masonry backing embed or bond flashing 25 mm in joint.
  - .2 For concrete backing, insert or bond flashing into reglets.
  - .3 For wood frame backing, staple flashing to walls behind water resistive paper, and lap joints 150 mm minimum.
  - .4 For gypsum board and glass fibre faced sheathing backing, bond to wall using manufacturer's recommended adhesive.
  - .5 Lap joints 150 mm and seal with adhesive.

.2 Form flashing (end dams) at lintels, sills, and wall ends to prevent water from travelling horizontally past flashing ends.

.3 Install vertical flashing where outer veneer returns at window or door jambs, to prevent contact of veneer with inner wall.

3.27 SITE TOLERANCES

.1 Tolerances in notes to CSA-A371 apply.

3.28 FIELD QUALITY CONTROL

.1 Refer to Section 01 21 00 – Allowances.

.2 Noise reduction between two rooms will be tested by independent testing agency appointed and paid by contractor under Section 01 21 00 – Allowances in accordance with ASTM E 336.

.3 Notify inspection agency minimum of 24 hours in advance of requirement for tests.

3.29 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Remove droppings and splashings using clean sponge and water.

.3 Clean masonry with low pressure clean water and soft natural bristle brush.

.4 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.5 Clean unglazed clay masonry: 10 m² area of wall designated by Consultant as directed below and leave for one week. If no harmful effects appear and after mortar has set and cured, protect windows, sills, doors, trim and other work, and clean all existing brick masonry as follows.

.1 Remove large particles with wood paddles without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.

.2 Scrub with solution of 25 mL trisodium phosphate and 25 mL household detergent dissolved in 1 L of clean water using stiff fibre brushes, then clean off immediately with clean water using hose. Alternatively, use proprietary compound recommended by brick masonry manufacturer in accordance with manufacturer's directions.

.3 Repeat cleaning process as often as necessary to remove mortar and other stains.

.4 Use acid solution treatment for difficult to clean masonry as described in Technical Note No.20 by the Brick Industry Association.

.6 Clean concrete brick masonry as work progresses.

.1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of brick and finally by brushing.

.7 Upon completion of installation, remove surplus materials, rubbish, tools, and equipment barriers.

.8 Final Cleaning

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Upon completion of installation and verification of performance of installation, remove surplus materials, rubbish, tools and equipment barriers.

.9 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Divert unused or damaged masonry units and glass block from landfill as specified in Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.30 PROTECTION OF COMPLETED WORK

.1 Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.

.2 Finished masonry works must be protected from mortar spatter by covering them with non-staining tarpaulins or polyethylene.

.3 Protect the windows, frames, doors and sills from spatter or other damaging elements.

3.31 PROTECTION

.1 Temporary Bracing:

.1 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

.2 In addition to required bracing, brace masonry walls as necessary to resist wind pressure and lateral forces during construction.

.2 Moisture Protection:

.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 completed and protected by flashing or other permanent construction.

.2 Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.

.3 Air Temperature Protection: protect completed masonry

3.32 SCHEDULE

.1 Approximate area of repointing is 25 m^2. Area in excess of this quantity to subject to Unit Pricing after Consultant approval to proceed.

END OF SECTION

PART 1 - GENERAL

1.1 STANDARDS

.1 ASTM International:
- .1 ASTM A36/A36M-14, Standard Specification for Carbon Structural Steel.
- .2 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .3 ASTM A193/A193M-17, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Services and Other Special Purpose Applications.
- .4 ASTM F1554-20-17e1, Standard Specification for Anchor Bolts, Steel, 36, 55 and 105-ksi Yield Strength.
- .5 ASTM F3125M-15A, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

.2 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB-85.10-99 (Withdrawn), Protective Coatings for Metals.

.3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA):
- .1 Handbook of the Canadian Institute of Steel Construction.
- .2 CISC Guide for Specifying Architecturally Exposed Structural Steel (AESS) 2012.
- .3 CISC/CPMA Standard 2-75, Quick Drying Primer for use on Structural Steel.
- .4 CISC/CPMA Standard 1-73a, Quick-Drying, One-Coat Paint for Use on Structural Steel.

.4 Canadian Standards Association (CSA International):
- .1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steel.
- .2 CSA-G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA-S16-14, Limit States Design of Steel Structures.
- .4 CSA-S136-16, North American Specifications for the Design of Cold Formed Steel Structural Members.
- .5 CSA W47.1-09 (R2014), Certification of Companies for Fusion Welding of Steel.
- .6 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.
- .7 CSA W55.3-08 (R2013), Certification of Companies for Resistance Welding of Steel and Aluminum.
- .8 CSA W59-18, Welded Steel Construction (Metal Arc Welding).

.5 Master Painters Institute:
- .1 MPI-INT 5.1-08, Structural Steel and Metal Fabrications.
- .2 MPI-EXT 5.1-08, Structural Steel and Metal Fabrications.

.6 The Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE) International:
- .1 NACE No. 3/SSPC-6-06, Commercial Blast Cleaning.

1.2 QUALIFICATIONS

.1 Fabrication and installation of structural steel to be performed only by firm fully approved by Canadian Welding Bureau to requirements of CSA Standard W47.1 (Division 1 or Division 2.1) and/or CSA Standard W55.3.

.2 In addition to those qualifications listed elsewhere in this Section, engage a firm competent in fabricating AESS elements similar to that indicated for this Project. Provided list of previous projects with AESS requirements and client references for review by the Consultant. Where doubt exists as to the qualifications of the proposed AESS fabricator, the Consultant may, at their discretion, order Contractor to arrange for an alternative AESS fabricator at no extra cost or delay to Owner.

.3 In addition to those qualifications listed elsewhere in this Section, engage a competent Erector who has completed comparable AESS work. Provide a list of previous projects with similar AESS requirements and client references for review by Consultant. Where doubt exists as to the qualifications of the proposed AESS erector, the Consultant may, at their discretion, order Contractor to arrange for an alternative AESS fabricator at no extra cost or delay to Owner.

1.3 QUALITY PLAN

.1 Develop and implement a Quality Plan that verifies the structural steel fabrication and installation is in conformance with this Section.

.2 The Quality Plan shall describe, as a minimum, the following plans and procedures:

- .1 Identify the personnel responsible for implementation and oversight of the quality control plan for this section in an organization chart. Describe the roles and responsibilities of each person listed.
- .2 Provide samples of Contractor's quality control inspection forms to be used on the project. The quality control forms shall, as a minimum, include the following:
  - .1 Shop Drawing Review and Sign Off.
  - .2 Structural Steel Inspection Request.
  - .3 Deficiency Sign-Off.
- .3 Quality plan shall include procedural steps for review of shop drawings by the Contractor prior to submission to the Consultant.
- .4 Describe quality control procedural steps related to:
  - .1 Shop and site fabrication.
  - .2 Installation of structural steel.
  - .3 Welding.
  - .4 Metal fabrications, including stairs, handrails, guardrails, and platforms.
  - .5 Metal deck installation.
  - .6 Defective work, including: identification, documentation, submission of proposed repair details, and follow-up inspection.
- .5 Risk Management: List and describe any anticipated project specific risks associated with this section or related sections and outline proposed means of mitigation.

.3 The Quality Plan shall be prepared taking into account the specific requirements of this project. Generic quality plans that, in the Consultant's opinion, fail to address the specific requirements of this project will be returned 'Revise and Resubmit'.

.4 The Quality Plan shall be submitted to the Consultant for review at least 10 business days prior to the scheduled commencement of shop fabrication. Allow five (5) business days for review of Quality Plan by Consultant. Acceptance of the Quality Plan by the Consultant shall be considered a prerequisite for structural steel fabrication. Failure of the Contractor to coordinate the timely submission of a complete Quality Plan, which ultimately results in the delay of the start of structural steel fabrication, shall not be at the risk of the Owner or Consultant for back charge.

.5 It is acceptable for Quality Plan for work of this section to also include quality control procedures for work of related sections.

1.4 INSPECTIONS

.1 Site inspections to ensure conformance with this Section are to be conducted by an inspection company appointed by the Contractor. Shop and site inspections to be performed only by a firm certified by the Canadian Welding Bureau for the requirements of CSA Standard W178 (Qualification of Welding Inspection Organizations) for buildings by visual methods.

.2 Testing company services will be paid for by the Contractor from a cash allowance carried Division 1.

.3 All inspection procedures to be as outlined in CAN/CSA S16.

.4 Site inspections, in general, are to check installation of high strength bolts, field welding procedures, and alignment and plumbness of framing after erection. Site inspections are to occur at the following erection milestones as a minimum:

.1 Structural steel 80% installed

.2 100% installation of all structural steel, metal fabrications, etc.

.5 Supply all necessary cooperation to facilitate site inspections. Provide safe access and working areas for testing on site.

1.5 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit connection design details, erection diagrams, and shop details for each member, hereafter referred to as shop drawings. Structural steel shop drawings shall be reviewed and accepted in accordance with the Contractor’s Quality Plan prior to forwarding on to the Consultant.

.3 Shop drawings to be submitted in the form of reproducible tracing plus one set of white prints. Quantity and format of shop drawings are to be in accordance with Section 01 33 00 – Submittal Procedures. Reproduction of Contract Documents will not be acceptable as shop drawings.

.4 Submit shop drawings in a single, complete set in order that all details may be read in conjunction with plans, elevations and all other dependent details.

.5 All materials, finishes, and loadings shall be clearly illustrated. All submittals shall be made in English with any abbreviations clearly defined.

.6 Where shop drawings are re-submitted, clearly illustrate all revisions from previous submissions using revision marks and "bubbles".

.7 Structural steel shop drawings to be stamped and signed by a qualified Professional Engineer registered in the Province of Ontario in the employ of the steel fabricator to signify that fabricator's responsibilities with respect to detailing and connection design have been completed and reviewed for compliance with Contract Documents.

.8 Clearly show, in plan, all members, bridging, bracing, connections, steel lintels, hangers, etc.

.9 For assemblies, components, and connections designated as AESS, clearly identify the following:

.1 Distinguish between shop and field welds and show size, length, and type of each weld.

.2 Grinding, finish, and profile of welds.

.3 Type and finish of bolts. Indicate which side of the connection bolt heads should be placed.

.4 Orientation of exposed seams in HSS members.

.5 Special tolerances.

.6 Erection requirements.

.10 Drawings to be prepared by fabricator in accordance with A.I.S.C. Structural Steel Detailing Manual.

.11 Do not commence fabrication until complete set of shop drawings has been reviewed by the Consultant. Where fabrication is initiated prior to such review, all subsequently required revisions shall be at no cost to the Owner.

.12 Submit mill test reports prior to fabrication of structural steel. Mill test reports to show chemical and physical properties and other details of steel to be incorporated in project. Mill test reports to be certified by metallurgists qualified to practice in the Province of Ontario.

.13 Provide structural steel fabricator's affidavit stating that materials and products used in fabrication conform to applicable material and products standards specified and indicated.

1.6 EXAMINATION

.1 Prior to fabrication, review all dimensions in conjunction with all Contract Documents. Report any conflicts or uncertainties for clarification.

.2 Prior to erection, examine all site conditions and dimensions which may affect this work. Report any inconsistencies to Consultant for direction.

1.7 COORDINATION OF QUALITY PLAN WITH WORK ON SITE

.1 Ensure field inspection processes are carried out in conformance with the Quality Plan.

.2 Consultant may elect to review the contents of the Quality Plan to assess if the work is proceeding in general conformance with the Contract Documents. The Consultant may also elect to review the work on site and prepare appropriate record of observations for the Owner. Supply all necessary cooperation to facilitate Consultant's review of work on site. Provide safe access and working areas for review and inspection on site.

1.8 COORDINATION

.1 Review all Contract Documents and shop drawings related to all other trades which may affect this work. Report any discrepancies to Consultant for direction.

.2 Cooperate with all other trades to fully coordinate all dimensions, openings, details, etc. which may be required during fabrication or erection.

1.9 SUPPLY AND INSTALLATION OF MISCELLANEOUS ITEMS

.1 Examine Contract Documents and shop drawings of all other trades and provide all items noted by Division 5.

.2 Supply all built-in items such as anchor bolts, bearing plates, steel lintels, etc. unless noted otherwise. Turn over such built-in items to the trade responsible for installation.

1.10 STORAGE AND HANDLING

.1 Store and handle steel members in accordance with the Contractor's Quality Plan to prevent damage which will impair adequacy or appearance of material in finished structure.

.2 All members damaged during shipping, handling or erection shall be repaired to the satisfaction of the Consultant at no cost to the Owner.

.3 Take special precautions when erecting long slender members.

.4 Erect finished AESS pieces using softened slings or other methods such that they are not damaged. Provide padding as required to protect elements while rigging and aligning member's frames. Weld tabs for temporary bracing and safety cabling only at points concealed from view in the completed structure or where approved by the Consultant.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Structural Steel:
- .1 Hot rolled structural sections and bars - Grade 350W to CAN/CSA G40.21 unless indicated otherwise.
- .2 Hollow structural sections - Grade 350W to CAN/CSA G40.21 manufactured to CAN/CSA G40.20, Class 'H' only, unless indicated otherwise.
- .3 Angles and plates – Grade 300W to CAN/CSA G40.2 unless indicated otherwise.

.2 Bolts - high strength to ASTM A325M with suitable nuts and hardened steel washers.

.3 Anchor Bolts - mild steel to ASTM A307 with suitable nuts and hardened steel washers, 20 mm diameter unless indicated otherwise. Provide template for trade responsible for installation.

.4 Drill-in-Anchors:
- .1 Expansion wedge type anchors: sizes as noted, Type 316 stainless steel. Standard of Acceptance: Hilti Kwik Bolt TZ.
- .2 Adhesive anchors: sizes as noted, type 316 stainless steel. Standard of Acceptance: Hilti HAS Rod secured with Hilti Hi HY 200 Adhesive Anchoring System (Safe Set).

.5 Welding Materials - conforming to W48.3 and suitable for use intended.

.6 Paint:
- .1 Shop and touch-up paint to CISC/CPMA 2-75.
- .2 Colour of shop applied primer: grey.

.7 Galvanizing:
- .1 Galvanizing to stricter requirements of ASTM A123/A123M-13 or CAN/CSA-G164 (withdrawn), minimum zinc coating 600 g/m^2.
- .2 Zinc-rich touch-up coating, ready mixed to CAN/CGSB-1.181-99. Standard of Acceptance: Fosroc Galvafroid distributed by W.R. Meadows.

2.2 DESIGN AND FABRICATION

.1 All fabrication to comply with requirements of CAN/CSA S16. All welding to conform to requirements of CSA W59. Use only welders approved by Canadian Welding Bureau for work class being performed.

.2 Fabrication

.1 Fabricate structural steel not designated as AESS, in accordance with CAN/CSA-S16 and in accordance with reviewed shop drawings.

.2 Fabricate structural steel elements, connections, and assemblies designated as AESS in accordance with the requirements of CISC-AESS-Categories specified on drawings and in accordance with reviewed shop drawings and visual samples.

.1 Fabricate and assemble AESS elements, connections, assemblies in the shop to the greatest extent possible. Locate field joints in AESS assemblies at concealed locations or as approved by Consultant.

.2 Fabricate AESS with surface quality consistent with the applicable CISC-AESS Category requirements and accepted visual samples.

.3 Appearance and quality of welds in AESS elements shall be consistent with applicable CISC-AESS-Category requirements and accepted visual samples. Assemble and weld built-up sections by methods that will maintain alignment of members to the required tolerances.

.4 Provide bolt type and finish specified. Place bolt heads as indicated on the approved shop drawings.

.3 Substitutions of member sizes will be permitted only if equivalent stiffness and load carrying capacity are provided and no interference with other details will result. Substitutions, including all necessary modifications to the work of this Section and all other trades, to be at no cost to the Owner.

.4 Where design reactions are not indicated, design and detail all connections to resist a total shear based on tributary floor, roof and wall loads noted and considering any concentrated loading which occurs on members. As a minimum, connections shall be capable of supporting one-half the allowable uniformly distributed load for the member and span considered.

.5 In general, framed connections with double angles, end connection plates or seated connections with top or side clip angles are acceptable. The Consultant may require the use of a specific connection type at their discretion, if considered necessary to ensure structural action assumed in design.

.6 Design all splices to develop full capacity of member unless noted otherwise.

.7 Detail and reinforce all slots, holes and openings in members so as to avoid overstressing. Construct re-entrant corners free from notches and with largest practical radii, with a minimum radius of 13 mm.

.8 Grind smooth or detail all butt welds, connections and splices in members, which will be exposed when construction is complete, so as to be as unobtrusive as possible. Appearance, location and details of exposed splices and connections to be to the Consultant's approval.

.9 Unless sizes are indicated, design beam bearing plates in accordance with method presented in C.I.S.C. Handbook. Limit bearing stresses to 2 MPa maximum on solid plain masonry and 8 MPa maximum on concrete.

.10 Unless detailed otherwise, beams up to 300 mm deep to bear 200 mm onto walls, and beams over 300 mm deep to bear 400 mm onto walls. Where wall thickness limits length of bearing available, bear beams on full wall thickness.

.11 Where indicated and where steel beams or columns interrupt reinforced bond beams, field weld dowels to the steel member to match those in bond beam and of length sufficient to lap 36 bar diameters.

.12 Stitch weld double angle members back to back to limit the slenderness ratio of each angle to less than that of the whole member.

.13 Unless indicated otherwise, where non load bearing masonry walls extend up to and parallel to underside of steel beams, install pairs of 76 x 76 x 6.4 mm clip angles 150 mm minimum length at 1200 mm centres or as otherwise detailed to provide lateral support for walls. If wall is parallel to but offset from steel members, install sections of 76 x 76 x 6.4 mm angle between primary framing members (i.e. joists or beams) at 1200 mm centres to receive lateral support clip angles. If wall is perpendicular to joists or beams, install clip angles on bottom chord or flange of each primary framing member crossing wall.

.14 For attachment of wood framing or blocking, provide 18 mm diameter drilled holes for 16 mm bolts unless noted. Space at 400 mm centres and stagger each side of flange or chord.

.15 Unless indicated otherwise, column anchor bolts to be 20 mm diameter with minimum 300 mm embedment with headed stud or hardened steel nut and washer welded to end. “J” bolt type anchor bolts will not be permitted.

2.3 PREPARATION AND CORROSION PROTECTION

.1 Clean structural steel to the requirements of SSPC - SP3 as a minimum.

.2 Apply one shop coat of primer paint except as follows:

.1 Do not paint surfaces and edges to be field welded. If painted, remove paint for field welding for a distance of at least 50 mm on all sides of joint.

.2 Do not paint members of portions thereof which will be encased in, or in direct contact with, cast-in-place concrete.

.3 Blast clean all steel members (including angle lintels, shelf angles, anchor plates and bolts, mechanical rooftop framing, etc.) which will be exposed to weather or a corrosive environment in finished structure, to requirements of SSPC - SP6. Galvanize to stricter requirements of ASTM A 123/A 123M-13 or CAN/CSA-G164 (withdrawn).

.4 Where members will be exposed to view in completed structure, carefully clean and paint so as to be free of imperfections which will mar finished painted surface.

.5 After erection, touch-up all field bolts, field welds and all damaged or missing shop paint with one touch-up coat of paint.

2.4 BEARING PLATES

.1 Provide bearing plates for all beams bearing on masonry or concrete. Minimum size 200 mm long x 10 mm thick x width of member plus 25 mm. Supply loose for building in by trade responsible for constructing wall.

PART 3 - EXECUTION

3.1 ERECTION

.1 Erection of all structural steel members to conform to requirements of CAN/CSA S16.

.2 Make adequate provision for erection stresses and install adequate temporary bracing to withstand all loads to which structure may be subject during erection and subsequent construction, including loads due to wind, equipment and operation of same. Leave temporary bracing in place as long as necessary for safety or until walls and/or permanent bracing upon which frame depends for lateral stability and all connections thereto, are completed.

.3 Supply beam and column anchor bolts for installation by trade constructing bearing surface. Prior to erection, check location and elevation of all anchor bolts and advise the Consultant Engineer of any discrepancies. Any corrective measures necessary to be approved by the Consultant.

.4 Support column bases at minimum 4 points by leveling nuts or steel shims so as to provide a minimum 40 mm grout space below base plates.

.5 Fabricate connections to comply with requirements of CAN/CSAS16-01. Field connections may be accomplished by welding or with high strength bolts. Bolted connections shall be pretensioned as per the requirements of CAN/CSA S16-01. Perform field welding carefully so as not to cause any damage to joists, structural steel, bridging or deck.

.6 Do not weld across beam flanges.

END OF SECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

.1 Provide components made of steel unless otherwise indicated.

.2 Provide the following components as required and / or where indicated:
- .1 Angle lintels over all masonry openings unless otherwise indicated.
- .2 Pipe railings.
- .3 Corner guards.
- .4 Exterior access ladders.
- .5 Trench covers and frames.
- .6 Interior Access covers.
- .7 Miscellaneous channel frames.
- .8 Under counter support brackets.
- .9 Masonry lateral support brackets.
- .10 Other metal fabrications shown and not specifically covered in other Sections.

.3 The above list is intended as a guide only and not to be considered as a complete list of all items to be provided. Examine drawings thoroughly to determine items and quantities required. The above list of items will not override items and quantities identified on Contract Drawings.

.4 The Contractor is to coordinate the correct installation of any fabricated items including obtaining suitable templates and guides required for a top-quality installation. Items to be fabricated and supplied to the site for installation in a timely manner which does not impact schedules or quality of workmanship of the associated trades.

.5 All exterior metal fabrications exposed to weather to be hot-dip galvanized, unless noted otherwise.

1.2 REFERENCES

.1 ASTM International:
- .1 ASTM A 36/A 36M-14, Standard Specification for Carbon Structural Steel.
- .2 ASTM A 53/A 53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .3 ASTM A 123/A 123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .4 ASTM A269/A269M-15a, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- .5 ASTM A 307-14e1, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .6 ASTM F3125M-15A, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

.2 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB-85.10-99 (Withdrawn), Protective Coatings for Metals.

.3 Canadian Institute of Steel Construction (CISC)/ Canadian Paint Manufacturer's Association (CPMA):
- .1 Handbook of the Canadian Institute of Steel Construction.
- .2 CISC Guide for Specifying Architecturally Exposed Structural Steel (AESS) (2012).
- .3 CISC/CPMA Standard 2-75, Quick Drying Primer for Use on Structural Steel.
- .4 CISC/CPMA Standard 1-73a, Quick Drying, One-Coat Paint for Use on Structural Steel.

.4 Canadian Standards Association (CSA International):
- .1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA G164-M92 (Withdrawn), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA S16-14, Design of Steel Structures.
- .4 CSA-S136-16, North American Specifications for the Design of Cold Formed Steel Structural Members.
- .5 CSA-S157-17, Strength Design in Aluminum.
- .6 CSA W47.1-09 (R2014), Certification of Companies for Fusion Welding of Steel.
- .7 CSA W47.2-11 (R2015), Certification of Companies for Fusion Welding of Aluminum.
- .8 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
- .9 CSA W59-18, Welded Steel Construction (Metal Arc Welding) Metric.

.5 Environmental Choice Program:
- .1 CCD-047-98(R2005), Architectural Surface Coatings.
- .2 CCD-048-98(R2006), Surface Coatings - Recycled Water-borne.

.6 Health Canada / Workplace Hazardous Materials Information System (WHMIS):
- .1 Material Safety Data Sheets (MSDS).

.7 The Master Painters Institute (MPI):
- .1 Architectural Painting Specification Manual - current edition.

1.3 QUALIFICATIONS

.1 Metal fabrication to be performed only by firm fully approved by Canadian Welding Bureau to requirements of CSA Standard W47.1 (Division 1 or Division 2.1) and/or CSA Standard W55.3.

1.4 DESIGN REQUIREMENTS

.1 Steel design to CSA-S16, Limit States Design of Steel Structures.

.2 Aluminum design to CSA-S157, Strength Design in Aluminum.

.3 Design ladders to the requirements of the Ontario Ministry of Labour Regulations and the Engineering Data Sheet 2-04 as a minimum standard.

.4 Design of Metal Fabrications to be completed by Professional Engineer registered or licensed in the Province of Ontario, Canada who is qualified and experienced in the design work being performed.

1.5 QUALITY PLAN

.1 Develop and implement a Quality Plan that verifies the metal fabrication and installation is in conformance with this Section.

.2 Submit details of Quality Plan to Consultant for review. It is acceptable for the Quality Plan for work of this section to be incorporated into the Quality Plan included in Section 05 12 23 – Structural Steel.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:

- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada in the employ of the steel fabricator to signify the fabricator's responsibilities with respect to detailing and connection design have been completed and reviewed for compliance with the Contract Documents.
- .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
- .3 For all aluminum fabrications, clearly indicated base metal yield strength (Fy) and reduced yield strength (Fwy) at welded heat affected zone.
- .4 Provide details to illustrate bracing and bridging systems, column and beam splices, bearing and base plates, connections and any other standard items or details required.
- .5 Metal fabrication shop drawings shall be reviewed and accepted in accordance with the Contractor's Quality Plan prior to forwarding on to the Consultant.
- .6 Do not commence fabrication until complete set of shop drawings has been reviewed and accepted by the Consultant. Where fabrication is initiated prior to such review, all subsequently required revisions shall be at no cost to the Owner.

.3 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.7 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate prior to commencing with Work of this section.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed Consultant.

1.8 COORDINATION OF QUALITY PLAN WITH FABRICATION

.1 Ensure shop fabrication is carried out in conformance with the Quality Plan.

1.9 COORDINATION OF QUALITY PLAN WITH WORK ON SITE

.1 Ensure field installation processes are carried out in conformance with the Quality Plan.

.2 Consultant may elect to review the contents of the Quality Plan to assess if the work is proceeding in general conformance with the Contract Documents. The Consultant may also elect to review and inspect the work on site and prepare appropriate record of observations for the Owner. Supply all necessary cooperation to facilitate Consultant's review of work on site. Provide safe access and working areas for review and inspection of work on site.

1.10 GENERAL COORDINATION

.1 Review all Contract Documents and shop drawings related to all other trades that may affect this work. Report any discrepancies to the Consultant for review.

.2 Cooperate with all other trades to fully coordinate all dimensions, openings, details, etc. which may be required during fabrication or installation.

.3 Supply all built-in items such as anchor bolt, bearing plates, steel lintels, etc. unless noted otherwise. Turn over such built-in items to the trade responsible for installation.

1.11 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 All metals to be new materials free from corrosion or other defects impairing strength, durability or finished appearance, in all respects to uses required and subject to review of Consultant. Furnish samples for review as required. All materials to be of best commercial quality for purposes specified.

.2 Hot rolled structural sections and bars: CAN/CSA-G40.21, Grade 350W.

.3 Hollow structural sections (HSS): CAN/CSA-G40.21, Grade 350W, Class 'H' only, unless indicated otherwise.

.4 Angles and plates: CAN/CSA-G40.2, Grade 300W, unless indicated otherwise.

.5 Steel pipe: to ASTM A 53/A 53M.

.6 Welding materials: to CSA W59.

.7 Welding electrodes: to CSA W48 Series.

.8 Bolts and anchor bolts: to ASTM A 307.

.9 Aluminum sections and plates to be aluminum alloy 6061-T6 to B209-65 and B308-65 (CSA Alloy GS11N-T6). Structural sections to be 6351-T6 alloy.

.10 Stainless steel tubing: to ASTM A 269, Type 302 commercial grade seamless welded with AISI No. 4 finish.

.11 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.
- .1 Acceptable materials: 'Por-Rock', by Hallemite Products Ltd. or 'SET 15 Minute Anchoring Cement' by SET Products Ltd.

.12 Sheet steel: hot dip galvanized, cold rolled, with stretcher level degree of flatness to ASTM A653/A653M; zinc coating designation Z275.

.13 Shop primer for interior components: CAN/CGSB-1.40.

.14 Zinc rich paint:
- .1 Shop primer for exterior components to be painted: Inorganic zinc rich paint.
- .2 Touch-up: CAN/CGSB-1.181.
  - .1 Acceptable materials: 'Inorganic Coating 'No.2000.302', by Glidden, or equivalent product approved by Consultant.

.15 Bituminous enamel: alkali resistant asphaltic coating.

2.2 FINISHES

.1 Thoroughly clean steel of loose scale, rust, oil, dirt and other foreign matter. Suitably prepare steel surfaces by power tool cleaning to receive specified finishes.

.2 Grind smooth sharp projections.

.3 Remove oil and grease by solvent cleaning.

.4 Apply coatings in the shop and before assembly. Where size permits, galvanize components after assembly.

.5 Interior components: shop apply coat of primer to interior components after fabrication except where stainless steel, galvanized or zinc rich paint finish is required.

.6 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.

.7 Exterior components to be painted, except where other finish is indicated: blast clean metal to "Near White Grade" (SSPC-SP-10) and spray apply a coat of zinc rich paint, maximum 3 mm / $^{1}/_{8}$" thick.

.8 Hot dip galvanize all exterior components not scheduled to be painted, components located within exterior building elements, and where indicated, interior components after fabrication in accord with the stricter requirements of ASTM A123/ A123 M and CAN/CSA-G164-(withdrawn), minimum coating weight 600 g/m^2.

.9 Apply coat of bituminous enamel to contact surfaces of metal components in contact with cementitious materials and dissimilar metals.

.10 Stainless steel: AISI No. 4 finish.

.11 Shop coat primer: to CAN/CGSB 1.40 and in accordance with Section 09 91 23 - Interior Painting and Section 09 91 13 - Exterior Painting.

.12 Zinc primer: zinc rich, ready mix to CAN/CGSB 1.181 and in accordance with Section 09 91 23 - Interior Painting and Section 09 91 13 - Exterior Painting.

2.3 ISOLATION COATING

.1 Isolate aluminum from following components, by means of bituminous paint:
- .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
- .2 Concrete, mortar and masonry.
- .3 Wood.

2.4 ANGLE LINTELS

.1 Refer to Structural drawings for sizes and locations of steel angle lintels.

.2 Steel angles: exterior and wet areas galvanized, interior dry areas prime painted, sizes indicated for openings. Provide 200 mm minimum bearing at ends.

.3 Weld or bolt back-to-back angles to profiles as indicated.

2.5 PIPE RAILINGS

.1 Unless indicated otherwise, steel pipe: 38 mm / 1½" nominal outside diameter, formed to shapes and sizes as indicated.

.2 Galvanize pipe railings after fabrication. Shop coat prime interior railings after fabrication.

2.6 EXTERIOR ACCESS LADDER

.1 Construct roof access ladder as follows:
- .1 42 mm O.D. x 3 mm thick stringers, length as required.
- .2 25 mm diameter knurled solid steel rungs, minimum 600 mm wide, spaced at 300 mm o.c. vertically, welded to stringers.
- .3 Attach stringers to block walls with bent steel brackets. Size stringer and brackets as sized and detailed by fabricator for intended use. Pre-drill holes for bolt fastening to stringers and anchorage to wall.

.4 When fastening to parapet, coordinate metal stud location in parapet to fasten brackets to metal stud as required. Coordinate fastening locations with aluminum composite panels as required

.5 Fasten brackets to existing beam framing using stainless steel anchors as required.

.6 Provide galvanized steel grating landing minimum 150 mm above parapet.

.7 Steel Safety Cage: where height ladder exceeds 3m in height, provide safe cage beginning at 2.2m above grade, 50 mm x 10 mm 2" x $^{3}/_{8}$" thick flat horizontal and vertical bars as detailed.

.8 Hot dipped galvanized finish.

2.7 TRENCH COVERS AND FRAMES

.1 Unless indicated otherwise, steel fabricate from 6 mm / ¼" thick raised pattern plate set in L 55 x 55 x 6 frame. Include anchors at 1200 mm / 4'-0" on centre for embedding in concrete. Supply trench covers in 1200 mm / 4'-0" removable lengths.

.2 Finish: Galvanized finish for exterior, prime paint for interior.

2.8 SUMP INTERIOR ACCESS COVERS

.1 Interior access cover subject to approval of Consultant. Standard of acceptance: Type T Floor Access Door by The BILCO Company, or approved equal.

.2 Furnish and install where indicated on plans access door Type T, size as indicated on drawings. The floor access door shall be single leaf and pre-assembled from the manufacturer.

.3 Cover to support a minimum live load of 4.8kPa with a maximum deflection of 3mm.

.4 Cover: Shall be 6mm aluminum smooth pattern plate with extruded aluminum molding fastened to the cover to receive floor covering

.5 Frame shall be extruded aluminum with strap anchors bolted to the exterior.

.6 Hinges shall be specifically designed for horizontal and shall be bolted to the underside of cover.

.7 Lifting mechanisms: Cam-action hinges shall pivot on torsion bars to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and to act as a check in retarding downward motion of the cover when closing.

.8 A removable exterior turn/lift handle with a spring loaded ball detent shall be provided to open the cover.

.9 Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.

2.9 STEEL GRATINGS

.1 Steel gratings – Armco Irving X-bar rectangular pressure locked, with 25 x 3 mm bearings bars at 30 mm centres and cross bars at 100 mm centres, hot-dip galvanized after fabrication, designed to support a uniform load of 9.6 kPa with a maximum deflection not exceeding 1/200 of the span.

.2 All panels to be banded. Clearance at sides not to exceed 3 mm.

.3 Continuous gratings to be arranged in panels of approximately 2000 mm lengths, except over slide gates, where 300 mm sections are to be used.

.4 When panels are laid side by side, ensure that carrier of spacer bars line up to preserve a continuous appearance. Clips are required to prevent movement when subjected to moving loads.

.5 Gratings to be supported on framing angles and supporting members set into or bolted to concrete as indicated. Framing angles and supports to be hot dip galvanized steel.

2.10 CHANNEL FRAMES

.1 Fabricate frames from steel, sizes of channel and opening as indicated.

.2 Weld channels together to form continuous frame for jambs and head of openings, sizes as indicated.

.3 Weld strap anchors to channel jamb frame at spacing as required by shop drawing engineer.

.4 Finish: Galvanized finish for exterior, prime paint for interior.

2.11 UNDER COUNTER SUPPORT BRACKETS

.1 Unless indicated otherwise, fabricate under counter brackets from 50 mm x 10 mm thick steel flat bar.

.2 Weld flat bar together to form continuous support bracket for counter tops as indicated. Space brackets for 914 mm / 3’-0” maximum spacing for counter support.

.3 Pre-drill holes for fastening of counter top as required by Section 06 40 00 – Architectural Woodwork.

.4 Shop prime steel under counter support brackets in accordance with Section – 09 91 23 Interior Painting.

2.12 MASONRY LATERAL SUPPORT BRACKETS

.1 Fabricate masonry lateral support brackets in sizes, shapes and quantities required to meet requirements of OBC and CSA-A30-94.

.2 Provide channel or angle brackets to support tops of non-loadbearing masonry partitions.

.3 Provide support brackets complete with all anchors and fasteners.

.4 Shop prime steel under exposed masonry support brackets and cages in accordance with Section 09 91 23 Interior Painting.

2.13 SLEEVES

.1 Provide Schedule 40 steel pipe sleeves for pipes passing through walls. Where walls are water retaining, sleeves to be complete with 6.5 x 75 mm water bars. Sleeves to be unpainted in order to obtain improved bond to concrete.

PART 3 - EXECUTION

3.1 FABRICATION

.1 Fabricate components in the shop in largest size practicable to minimize field jointing.

.2 Fabricate components square, straight, true, fee from warpage and other defects. Accurately cut, machine file and fit joints, corners, copes and mitres.

.3 Reinforce fabricated components to safely withstand expected loads.

.4 Make joints in built-up sections with hairline joints in least conspicuous locations and manner.

.5 Make allowance for thermal expansion and contraction when fabricating exterior Work.

.6 Joints shall be welded unless otherwise indicated and unless details of construction do not permit welding. Exposed welds shall be continuous and ground smooth.

.7 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.

.8 Close exposed open ends of tubular members with welded on steel plugs.

.9 Where Work of other Sections is to be attached to Work of this section, prepare Work by drilling and tapping holes, as required to facilitate installation of such other Work.

.10 Work of this Section, supplied for installation under other Sections, shall be prepared as required ready for installation by: drilling, countersinking and tapping holes, forming shapes and cutting to required sizes.

.11 Grind off mill stampings and fill recessed markings on steel components left exposed to view.

.12 Follow recommendations of AISI Committee of Stainless Steel Producers when fabricating, joining, welding, and finishing stainless steel components. Remove heat discolouration with mechanical, chemical or electrochemical means. Provide temporary protective coverings for all stainless steel components.

.13 All aluminum fabrication to be by shop welding in an inert gas atmosphere in accordance with CSA Standards S157 and W47.2. Field joining by brazing not permitted.

.14 Where possible, fit and shop assemble work, ready for erection.

3.2 ERECTION

.1 Perform welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles as follows, unless otherwise indicated:

.1 To concrete and solid masonry with expansion type anchor bolts.

.2 To hollow construction with toggle bolts.

.3 To sheet metal with screws or bolts.
.4 To structural steel or plates with bolts or by welding.
.5 To wood with bolts or lag screws.
.6 Fill space between railing members and sleeves with non-shrink grout.

.4 Provide all components required for anchoring. Make anchoring in concealed manner wherever possible. Make exposed fastenings, where approved by Consultant, neatly and of the same material, colour, texture and finish as base metal on which they occur. Keep exposed fastenings evenly spaced.

.5 Chemical anchor system to be Hilti HIT-HY 200 adhesive anchoring system (safe set), unless noted otherwise.

.6 Supply components for work by other trades in accordance with shop drawings and schedule.

.7 Make field connections with bolts to CSA S16 or Weld field connection as detailed on the erection drawings.

.8 Thread dimensions of galvanized or other plated materials to be such that nuts will thread over bolts, without rethreading or chasing.

.9 All fastenings to be selected to avoid galvanic action between dissimilar metals.

.10 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.

.11 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion.

.12 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning:
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American National Standards Institute/National Particleboard Association (ANSI/NPA)

.1 ANSI/NPA A208.1-2009, Particleboard.

.2 ASTM International

.1 ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A 653/A 653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

.3 ASTM C 578-15, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

.4 ASTM C 1289-15, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

.5 ASTM C1396/C1396M-11, Standard Specification for Gypsum Board.

.6 ASTM F1482-14a, Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring.

.7 ASTM D 1761-12, Standard Test Methods for Mechanical Fasteners in Wood.

.8 ASTM D5055-13e1, Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.

.9 ASTM D5456-14b, Standard Specification for Evaluation of Structural Composite Lumber Products.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-11.3-M87, Hardboard.

.2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.

.3 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction and amendment.

.4 CAN/CGSB-71.26-M88, Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.

.4 CSA International

.1 CAN/CSA-A123.2-03 (R2014), Asphalt Coated Roofing Sheets.

.2 CAN/CSA-A247-M86 (R1996), Insulating Fiberboard.

.3 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.

.4 CSA O112.9-10 (R2014), Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).

.5 CSA O121-08 (R2013), Douglas Fir Plywood.

.6 CAN/CSA O122-06 (R2011), Structural Glued-Laminated Timber.

.7 CSA O141-05 (R2014), Softwood Lumber.

.8 CSA O151-09 (R2014), Canadian Softwood Plywood.

.9 CSA O153-13, Poplar Plywood.

.10 CSA O325-07 (R2012), Construction Sheathing.

.11 CSA O437 Series-93 (R2011, Standards on OSB and Waferboard).

.12 CSA-Z809-08, Sustainable Forest Management.

.5 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber 2010.

.6 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S706-09, Standard for Wood Fibre Insulating Boards for Buildings.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

1.3 QUALITY ASSURANCE

.1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 All lumber shall be sound, straight, dressed all sides and kiln dried, and moisture content at any time during shipment and storage shall not exceed 19%.

.3 Grading: 120, National Grading Rule for Dimension Lumber.

.4 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wood from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 FRAMING STRUCTURAL AND PANEL MATERIALS

.1 Lumber: softwood, S**4**S, moisture content 19% (S-dry) or less in accordance with standards:

.1 CSA O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:

.1 S2S in accordance with the following standards:

.1 CSA O141.

.2 NLGA Standard Grading Rules for Canadian Lumber, 1987 edition.

.2 Board sizes: "Standard" or better grade.

.3 Dimension sizes: "Standard" light framing or better grade.

.3 Plywood, OSB and wood based composite panels: to CSA O325.

.4 Interior mat-formed wood particleboard: to ANSI/NPA 208.1.

.5 Gypsum sheathing: refer to Section 09 21 16 – Gypsum Board Assemblies, 09 21 99 – Partitions.

2.2 ACCESSORIES

.1 Air Barrier: Refer to Section 07 27 00 Air Barrier.

.2 Air-Vapour Barrier: Refer to Section 07 28 00 Air Barrier.

.3 Vapour Retarders: Refer to Section 07 26 00 Air Barrier.

.4 Polyethylene film: to CAN/CGSB-51.34, Type 1, 6 mil thick.

.5 Sealants: in accordance with Section 07 92 00 – Joint Sealants.

.6 General purpose adhesive: to CSA O112.9.

.7 Nails, spikes and staples: to CSA B111.

.8 Bolts: 12.5 mm/1/2" diameter unless indicated otherwise, complete with nuts and washers.

.9 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

.10 Fastener Finishes:

.1 Galvanizing: to ASTM A 123/A 123M ASTM A 653, use galvanized fasteners for exterior work and interior highly humid areas, pressure-preservative, fire-retardant treated lumber.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate prior to commencing with Work of this section.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 PREPARATION

.1 Treat surfaces of material with wood preservative where indicated.

.2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and one minute soak on plywood.

.3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

.4 Confirm compatibility of treated surfaces with adjacent materials. Notify Consultant of unacceptable conditions immediately upon discovery. Proceed with treatment only after approval of adjacent materials are deemed acceptable. Treat material as follows:

- .1 Wood cants, fascia backing, curbs, nailers, sleepers on roof deck.
- .2 Wood furring for wood products on outside surface of exterior masonry and concrete walls.
- .3 Wood cants, fascia backing, curbs, nailers, sleepers on roof deck.
- .4 Wood furring strapping on outside surface of exterior masonry and concrete walls.
- .5 Wood sleepers supporting wood subflooring over concrete slabs in contact with ground or fill.

3.3 PRESSURE TREATED COMPONENTS

.1 Use preservative pressure treated lumber and plywood within exterior wall and roof systems.

.2 Where it is necessary to cut, bore or otherwise alter pressure treated components in the field, treat cut surfaces with heavy coat of wood preservative in accordance manufacturer's written recommendations.

.3 Use fire retardant pressure treated plywood at backboards and where plywood is installed on steel stud framed wall, behind gypsum board and parapets extend beyond 600 mm/2'-0".

3.4 MATERIAL USAGE

.1 Exterior Wall Sheathing:

- .1 Pressure treated plywood, DFP or CSP sheathing grade, T&G, thickness as indicated.
- .2 Glass fibre sheathing, thickness as indicated.

.2 All concealed locations except backboards: DFP or CSP, C grade, square edge, thickness as indicated.

.3 Electrical equipment mounting boards:

- .1 Plywood, DFP or CSP, G1S, A grade, square edge 3/4" thick.

.4 .4 Refer also to Section 09 21 16 – Gypsum Board Assemblies.

3.5 INSTALLATION

.1 Install members true to line, levels and elevations, square and plumb.

.2 Construct continuous members from pieces of longest practical length.

.3 Install spanning members with "crown-edge" up.

.4 Select exposed framing for appearance. Install lumber and panel materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.

.5 Install exterior wall sheathing in accordance with manufacturer's printed instructions.

.1 Substrates to receive air/vapour must be sound and free of sharp protrusions, gaps, and voids exceeding 6mm/1/4" in width. Remove contaminants such as grease, oil and wax from exposed surfaces. Use repair materials and methods acceptable to air/vapour barrier membrane manufacturer.

.6 Install exterior roof sheathing in accordance with requirements of the OBC and roofing manufacturers recommended installation.

.7 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding, electrical equipment mounting boards, and other work as required.

.8 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.9 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.

.10 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

.11 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.12 Countersink bolts where necessary to provide clearance for other work.

.13 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by rough carpentry installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American National Standards Institute (ANSI)
- .1 ANSI A208.1-09, Particleboard.
- .2 ANSI A208.2-09, Medium Density Fiberboard (MDF) for Interior Applications.
- .3 ANSI/HPVA HP-1-2009, Standard for Hardwood and Decorative Plywood.

.2 ASTM International
- .1 ASTM E 1333-14, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates From Wood Products Using a Large Chamber.
- .2 ASTM D 2832-92(R2011), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
- .3 ASTM D 5116-10, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.

.3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
- .1 Architectural Woodwork Quality Standards Illustrated, Edition Two, 2014.

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.
- .2 CAN/CGSB 11.3-M87, Hardboard.

.5 CSA International
- .1 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
- .2 CSA O112.10-08(R2014), Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).
- .3 CSA O121-08(R2014), Douglas Fir Plywood.
- .4 CSA O141-05(R2014), Softwood Lumber.
- .5 CSA O151-09(R2014), Canadian Softwood Plywood.
- .6 CSA O153-13), Poplar Plywood.
- .7 CSA-Z809-08, Sustainable Forest Management.
- .8 CSA Z760-94-(R2001), Life Cycle Assessment.

.6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.7 International Organization for Standardization (ISO)
- .1 CAN/CSA-ISO 14040-06(R2011), Environmental Management-Life Cycle Assessment - Principles and Framework.
- .2 CAN/CSA-ISO 14041-98(R2003), Environmental Management-Life Cycle Assessment - Goal and Scope Definition and Inventory Analysis.

.8 National Electrical Manufacturers Association (NEMA)
- .1 ANSI/NEMA LD-3-05, High-Pressure Decorative Laminates (HPDL).

.9 National Hardwood Lumber Association (NHLA)
  .1 Rules for the Measurement and Inspection of Hardwood and Cypress 2011.

.10 National Lumber Grades Authority (NLGA)
  .1 Standard Grading Rules for Canadian Lumber 2010.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
  .1 Submit manufacturer's instructions, printed product literature and data sheets for architectural woodwork and include product characteristics, performance criteria, physical size, finish and limitations.
  .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29 Health and Safety Requirements 01 35 43 – Environmental Procedures.

.3 Shop Drawings:
  .1 Submit shop drawings. Indicate details of construction, profiles, jointing, fastening and other related details.
    .1 Scales: profiles full size, and details half full size as required, to Consultant approval, to clearly define the Work.
  .2 Indicate materials, thicknesses, finishes and hardware.
  .3 Indicate locations of service outlets in casework, typical and special installation conditions, and connections, attachments, anchorage and location of exposed fastenings.

.4 Samples:
  .1 Submit for review and acceptance of each unit.
  .2 Samples may be returned for inclusion into work.
  .3 Submit duplicate samples of hardwood, plywood, and particleboard: sample size 12” x 12” or 12” long unless otherwise specified or requested by Consultant.
  .4 Submit duplicate samples of laminated plastic for colour selection.
  .5 Submit duplicate samples of laminated plastic joints, edging, cutouts and postformed profiles.

.5 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.3 QUALITY ASSURANCE

.1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood, particleboard, OSB and wood based composite panels to CSA and ANSI standards.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
  .1 Protect millwork against dampness and damage during and after delivery.
  .2 Store millwork in ventilated areas, protected from extreme changes of temperature or humidity.

.3 Storage and Handling Requirements:
  .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  .2 Store and protect architectural woodwork from nicks, scratches, and blemishes.
  .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Softwood lumber: unless specified otherwise, S4S, moisture content 15 % or less in accordance with following standards:
  .1 CSA O141.
  .2 CAN/CSA-Z809 or FSC or SFI certified.
  .3 NLGA Standard Grading Rules for Canadian Lumber.
  .4 AWMAC premium grade, moisture content as specified.

.2 Machine stress-rated lumber is acceptable for all purposes.

.3 Ensure manufacturing process adheres to Lifecycle Assessment (LCA) Standards to ISO 14040/14041 LCA Standards, CSA Z760-94 Life Cycle Assessment.

.4 Hardwood lumber: moisture content 5-9% % or less in accordance with following standards:
  .1 National Hardwood Lumber Association (NHLA).
  .2 CAN/CSA-Z809 or FSC or SFI certified.
  .3 AWMAC premium grade, moisture content as specified.
  .4 Wood trim/cap shall be solid maple, sizes as indicated.
  .5 All edge returns shall be solid maple, sizes and locations as indicated.
  .6 Handrails to be solid oak in size and locations as indicated.

.5 Douglas fir plywood (DFP): to CSA O121, standard construction, CAN/CSA-Z809.

.6 Canadian softwood plywood (CSP): to CSA O151, standard construction, CAN/CSA-Z809.

.7 Hardwood plywood: to ANSI/HPVA HP-1, CAN/CSA-Z809.

.8 Poplar plywood (PP): to CSA O153, standard construction, CAN/CSA-Z809.

.9 Interior mat-formed wood particleboard: to ANSI/NPA A208.1, CAN/CSA-Z809.

.10 Birch plywood: to AWMAC Paint Grade , CAN/CSA-Z809MDF (medium density fibreboard) core: to ANSI A208.2, thickness as indicated, density 769 kg/m².

.11 Wood Veneer – architectural custom grade, flat cut, plain sliced, book matched maple
  .1 Top coated with post-catalyzed lacquer finish by Chemcraft.
  .2 10% Sheen
  .3 Stain to match sample supplied by consultant, up to three (3) colours.

.12 Laminated plastic for flatwork: Refer to 06 47 00 – Plastic Laminate Finishing.

.13 Laminated plastic for postforming work: Refer to 06 47 00 – Plastic Laminate Finishing.

.14 Laminated plastic backing sheet: Refer to 06 47 00 – Plastic Laminate Finishing.

.15 Laminated plastic liner sheet: Refer to 06 47 00 – Plastic Laminate Finishing.

.16 Melamine Component Panels (MCP):
  .1 Melamine resin impregnated paper, to ANSI A208.1/ASTM E1333, grade M3, density 630-700 Kg/m³, thermal-fused to particleboard core with matching edge binding, sanded, thickness as indicated.
  .2 Colour (exposed to view including open shelving): From MCP manufacturer's complete colour range, not more than eight (8) colours for entire project. Colours will be solid colours. Cabinet backing to be the same colour as casework.
  .3 Colour (cabinet interiors): to match exterior unless otherwise noted.
  .4 Manufacturer: Uniboard Canada, or Panolam, or Flakeboard, or approved alternate.

.17 Edge Banding:
  .1 Matching 3 mm 1/8” thick PVC edging, colour as later selected by Consultant from complete colour range.
  .2 Provide 10 mm / 1/8” thick solid matching wood strip on exposed face of plywood particleboard edges 12 mm / 1/2" or thicker.wood to match veneer finish. Strip width to match plywood or particleboard.
  .3 Edges dadoed or saw kerfed to take plastic "T" moulding in width and colour to match melamine finish.
  .4 Edge filler to provide a smooth surface for paint finish.

.18 Cabinet hardware: Refer to Section 08 70 05 Cabinet and Miscellaneous Hardware.

.19 Tackboard Material (TB): 6 mm / ¼" thick, manufactured coloured cork laminated to 6 mm / ¼" particleboard, colour as later selected by Consultant from manufacturer’s complete colour range.
  .1 Acceptable material: Krommenie / Forbo ‘Bulletin Board’ or approved alternate.
  .2 Refer to drawings and schedule for locations.

.20 Whiteboard (WB): Refer to Section 08 80 50 – Glazing.

.21 Nails and staples: to CSA B111.

.22 Wood screws: stainless steel, type and size to suit application.

.23 Splines: wood.

.24 Sealant: Refer to Section 07 92 00 – Joint Sealing.
  .1 Manufactured MCP Units:
    .1 Fabricate manufactured MCP units from Melamine Component Panels (MCP), unless otherwise noted.

.25 Counters Without Cabinets:
- .1 Countertops, nosing and under nosings: plastic laminate on 19 mm / ¾" plywood (DFP), unless otherwise noted.
- .2 Intermediate supports, locations as indicated but not more than 914 mm / 3'-0" o/c: MCP brackets as detailed, unless otherwise noted.
- .3 Wall support cleats: MCP, unless otherwise noted.
- .4 End gables: where indicated, MCP, unless otherwise indicated.
- .5 Grommets: Locations as indicated.

.26 Lower Cabinet Units:
- .1 Countertops, nosing and under nosing, backsplash and sidesplash: plastic laminate on 19 mm / ¾" plywood (DFP), unless otherwise noted.
- .2 Case body, backs, shelving unit inserts, doors and gables: plastic laminate on 19 mm / ¾" plywood (DFP),, unless otherwise noted.
- .3 Interiors: melamine on 19 mm / ¾" plywood (DFP), unless otherwise noted.
- .4 Drawers: fronts, sides, back and bottom from 19 mm / ¾" plywood (DFP), unless otherwise noted.
- .5 Kickplate: 100 mm x 19 mm / 4'"x ¾" plywood (DFP),.

.27 Upper Cabinet Units:
- .1 Case body, backs, shelving unit inserts, doors and gables: plastic laminate on 19 mm / ¾" plywood (DFP) unless otherwise noted.
- .2 Interiors: melamine on 19 mm / ¾" plywood (DFP), unless otherwise noted.

.28 Window/Interior Screen/Pass-through Stools:
- .1 Fabricate stools from plastic laminate on 19 mm / ¾" plywood (DFP), to profiles as indicated.
- .2 Return plastic laminate on underside of Window/Interior Screen/Pass-through Stools stool return

.29 Tackboards:
- .1 Fabricate manufactured coloured cork tackboards as detailed.

.30 Reception Counter:
- .1 Countertops and nosings: Solid surface on 19 mm / ¾" plywood (DFP), unless otherwise noted. Underside finished with plastic laminate on 19 mm / ¾" plywood (DFP), unless otherwise noted.
- .2 Return Gables, locations as indicated: Solid surface on 19 mm / ¾" plywood (DFP), unless otherwise noted.
- .3 Tackboards: manufactured coloured cork where indicated.
- .4 Base: 100 mm / 4" high MDF, finish as indicated.
- .5 Grommets: locations as indicated.

.31 Solid Wood Handrail
- .1 40mm diameter solid oak
- .2 Finish: clear coats over stain to match composite wood veneer panels. 10% sheen.

2.2 FABRICATION

.1 Install architectural woodwork to Quality Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC), Premium grade except where specified otherwise.

.2 Edge banding: Install edge banding to all panel material of:
- .1 Case bodies.
- .2 Shelving.
- .3 Gables.
- .4 Doors, drawer fronts, and false panels.
- .5 Trim.
- .6 Wall panels.
- .7 Under counter skirts.
- .8 Support brackets.
- .9 Tackboards.

.3 Set nails and countersink screws apply plain wood filler to indentations, sand smooth and leave ready to receive finish.

.4 Shop install cabinet hardware for doors, shelves, and drawers. Recess shelf standards unless noted otherwise.

.5 Shelving to cabinetwork to be adjustable unless otherwise noted.

.6 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.

.7 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.

.8 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.

.9 Ensure adjacent parts of continuous laminate work match in colour and pattern.

.10 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 12’-0”. Keep joints 2’-0” from sink cutouts.

.11 Form shaped profiles and bends as indicated, using postforming grade laminate to laminate manufacturer's instructions.

.12 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.

.13 Apply laminate backing sheet to reverse side of core of plastic laminate work.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for architectural woodwork installation in accordance with manufacturer's instructions.
- .1 Visually inspect substrate prior to commencing with Work of this section.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Do architectural woodwork to Quality Standards of AWMAC.

.2 Install prefinished millwork at locations shown on drawings.
  .1 Position accurately, level, plumb straight.

.3 Fasten and anchor millwork securely.
  .1 Supply and install heavy duty fixture attachments for wall mounted cabinets.

.4 Use draw bolts in countertop joints.

.5 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.

.6 At junction of plastic laminate counter back splash and adjacent wall finish, apply small bead of sealant in accordance with Section 07 92 00 - Joint Sealants.

.7 Apply water resistant building paper over wood framing members in contact with masonry or cementitious construction.

.8 Fit hardware accurately and securely in accordance with manufacturer's written instructions.

.9 Apply joint sealant in accordance with Section 07 92 00 – Joint Sealants.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
  .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.
  .1 Clean millwork and cabinet work inside cupboards and drawers and outside surfaces.
  .2 Remove excess glue from surfaces.

3.4 PROTECTION

.1 Protect millwork and cabinet work from damage until final inspection.

.2 Protect installed products and components from damage during construction.

.3 Repair damage to adjacent materials caused by architectural woodwork installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American National Standards Institute (ANSI)
- .1 ANSI 208.1-09, Particleboard.

.2 ASTM International
- .1 ASTM D 2832-92(R2011), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
- .2 ASTM D 2369-10(2015) e1, Standard Test Method for Volatile Content of Coatings.

.3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
- .1 Architectural Woodwork Quality Standards Illustrated, Edition 2, 2014.

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.

.5 CSA International
- .1 CSA O112.10-08(R2013), Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).
- .2 CSA O121-08 (R2013), Douglas Fir Plywood.
- .3 CSA O151-09 (R2013), Canadian Softwood Plywood.
- .4 CSA O153-13, Poplar Plywood.
- .5 CSA-Z809-08, Sustainable Forest Management.

.6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.7 National Electrical Manufacturers Association (NEMA)
- .1 ANSI/NEMA LD-3-05, High Pressure Decorative Laminates (HPDL).

.8 Scientific Equipment and Furniture Association (SEFA)
- .1 SEFA 8-99, Laboratory Furniture.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for laminate, adhesive, and core materials and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures. Indicate VOC's for adhesives in g/L.

.3 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Submit duplicate samples of joints, edging, cutouts and postformed profiles.

.4 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for laminate work for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect laminate, adhesive, and core materials from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MANUFACTURER

.1 Manufacturer:
- .1 Products specified are manufactured by WilsonartEgger and Formica.

2.2 MATERIALS

.1 Laminated plastic for general flatwork: to NEMA LD3.
- .1 Laminated plastic for horizontal flatwork:
  - .1 Type: general purpose.
  - .2 Grade: HGS.
  - .3 Thickness: 1.2 mm / 0.039" thick.
  - .4 Standard of Acceptance: 'Type 107' General Purpose Laminate by Wilsonart and Formica.
- .2 Laminated plastic for vertical flatwork:
  - .1 Type: vertical surface.
  - .2 Grade: VGS.
  - .3 Thickness: 0.030" thick.
  - .4 Standard of Acceptance: 'Type 335' Vertical Surface Laminate by Wilsonart, Egger and Formica.
- .3 Colour: integral colour throughout.
- .4 Pattern: solid, woodgrain and/or printed pattern.
- .5 Finish: as indicated.
- .6 Plastic Laminate – Type:
  - .1 Plastic Laminate Type 1 (PL-1): H3325 ST28 "Tobacco Gladstone Oak" by Egger.
  - .2 Plastic Laminate Type 2 (PL-2): 8826-58 "Neutral Twill" Matte Finish by Formica.
  - .3 Plastic Laminate Type 3 (PL-3): 1500-60 "Grey" Matte Finish by Wilsonart.
  - .4 Plastic Laminate Type 4 (PL-4): 6277 "Alumasteel" brushed finish by Wilsonart.

.2 Laminated plastic for post-forming work: to NEMA LD3.
- .1 Type: post-forming.
- .2 Grade: HGP.
- .3 Thickness: 1.016 mm / 0.04" thick.
- .4 Colour: integral colour throughout.
- .5 Pattern: printed pattern.
- .6 Finish: as indicated.
- .7 Standard of Acceptance: 'Post-forming Type 350' by Wilsonart
- .8 . Plastic Laminate – Type:
  - .1 Plastic Laminate Type 3 (PL-3): 1500-60 "Grey" Matte Finish by Wilsonart.

.3 Plywood core: to CSA O121 DFP, Forestry Stewardship Council (FSC) certified, solid two sides, 19 mm¾" thick.

.4 Laminated plastic adhesiveLaminated plastic adhesive:: urea resin adhesive to CSA O112.10 contact adhesive to CAN/CGSB-71.20 resorcinol resin adhesive to CSA O112.10 polyvinyl adhesive to CSA O112.10 two component epoxy thermosetting adhesive as recommended by manufacture.

.5 Sealer: water resistant sealer or glue acceptable to laminate manufacturer.

.6 Sealants: Refer to Section 07 92 00 – Joint Sealants.

.7 Draw bolts and splines: as recommended by fabricator.

2.3 FABRICATION

.1 Comply with NEMA LD3, Annex A.

.2 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.

.3 Ensure adjacent parts of continuous laminate work match in colour and pattern.

.4 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 3660 mm / 12’-0”.

.5 Form shaped profiles and bends as indicated, using postforming grade laminate to laminate manufacturer's instructions.

.6 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.

.7 Apply laminate backing sheet to reverse side of core of plastic laminate work.

PART 3- EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for laminate, adhesive, and core materials installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate prior to commencing with Work of this section.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.3 INSTALLATION

.1 Install work plumb, true and square, neatly scribed to adjoining surfaces.

.2 Make allowances around perimeter where fixed objects pass through or project into laminated plastic work to permit normal movement without restriction.

.3 Use draw bolts and splines in countertop joints. Maximum spacing 450 mm / 18” on centre, 75 mm / 3” from edge. Make flush hairline joints.

.4 Provide cutouts for inserts, grilles, appliances, outlet boxes and other penetrations. Round internal corners, chamfer edges and seal exposed core.

.5 At junction of laminated plastic counter back splash and adjacent wall finish, apply small bead of sealant.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.
- .1 Clean to NEMA LD3, Annex B.
- .2 Remove traces of primer, caulking, epoxy and filler materials and clean doors and frames.

3.5 PROTECTION

.1 Cover finished laminated plastic veneered surfaces with heavy kraft paper or put in cartons during shipment.

.2 Protect installed laminated surfaces in accordance with manufacturer's written recommendations.
- .1 Remove protection only immediately before final inspection.

.3 Protect installed products and components from damage during construction.

.4 Repair damage to adjacent materials caused by laminate, adhesive, and core materials installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM D 412-06 (2013), Standard Test Method for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
- .2 ASTM D 635-14, Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
- .3 ASTM D 638-14, Standard Test Method for Tensile Properties of Plastics.
- .4 ASTM D 695-10, Standard Test Method for Compressive Properties of Rigid Plastics.
- .5 ASTM D 696-11, Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 degrees C With a Vitreous Silica Dilatometer.
- .6 ASTM D 2240-05 (2010), Standard Test Method for Rubber Property-Durometer Hardness.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
- .1 Material Safety Data Sheets (MSDS).

.3 International Standards Organization (ISO):
- .1 ISO 19712-2:2007, Plastics – Decorative solid surfacing materials.
- .2 ISO 4586-2:2015, High-pressure decorative laminates (HPL, HPDL) – Sheets based on thermosetting resins.

.4 Terrazzo, Tile and Marble Association of Canada (TTMAC):
- .1 2012/2014 Specification Guide - Tile Installation Manual.

1.2 GENERAL DESCRIPTION

.1 Work in this section includes items utilizing solid polymer fabrication as shown on the drawings and as described in this specification. Do not change source of supply for materials after work has started, if the appearance of finished work would be affected. Variation in component size and location of openings to be plus or minus 1.5 mm (1/16”).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for solid quartz components and include product location and characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two (2) copies of WHMIS MSDS in accordance with Section 01 35 29.06 – Health and Safety Requirements.

.3 Shop Drawings:
- .1 Submit shop drawings. Indicate details of construction, profiles, jointing, fastening, and other related details.
  - .1 Scales: profiles and details as required, to Consultant approval, to clearly define the Work.

.2 Indicate materials, thicknesses, finishes, and hardware.

.3 Indicate connections, attachments, anchorage locations, and coordination requirements with adjacent work.

.4 Samples:

.1 Submit for review and acceptance of each unit.

.2 Submit duplicate samples of a 300 mm wide x 150 mm deep / 1'-0" wide x 6" deep minimum sample of each colour and pattern for approval. Samples shall indicate full range of colour and pattern variation. Approved samples may be retained as a standard for this work to Consultant approval.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials listed in this Section only when ready for installation. Deliver materials undamaged, in original packages, containers, or bundles bearing manufacturers brand name and identification.

.2 Delivery and Acceptance Requirements:

.1 Minor chipping resulting from shipment, delivery and installation will be grounds for rejection

.3 Storage and Handling Requirements:

.1 Store materials off ground, indoors, under cover, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Protect from weather, other elements and damage from construction operations and other causes.

.3 Handle solid quartz components to prevent damage to edges, ends or surfaces. Protect all accessories and trims from being bent or damaged.

1.5 SITE ENVIRONMENTAL REQUIREMENTS

.1 Maintain temperature minimum 10 degrees C, maximum 21 degrees C for 48 hours prior to and during installation of solid fabrications, and for at least 48 hours after completion of joint treatment.

.2 Ventilation: Ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

1.6 QUALIFICATIONS

.1 To ensure warranty coverage, solid fabricators shall be certified with a minimum 5 years' experience working with solid materials by the solid material manufacturer. All fabrications shall be marked with the fabricator's certification label affixed in an inconspicuous location.

1.7 WARRANTY

.1 Manufacturer's warranty of ten years against defects in materials, excluding damages caused by physical or chemical abuse or excessive heat, shall be provided. Warranty to cover material and labour for replacement or repair of defective material for a period of ten years after component installation.

PART 2 - PRODUCTS

2.1 QUARTZ COUNTERTOPS

.1 Solid polymer components: Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through-body colours meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified to the following physical properties:

- .1 Density: 1.7 g/cm³ to ASTM D792
- .2 Thermal Expansion: 3.9 x 10^{-5} m/m ºC (2.2 x 10^{-5} in./in. ºF) to ASTM E228
- .3 Hardness – Rockwell “M” Scale: >85 to ASTM D785
- .4 Hardness Barcol Impressor: 56 to ISO 19712-2 (ASTM D2583)
- .5 Flexural Modulus: 1.2 x 10^{6} psi to ASTM D790
- .6 Flexural Strength: 10,000 psi to ASTM D790
- .7 Tensile Modulus: 1.5 x 10^{6} psi to ASTM D638
- .8 Tensile Strength: 6,000 psi to ASTM D638
- .9 Tensile Elongation: 0.4% min. to ASTM D638
- .10 Compressive Strength: 16,000 psi to ASTM C365
- .11 Stain/chemical-resistance test: Pass to ISO 19712-2
- .12 Resistance to cigarette burns: Pass to ISO 19712-2
- .13 Resistance to dry heat: Pass to ISO 19712-2
- .14 Resistance to wet heat: Pass to ISO 19712-2
- .15 Hot/cold cycle water-resistance test: Pass to ISO 19712-2
- .16 Load test: Pass to ISO 19712-2
- .17 Dimensional stability: Pass to ISO 4586-2
- .18 Resistance to surface wear: 0.18% wt/25 revolutions to ISO 4586-2
- .19 Fungal resistance: ASTM rating of 0, No Observed growth on product at 100x power to ASTM G21.
- .20 Bacterial resistance: No observed growth on product at 100x power to ASTM G22
- .21 Microbial resistance: Highly resistant to mold growth to UL 2824 (ASTM D6329)
- .22 Flammability: Class A to NFPA 101 - Life Safety Code
- .23 Flame spread index: <25 to ANSI/UL 723 (ASTM E84, NFPA 255)
- .24 Flame spread rating: 0 to CAN/ULC-S102.2
- .25 Smoke developed index: <25 to ANSI/UL 723 (ASTM E84, NFPA 255)
- .26 Smoke development rating: 5 to CAN/ULC-S102.2.
- .27 Superficial damage to a depth of 0.25 mm / 0.010” repairable by sanding and/or polishing
- .28 Acceptable Product:
  - .1 ’Formica Signatures Solid Surfacing’ or approved alternate.

2.2 .COMPONENTS

.1 Solid polymer Panels: Polished natural polymer, 12 mm thick solid, hard and durable, well-seasoned and of uniform strength with 1/4” – 5/16” rounded edge between cap and front return.

- .1 Edge Detail: Edge profile as indicated on drawings.
- .2 Length: one piece to suit application.
  - .1 Solid Surface Type 1 (SLDS-1): 714 “Federal Cornerstone” by Formica.
  - .2 Solid Surface Type 2 (SLDS-2): 742 “Blanco Terrazzo” by Formica.

.2 Accessories General: Provide accessory products, as specified below, from the solid polymer manufacturer or provide products approved by the solid polymer manufacturer for intended use.

.3 Seam Adhesive: As required and approved by manufacturer to create permanent, inconspicuous, non-porous, hard seams and joints by chemical bond between solid polymer materials and components to create a monolithic appearance of the fabrication.

.1 Colour: colour-match adhesive to the surfaces where solid polymer materials are being bonded together.

.4 Panel Adhesive: To solid polymer manufacturer written recommendations for use to bond solid polymer components to adjacent and underlying substrates, neoprene based, Underwriter's Laboratories (UL) listed.

.5 Sealant: Sealants in accordance with Section 07 92 00 - Joint Sealants unless otherwise indicated.

.6 Mounting Hardware: As required by manufacturer for mounting hardware, including sink/bowl clips, inserts and fasteners for attachment of undermount sinks and lavatories.

2.3 FABRICATION

.1 Shop-fabricate components to sizes and shapes indicated, to the greatest extent practical, in accordance with approved shop drawings and manufacturer's requirements. Rout contours and radii from site obtained template to provide smooth edges. Defective and inaccurate work will be rejected.

.2 Joints and seams: Form joints and seams between components using manufacturer's approved seam adhesive. Joints shall be inconspicuous in appearance and without voids to create a monolithic appearance.

.3 Edge Finishing: Rout and finish component edges to a smooth, uniform appearance and finish. Edge shapes and treatment, complete with any inserts, to profiles as detailed on the drawings. Repair or reject defective or inaccurate work.

.4 Counter and Vanity Top Splashes: Fabricate backsplashes and end splashes from 19 mm / ¾" thick solid polymer material x 100 mm / 4” high to dimensions and shapes as indicated on the drawings. Fabricate and install backsplashes for permanent installation.

.1 End Splashes: Supply end splashes loose for site installation at the jobsite.

.5 Counter and Vanity Tops: Fabricate solid polymer counter top and vanity top components from 19 mm / ¾" thick material. Provide edge details, dimensions, locations, and quantities as indicated on the Drawings. Fabricate counter tops complete with 4” high permanently attached, 90 degree transition, permanently attached with coved transition backsplash and loose end splashes at locations as indicated on the drawings.

.1 Counter and Vanity Tops with Sinks: Obtain sink and plumbing fixture templates and mounting instructions as furnished by the sink and plumbing fixture manufacturers. Provide counter and vanity tops with cutouts to accept sinks and plumbing fixtures. Fabricate solid polymer counter and vanity tops to accept manufacturer's standard mounting hardware for, rimless sink and plumbing fixtures. Install sink with watertight seam between sink and counter and vanity tops. Coordinate sink, faucet, and plumbing requirements in accordance with Division 22 00 00.

PART 3 - EXECUTION

3.1 COORDINATION

.1 Installation of solid polymer components and assemblies will require sound substrate by other trades. To provide a stable, sound, secure installation, close coordination is required between the solid polymer fabricator/installer and other trades to ensure structural base support, proper clearances and other supporting components will be provided for the installation of solid polymer components as required by the solid polymer manufacturer. Contractor to coordinate and provide appropriate substrates and staging areas for solid polymer installations.

3.2 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for solid fabrications installation as per manufacturer's written instructions.
- .1 Visually inspect substrate prior to commencing with Work of this section.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.3 INSTALLATION

.1 Install all components and fabricated units plumb, level, and rigid. Field joints between solid polymer components to provide a monolithic appearance using solid polymer manufacturers approved seam adhesives, with joints inconspicuous in the finished work.

.2 Attach sinks to counter and vanity tops with mounting hardware, seam adhesive and sealants to solid polymer manufacturer's recommendations. Coordinate sinks, lavatories, and plumbing fixture connections with Division 22 00 00.

.3 Sealant: in accordance with Section 07 92 00 – Joint Sealants.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.
- .1 Clean solid polymer components and adjacent surfaces.
- .2 Remove excess glue from surfaces.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by solid polymer installation.

.3 Protect installed products and components from damage during construction.

.4 Protect solid polymer components from damage until final inspection.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
- .2 CAN/CGSB 37.3-M89, Application of Emulsified Asphalts for Dampproofing or Waterproofing.
- .3 CAN/CGSB 37.5-M89, Cutback Asphalt Plastic Cement.
- .4 CGSB 37-GP-6Ma-83, Asphalt, Cutback, Unfilled, for Dampproofing.
- .5 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
- .6 CGSB 37-GP-11M-76(R1984), Application of Cutback Asphalt Plastic Cement.
- .7 CGSB 37-GP-12Ma-84, Application of Unfilled Cutback Asphalt for Dampproofing.
- .8 CGSB 37-GP-15M-76(R1984), Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing.
- .9 CAN/CGSB 37.16-M89, Filled, Cutback, Asphalt for Dampproofing and Waterproofing.
- .10 CAN/CGSB 37.28-M89, Reinforced Mineral Colloid Type, Emulsified Asphalt for Roof Coatings and for Waterproofing.
- .11 CGSB 37-GP-36M-76, Application of Filled Cutback Asphalts for Dampproofing and Waterproofing.
- .12 CGSB 37-GP-37M-77, Application of Hot Asphalt for Dampproofing or Waterproofing.

.2 Canadian Standards Association (CSA International)
- .1 CSA A123.4-04(R2013), Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems.

.3 Health Canada
- .1 Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for bituminous dampproofing application and include product characteristics, performance criteria, physical size, finish, and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.

.3 Manufacturer's Instructions: provide to indicate special handling criteria, installation sequence, and cleaning procedures.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect dampproofing materials from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

1.4 SITE CONDITIONS

.1 Ambient Conditions: temperature, relative humidity, moisture content.
- .1 Apply dampproofing materials only when surfaces and ambient temperatures are within manufacturers' prescribed limits.
- .2 Do not proceed with Work when wind chill effect would tend to set bitumen before proper curing takes place.
- .3 Maintain air temperature and substrate temperature at dampproofing installation area above 5 degrees C for 24 hours before, during and 24 hours after installation.
- .4 Do not apply dampproofing in wet weather.

.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.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Asphalt:
- .1 For application and curing at temperatures above 5 degrees C: asphalt emulsion dampproofing conforming to CAN/CGSB-37.2.
  - .1 Package label or bill of lading for bulk hot liquid asphalt must indicate type, flash point, equiviscous temperature range, and final blowing temperature.
  - .2 Acceptable materials: ‘700-01’ Asphalt Emulsion Dampproofing by Bakor, or approved alternate.
- .2 For application and curing at temperatures below 5 degrees C: premium grade fibrated asphalt coating for horizontal and vertical foundation wall applications conforming to CAN/CGSB-37.16.
  - .1 Package label or bill of lading for bulk hot liquid asphalt must indicate type, flash point, equiviscous temperature range, and final blowing temperature.
  - .2 Acceptable materials: ‘710-11’ Premium Grade Foundation Coating by Bakor, or approved alternate.

.2 Sealing compound: plastic cutback asphalt cement to CAN/CGSB-37.5.

.1 Acceptable materials: '710-11' Premium Grade Foundation Coating manufactured by Bakor or approved alternate.

.3 Asphalt primer:

.1 Acceptable materials:

.1 For temperatures above 5 degrees C, to CAN/CGSB-37.2: '700-01' Asphalt Emulsion Dampproofing as manufactured by Bakor diluted 20% with clean water, or approved alternate.

.2 For temperatures below 5 degrees C to the requirements of CAN/CGSB 37.9: '910-01' Penetrating Asphalt Primer by Bakor or approved alternate.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for bituminous dampproofing application installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 WORKMANSHIP

.1 Keep hot asphalt:

.1 Below its flash point.

.2 At or below its final blowing temperature.

.3 Within its equiviscous temperature range at place of application.

3.3 PREPARATION

.1 Before applying dampproofing:

.1 Seal exterior joints between foundation walls and footings, joints between concrete floor slab and foundation and around penetrations through dampproofing with sealing compound.

3.4 APPLICATION

.1 Do dampproofing in accordance with manufacturer's written recommendations and CAN/CGSB-37.3 except where specified otherwise.

.2 Do sealing work in accordance with CGSB 37-GP-11M except where specified otherwise.

.3 Do priming of surface in accordance with CGSB 37-GP-15M except where specified otherwise.

.4 Apply primer to CGSB primer standard.

.5 Apply dampproofing in accordance with manufacturer's written recommendations and applicable CGSB application standard.

.6 Application of Dampproofing Coating for Temperatures Above 5 degrees C:
- .1 Apply a coat of asphalt emulsion dampproofing diluted 20% with clean water at the rate of 0.5l/m2 as a primer and allow to dry.
- .2 Apply a second coat of asphalt emulsion dampproofing at rate of 1.0 to 1.5 l/m2 and allow to dry.

.7 Application of Dampproofing Coating for Temperatures Below 5 degrees C (40 degrees F).
- .1 Apply a coat of primer at rate of 0.5 to 2.0l/m2 and allow to cure until touch dry.
- .2 Apply a coat of fibrated asphalt dampproofing at rate of 1.0 to 1.5 l/m2 and allow to cure.

.8 Finish dampproofing application with top edge straight, clean, and level.

3.5 SCHEDULE

.1 Apply continuous, uniform coating to entire exterior faces of foundation walls from 2” below finished grade level to and including tops of foundation wall footings. Apply continuous, uniform coating to exterior side of foundation walls enclosing rooms below finished grade. Include exterior portion of interior walls where floors in adjacent rooms are at different elevations.

.2 Apply two additional coats of dampproofing to vertical corners and construction joints for a minimum width of 230 mm / 9” on each side, and all around and for230 mm / 9” along pipes passing through walls.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Protect completed dampproofing from precipitation or contact with ground water until ready for backfilling or simultaneously backfilling after each panel course completed.

.3 Remove protection before backfilling.

.4 Protect dampproofing with protection board from damage by backfilling or other causes.

.5 Protect dampproofing from frost damage in accordance with manufacturer's instructions.

.6 Repair damage to adjacent materials caused by dampproofing application.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C 208-12, Specification for Cellulosic Fiber Insulating Board.
- .2 ASTM C 591- 15, Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
- .3 ASTM C 612- 14, Standard Specification for Mineral Fibre Block and Board Thermal Insulation.
- .4 ASTM C 726-12, Standard Specification for Mineral Fiber Roof Insulation Board.
- .5 ASTM C 728-15, Standard Specification for Perlite Thermal Insulation Board.
- .6 ASTM C 1126-15, Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation.
- .7 ASTM C 1289-15, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
- .8 ASTM E 96/E 96M-14, Standard Test Methods for Water Vapour Transmission of Materials.
- .9 ASTM C 1338- Determination of Fungi Resistance

.2 Canadian General Standards Board (CGSB)
- .1 CGSB 71-GP-24M-77(R1983), Adhesive, Flexible, for Bonding Cellular polystyrene Insulation.

.3 CSA Group
- .1 CSA B149 PACKAGE-15, Consists of B149.1, Natural Gas and Propane Installation Code and B149.2, Propane Storage and Handling Code.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.5 Material Safety Data Sheets (MSDS). Underwriters Laboratories of Canada (ULC)
- .1 CAN/ULC S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .2 CAN/ULC-S604-2012, Standard for Type A Chimneys.
- .3 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
- .4 CAN/ULC-S702-14, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
- .5 CAN/ULC-S704-11, Standard for Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for board insulation and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit copy of WHMIS MSDS in accordance with Section 01 35 29- Health and Safety Requirements 01 35 43 - Environmental Procedures. Indicate VOC's during application and curing.

.3 Samples:
- .1 Submit 300 x 300 mm x 40 mm / 12” x 12’ x 1 1/2" sample of board insulation.

.4 Certificates:
.1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.5 Test Reports:
.1 Submit certified test reports showing compliance with specified performance characteristics and physical properties.

.6 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials off ground, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect insulation from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

1.4 QUALITY ASSURANCE

.1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations in accordance with Section 01 32 16 - Construction Progress Schedules - Bar (GANTT) Chart.
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordinate with other building sub-trades.
.4 Review manufacturer's installation instructions and warranty requirements.

PART 2- PRODUCTS

2.1 INSULATION

.1 Polyisocyanurate Board Insulation for roof systems:
.1 General Compliance:
.1 ASTM C1289, Type II, Class 1 Grade 2
.2 HCFC free
.3 Can/ULC-S704
.2 Compressive strength: 20psi (210kPa).
.3 Thickness: as indicated.
.4 R-Value/inch (25.4 mm / 1”): R5.8.

.5 Dimensional Stability (ASTM D2126): < 2 percent linear change.
.6 Water Absorption (ASTM C209): < 1 percent by volume.
.7 Faces: non-asphaltic, fibre-reinforced felt facers both sides.
.8 Combustibility: meets CAN/ULC-S107-M87 and CAN/ULC-S126-M86.
.9 Closed cell foam with integrally formed and coated inorganic felt or glass fibre mat facer on both major surfaces.
.10 Size: maximum board size 1220mm x 2440mm / 4'-0" x 8'-0" , total thickness indicated, width to suit application.
.11 Acceptable materials: 'Trisotech' by Tremco, or approved alternate.

.2 Tapered Polyisocyanurate Insulation:
.1 General Compliance:
.1 ASTM C1289, Type II, Class 1 Grade 2
.2 HCFC free
.3 Can/ULC-S704
.2 Compressive strength: 20psi (210kPa).
.3 Thickness: as indicated.
.4 R-Value/inch (25.4 mm / 1"): R5.8.
.5 Dimensional Stability (ASTM D2126): < 2 percent linear change.
.6 Water Absorption (ASTM C209): < 1 percent by volume.
.7 Faces: non-asphaltic, fibre-reinforced felt facers both sides.
.8 Combustibility: meets CAN/ULC-S107-M87 and CAN/ULC-S126-M86.
.9 Closed cell foam with integrally formed and coated inorganic felt or glass fibre mat facer on both major surfaces.
.10 Size: maximum board size 1220mm x 2440mm / 4'-0" x 8'-0" , total thickness indicated, width to suit application.
.11 Tapered as per drawings and details. Uniform slope and all panels/corners/hips to be factory cut and labelled for ease of installation. Material to be same type and from same manufacturer as base insulation.
.12 Acceptable materials: 'Trisotech Tapered Insulation' by Tremco, or approved alternate.

.3 Stone/Mineral Wool Insulation for Exterior Cavity Walls:
.1 Compliance: ASTM C612 Type IVB and CAN/ULC-S702 Type 1 mineral fiber insulation.
.2 Fire Performance: ASTM E136 and CAN4 S114, non-combustible.
.3 Fire Performance, Surface Burning Characteristics: ASTM E84 (UL 723) and CAN/ULC S102, flame spread 0 and smoke developed 0.
.4 Water Vapor Transmission: ASTM E96: 27.2 to 33.1 perms (1555 to 1895 mg Pa.s.m^2).
.5 Moisture Resistance: ASTM C1104, moisture sorption of: 0.03 to 0.07 percent.
.6 Fungi Resistance: ASTM C1338, pass
.7 Thermal Resistance to ASTM C518 (C177),
.1 R-value of 4.2 to 4.3 per inch at 75 degrees F (RSI value 0.74 to 0.76 m m2K/W at 24 degrees C).
.8 Corrosive Resistance: ASTM C665, Corrosiveness to Steel - Pass, ASTM C795, Stainless Steel Stress Corrosion Specification as per Test Methods C871 and C692.
.9 Density to ASTM C612, from 3.4 to 6.2 lbs/ft^3 (70 kg/m3)
.10 Thickness: as indicated on drawings.
.11 Dimensions: to suit application.
.12 Acceptable material as required to suit thickness indicated:
.1 'CavityRock' by Rockwell Inc. or approved alternate.

2.2 ADHESIVE

.1 Adhesive (for Polyisocyanurate at roof locations):
- .1 Adhesive: Solvent-free, cold fluid applied bituminous-urethane adhesive formulated to adhere roof insulation to substrate, with the following physical properties:
- .2 Asbestos Content: EPA 600/R13/116 - None.
- .3 Volatile Organic Compounds (VOC): maximum, ASTM D 3960 - 20 g/L.
- .4 Non-Volatile Content: minimum, ASTM D 1644 - 98 percent.
- .5 Density at 25 deg. C (77 deg. F), minimum: ASTM D 1875: 1.01 kg/L (8.5 lb./gal).
- .6 Elongation at 25 deg. C (77 deg. F): minimum, ASTM D 412 - 1200 percent.
- .7 T-Peel Strength at 25 deg. C (77 deg. F): minimum: ASTM D 1876 - 66 N (15 lab).
- .8 Adhesion Strength in Shear at 25 deg. C (77 deg. F), minimum, ASTM D 816 - 552 kPa. (80 psi).
- .9 8. Low-Temperature Flexibility, maximum, ASTM D 816: -51 deg. C (-60 deg. F).
- .10 Acceptable product: Fast-n-Free, by Tremco, or approved alternate.

2.3 ACCESSORIES

.1 Insulation Fasteners: mechanically driven insulation fasteners fabricated from high density polyethylene plastic, complete with zinc plated pin, holding diameter and fastener depth as recommended by manufacture to suit substrate, insulation type and thickness.
- .1 Acceptable product: ‘Ramset Insulfast Fastener’ by Ramset, ‘Grid-Mate PB Mechanical Fasteners’ by Grid-Mate, or approved alternate.

.2 Refer also to Section 07 51 00 Built-up Bituminous Roofing.

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 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for board insulation application in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

.2 Prior to commencement of work ensure:
- .1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

3.3 INSTALLATION

.1 Install insulation after building substrate materials are dry.

.2 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.

.4 Keep insulation minimum 3” from heat emitting devices such as recessed light fixtures, and minimum 2” from sidewalls of CAN4-S604 type A chimneys and CAN/CGA-B149.1 and CAN/CGA-B149.2 type B and L vents.

.5 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.

.6 Offset both vertical and horizontal joints in multiple layer applications.

.7 Do not enclose insulation until it has been reviewed and accepted by Consultant.

3.4 CAVITY WALL SYSTEM RIGID INSULATION INSTALLATION

.1 Cavity Wall Insulation Installation in adjustable Z-Girt Locations over air/vapour barrier membrane:

- .1 In locations where adjustable Z-girts are specified install first layer of insulation tight to air/vapour barrier using adhesive.
- .2 Using a notched trowel, trowel air/vapour barrier membrane adhesive in ribbon strips to back of insulation board as required, and as recommended by manufacture, for firm tight contact to air/vapour substrate.
- .3 Butter air/vapour barrier membrane adhesive around all board insulation edges to eliminate any potential air gaps between adjacent boards.
- .4 Install boards placed tightly together with no gaps between adjacent boards.
- .5 Install boards placed tightly with no gaps between back of insulation board and air/vapour membrane.

.2 Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 6” wide 0.006” modified bituminous membrane over expansion and control joints using compatible adhesive and primer before application of insulation.

3.5 ROOF INSTALLATION

.1 Refer to Section 07 51 00 Built-up Bituminous Roofing.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C 553-13, Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.
- .2 ASTM C 665-12, Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- .3 ASTM C 1320-10, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.

.2 Canadian Gas Association (CGA)
- .1 CSA ONT GAS CODE 1996 Ontario Gas Utilization Code, 1996 (Includes Energy Act, Regulation and CAN/CGA-B149.1-M95).
- .2 CSA ONT PROPANE CODE 1996 Ontario Propane Code, 1996 (Includes Ontario Energy Act and Regulation and CAN/CGA-B149.2-M95).

.3 Canadian Standards Association (CSA International)
- .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

.4 Underwriters Laboratories of Canada (ULC)
- .1 CAN/ULC-S604-M1991 (R2003, Type A Chimneys.
- .2 CAN/ULC-S702-14, Standard for Mineral Fibre Insulation.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for blanket insulation and include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Certificates:
- .1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.4 Test Reports:
- .1 Submit certified test reports showing compliance with specified performance characteristics and physical properties.

.5 Manufacturer's Instructions:
- .1 Submit manufacturer's installation instructions.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect specified materials from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

1.4 QUALITY ASSURANCE

.1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations in accordance with Section 01 32 16 – Construction Progress Schedules - Bar (GANTT) Chart.
- .1 Verify project requirements.
- .2 Review installation and substrate conditions.
- .3 Coordinate with other building sub-trades.
- .4 Review manufacturer's installation instructions and warranty requirements.

.2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 6 – Health and Safety Requirements.

PART 2 - PRODUCTS

2.1 INSULATION

.1 Stone/Mineral Wool Fiber Thermal Insulation for Exterior Stud Walls:
- .1 Compliance: CAN/ULC-S702 Type 1 mineral fiber insulation.
- .2 CCMC Evaluation Listing: 07210: Mineral Fibre Batt Insulation.
- .3 Fire Performance: CAN4 S114, non-combustible.
- .4 Fire Performance, Surface Burning Characteristics: ASTM E84 (UL 723) and CAN/ULC S102, flame spread 0 and smoke developed less than 5.
- .5 Thermal Resistance:
  - .1 R-value of 22 6”.
- .6 Certification: Greenguard indoor air quality certified.
- .7 Density: to suit R-value.
- .8 Dimensions: to suit stud type and spacing.
- .9 Thickness: as indicated.
- .10 Acceptable material: ‘ComfortBatt’ by Rockwool, or approved alternate.
- .11 Acceptable material: ‘ComfortBatt’ by Roxul Inc., or approved alternate.

.2 Stone/Mineral Wool Interior Acoustic and Fire-Rated Partitions:
- .1 Compliance: ASTM C612 Type 1, ASTM C665 Type 1, CAN/ULC-S702 Type 1, UL and ULC Design Numbers.
- .2 Fire Performance: ASTM E136 and CAN4 S114, non-combustible.
- .3 Fire Performance Surface Burning Characteristics: ASTM E84 (UL 723) and CAN/ULC S102, flame spread 0 and smoke developed 0.
- .4 CAN/ULC S129 Smolder Resistance 0.09 percent.
- .5 Air Erosion: UL 181, maximum air velocity 1000 fpm (5.08 m/s).
- .6 Thermal Resistance: R-value of 4.1 per inch at 75 degrees F (RSI value 0.72 m2K/W at 24 degrees C).
- .7 Acoustic Performance: ASTM E90, ASTM E413, ASTM C423, ASTM E1050.
- .8 Corrosive Resistance: ASTM C665, Corrosiveness to Steel - Pass, ASTM C795, Stainless Steel Stress Corrosion Specification as per Test Methods C871 and C692.
- .9 Certification: Greenguard Indoor air quality certified.
- .10 Density: ASTM C612, 2.8 lbs/ft3 (45 kg/m3).
- .11 Dimensions: to suit application.
- .12 Thickness: as indicated.
- .13 Acceptable material: ‘Roxul AFB’ by Rockwool , or approved alternate.

2.2 ACCESSORIES

.1 Insulation clips:
- .1 Impale type, perforated 2” x 2” cold rolled carbon steel 0.03” thick, adhesive back, spindle of 3/32” diameter annealed steel, length to suit insulation, 1” diameter washers of self-locking type.

.2 Nails: galvanized steel, length to suit insulation plus to CSA B111.

.3 Staples: 1/2" minimum leg.

.4 Tape: as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for blanket insulation application in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 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.

3.3 INSULATION INSTALLATION

.1 Install insulation to maintain continuity of thermal protection to building elements and spaces and to ASTM C 1320.

.2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

.3 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of sound ratings are maintained in partitions identified with STC ratings.

.4 Do not compress insulation to fit into spaces.

.5 Keep insulation minimum 75 mm / 3” from heat emitting devices such as recessed light fixtures, and minimum 50 mm / 2” from sidewalls of CAN/ULC-S604 Type A chimneys and CAN/CGA-B149.1 and CAN/CGA-B149.2 Type B and L vents.

.6 Do not enclose insulation until it has been inspected and approved by Consultant.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C411-11, Standard Test Method for Hot-Surface Performance of High Temperature Thermal Insulation.
- .2 ASTM C518-10, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- .3 ASTM C1338-14, Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
- .4 ASTM D1621-10, Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- .5 ASTM D1622/D1622M-14, Standard Test Method for Apparent Density of Rigid Cellular Plastics.
- .6 ASTM D1623-09, Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics (Type C sample).
- .7 ASTM D2126-09, Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
- .8 ASTM D2369-10(2015) e1, Standard Test Method for Volatile Content of Coatings.
- .9 ASTM D2842-12, Standard Test Method for Water Absorption of Rigid Cellular Plastics
- .10 ASTM D6226-10, Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
- .11 ASTM E96/E96M-14, Standard Test Methods for Water Vapor Transmission of Materials.

.2 Canadian Urethane Foam Contractors' Association Inc. (CUFCA)

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.4 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S101-14, Fire Endurance Tests of Building Construction and Materials.
- .2 CAN/ULC-S102-10, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .3 CAN/ULC-S127-14 - Standard Corner Wall Method of Test for Flammability Characteristics of Non-Melting Building Materials.
- .4 CAN/ULC-S705.1-15, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Material Specification.
- .5 CAN/ULC-S705.2-05, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density, Application.
- .6 CAN/ULC-S770-15 - Standard Test Method for Determination of Long-term Thermal Resistance of Closed-Cell Thermal Insulating Foams.
- .7 CAN/ULC-S774-09(R2014) - Standard Laboratory Guide for the Determination of Volatile Organic Compound Emissions from Polyurethane Foam.
- .8 Canadian Construction Materials Centre (CCMC) Evaluation Report CCMC 13588-L.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications, and datasheet and include product characteristics, performance criteria, physical size, finish, and limitations.

.2 Submit copy of WHMIS MSDS – Material Safety Data Sheets.

.3 Test Reports:

.1 Submit certified test reports for insulation from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.2 Submit test reports in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.

.4 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

.5 Manufacturer's Reports:

.1 Submit letter from the manufacturer confirming adhesion of insulation to adjacent materials and membranes. Letter to identify any special measures to be taken by the contractor to warranty the application.

.2 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.3 QUALITY ASSURANCE

.1 Applicators to conform to manufacturer’s quality assurance program.

.2 Qualifications:

.1 Installer: person specializing in sprayed insulation installations with 5 years documented experience, approved by manufacturer.

.2 Applicator's qualifications: trained and experienced in application of spray urethane insulation, and be approved by system manufacturer.

.3 Manufacturer: company with minimum 5 years’ experience in producing of material used for work required for this project, with sufficient production capacity to produce and deliver required units without causing delay in work.

.3 Mock-up:

.1 Construct mock-up in accordance with Section 01 45 00 – Quality Control.

.2 Construct mock-up 10m²100 sq.ft. minimum, of sprayed insulation including one inside corner and one outside corner, one door and window openings.

.3 Mock-up may be part of finished work.

.4 Allow 48 hours for review of mock-up by Consultant and manufacturer’s representative prior to proceeding with sprayed insulation work.

.5 Using the polyurethane foam insulation sample that was sprayed in place, verify the following on site conditions:

.1 Core density.

.2 Adhesion between the transition membrane and the substrate.

.3 Cohesion/adhesion between the insulation material and the substrate.

.4 Keep copy on site of spray foam manufacturer’s current installation instructions and the manufacturer’s installation manual or guide for transition membrane installation. Strictly follow manufacturer's instructions.

.5 Conducted tests daily on both core density and cohesion/adhesion to the substrate, following procedures that meet the requirements of CAN/ULC-S705.

.6 Once the curing time required by the membrane manufacturer has elapsed, conduct a test to verify adhesion between the membrane and the substrate. Perform all adhesion tests using COM-TEN INDUSTRIES Series 301N1M equipment or approved alternate. Should adhesion be found lower than the required minimum of 110 kPa, mechanically fastened the membrane to substrate.

.7 Perform adhesion tests on all corners and building angles, and wall to roof intersections as follows:
- .1 One test on every wall less than 30 m/100’ in length.
- .2 Two tests on walls between 30 m/100’ and 60 m/200’ in length.
- .3 One test every 30 m /100’ on walls more than 60 m/200’ long.
- .4 Mechanically fasten membrane to concrete slab at all areas where adhesion tests are unable to be conducted.
- .5 Perform transition membranes adhesion tests at perimeter openings as follows:
- .6 10 openings or more: perform tests on 15% of openings.
- .7 10 openings or less: perform tests on 30% of openings.
- .8 Perform adhesion tests on the transition membranes at every tenth column or beam.
- .9 Adhesion tests are not required if membrane is adjusted mechanically.
- .10 Permit jobsite access to manufacturer’s representative for the purpose of technical assistance or verifying operator certification or the quality of the polyurethane foam application.
- .11 Submit copy of all adhesion tests to Consultant prior to making application for payment.

.8 Manufacturer’s Field Services: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits with manufacturer’s representative, to review Work, at stages listed.
- .1 After delivery and storage of products, and when preparatory Work and mock-up is complete, but before installation begins.
- .2 Twice during progress of Work at 25% and 60% complete.
- .3 Upon completion of Work, after cleaning is carried out.
- .4 Independent Testing Agency:
  - .1 Arrange for site reviews by Manufacturer’s authorized agent. Schedule the number of site reviews in accordance with the following schedule:

Coverage Area, sq.m./sq.ft.	No. of Site Reviews
3,252 – 6,503/35,000 – 70,000	1
6,503 – 9,755/105,001 – 140,000	2
9,755 – 13,006/105001 – 140,000	3
over 13,006 / over 140,000	4

  - .2 Using the polyurethane foam insulation sample that was sprayed in place, verify the following on site conditions:
    - .1 Core density.
    - .2 Adhesion between the transition membrane and the substrate.
    - .3 Cohesion/adhesion between the insulation material and the substrate.

.9 Health and Safety Requirements, worker protection:
- .1 Protect workers as recommended by CAN/ULC-S705.2 and manufacturer's recommendations:
- .2 Workers must wear gloves, respirators, long sleeved clothing, eye protection, protective clothing when applying foam insulation.
- .3 Workers must not eat, drink, or smoke while applying foam insulation.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store, and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect specified materials from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

1.5 SITE CONDITIONS

.1 Ventilate area in accordance with Section 01 51 00 – Temporary Utilities.

.2 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.

.3 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.

.4 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.

.5 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Insulation:
- .1 Spray polyurethane to CAN/ULC-S705.1.
- .2 Performance Requirements:
  - .1 Water Vapour Permeance ASTM E96:41 ng/ Pa-s-sq m (0.70 Perms).
  - .2 Flame Spread Classification CAN/ULC S102: Flame Spread < 500.
- .3 Hot Surface Performance ASTM C411: Passed when exposed to 93 deg C for 96 hours.
- .4 Fungi Resistance ASTM C1338: No fungal growth after 28 day incubation.
- .5 Long Term Thermal Resistance (LTTR): Conform to the following when tested to CAN/ULC S770.
  - .1 RSI 0.9 @ 25.4 mm/R5.1 @ 1 inch
  - .2 RSI 1.9 @ 50.8 mm/R10.8 @ 2 inches
  - .3 RSI 2.9 @ 76.2 mm/R16.5 @ 3 inches
  - .4 RSI 4.0 @ 100 mm/R22.7 @ 4 inches

.6 Physical Requirements:
  .1 Colour: manufacturer's standard colour with Indicator Dye Technology.
  .2 Density ASTM D1622: Minimum 28.9 kg/cu m (1.8 lb/cu ft).
  .3 Compressive Strength ASTM D1621: 201 kPa (29.2 psi).
  .4 Tensile Strength ASTM D1623:325 kPa (47.1 psi).
  .5 Open Cell Content ASTM DD2856:6.0 %.
  .6 Water Absorption ASTM D2842:0.6 % by volume.

.7 Sustainable Requirements:
  .1 Zero ozone depleting blowing agents.
  .2 Minimum Recycled Content: EcoLogo certified; >5% by weight.
  .3 Eco-efficiency analysis: life cycle assessment approved by NSF or equivalent.

.8 Use spray foam from the following family of insulation types as per manufacturer's written recommendations to suit appropriate temperature range:
  .1 Acceptable Products:
    .1 'Foamsulate-Eco' by Premium Spray Products Canada – Hesterman Technical Services Inc.
    .2 'Polar Foam 7300' by Polyurethane Foam Systems Inc.
    .3 'ProSeal (MD-C-200v3)' by Icynene.
    .4 'Styrofoam Brand SPF CA' by Dow.
    .5 'Walltite Eco' by BASF Canada.
    .6 Or approved alternate.

.2 Primers: in accordance with manufacturer's recommendations for surface conditions.

.3 Expansion/Deflection Joint Angles: Preformed angle comprising at least 26 ga steel core zinc coating, as stipulated in ASTM A653/A653M (galvanized steel G-90).

2.2 EQUIPMENT

.1 Comply with CAN/ULC S705.2 and the equipment manufacturer's recommendations for specific type of application.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sprayed insulation application accordance with manufacturer's written instructions.
  .1 Visually inspect substrate.
  .2 Inform Consultant of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.3 APPLICATION

.1 Apply insulation to clean surfaces in accordance with CAN/ULC-S705.2 and manufacturer's printed instructions.

.2 Use primer where recommended by manufacturer.

.3 Apply sprayed foam insulation in thickness as indicated.

.4 Apply insulation to substrate free of all frost, high moisture content, dust, oil, grease, oxidization, or any other element that may affect this property.

.5 Ensure metallic surfaces are free of oxidization. Apply primer in accordance with manufacturer’s written instructions.

.6 Do not apply spray foam insulation until the following Work is complete:
- .1 Anchoring for exterior ladder to existing masonry.
- .2 Primer where recommended by manufacturer.
- .3 Transition Membrane and Thru-Wall Flashing Membrane is fully installed and reviewed by Consultant.
- .4 Furring, blocking, and preparation work for window and door frames and mechanical metal louvers.
- .5 Sub-girt clip angles and sub-girt framing angle for exterior cladding.
- .6 Mechanical and electrical work.
- .7 Adjacent areas have been protected with drop sheets and/or masking tape to adjacent surfaces.

.7 Apply sprayed foam insulation in consecutive layers not less than 12.5 mm /½" and no more than 50 mm /2” thick, for a total thickness as indicated.

.8 Do not spray foam over expansion and deflection joints. Install 0.5 mm /26 ga. sheet metal angle 75 mm /3” wide x total foam insulation thickness on both sides of joints and install continuous strip of 25% compressed continuous mineral wool insulation in thickness to match depth of spray foam between angles to absorb deflections.

.9 Apply spray foam to a maximum tolerance of +6 mm /¼" in relation to the specified thickness.

.10 Avoid formation of sub-layer air pockets during spray foam application.

.11 Avoid overspray foam to surfaces other than those indicated. Use drop sheets and/or masking tape to protect adjacent surfaces.

.12 Remove overspray from non-prescribed surfaces once the foam has hardened. Do not damage adjacent surfaces. Assume responsibility for repair should adjacent surfaces become damaged during removal of overspray.

.13 Upon completion of spray foam insulation, remove drop sheets and masking tape and protect spray foam work from other trades.

.14 Complete subsequent coverage to applied insulating foam within the manufacturer’s prescribed timeframe.

.15 Apply spray foam in overlapping layers, to obtain a smooth, uniform surface.

.16 Apply spray applied foam as follows to areas exceeding 100 linear feet in either direction:
- .1 Apply first layer in 3 m/10'-0" strips at 1 m/3' intervals. Following a curing period of ± four (4) hours, spray foam to all unfilled spaces.
- .2 In cold weather follow same procedure, for a minimum surface area of 15 lineal metres / 50'.

.17 Do not spray foam any closer than 75 mm /3" from chimneys, heating vents, steam pipes, recessed lighting fixtures, and other heat sources. Do not spray insides of any exit openings or electrical junction boxes.

.18 In temperatures below +10°C, mechanically adjusted transition membranes to manufacturer's written instructions.

.19 Cover all mechanical fixtures with spray applied foam to reduce thermal bridges by means of galvanized spring clip for drywall, screwed 200 mm /8" through the membrane.

3.4 FIELD QUALITY CONTROL

.1 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.
- .2 Schedule site visits, to review Work, as directed in PART 1 – QUALITY ASSURANCE.
- .3 Obtain written reports 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.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.
- .1 Remove insulation material spilled during installation and leave work area ready for application of wall board.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM E 1745-11, Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
- .2 ASTM E154/E154M-08A (2013) E1, Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
- .3 ASTM E96/E96M-14, Standard Test Methods for Water Vapor Transmission of Materials.
- .4 ASTM F 1249-13, Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
- .5 ASTM E 1643-11, Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.

.2 American Concrete Institute (ACI)
- .1 ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.
- .2 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.

.4 Vapour Barrier / Vapour Retarder definition: the terms vapour barrier and vapour retarder are to be considered as one in the same throughout these documents.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for vapour retarders and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit copy of WHMIS MSDS in accordance with Section 01 35 29 – Health and Safety Requirements and 01 35 43 – Environmental Procedures. Product characteristics.

.3 Certificates:
- .1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.3 QUALITY ASSURANCE

.1 Mock-Ups:
- .1 Construct mock-ups in accordance with Section 01 45 00 – Quality Control.
- .2 Construct mock-up of sheet vapour barrier installation including one lap joint, one inside corner and at one electrical box.

.3 Mock-up will be used to judge workmanship, substrate preparation, and material application.
.4 Locate where directed.
.5 Allow 48 hours for inspection of mock-up by Consultant before proceeding with vapour barrier work.
.6 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work to the approval of the Consultant.

1.4 DELIVERY, STORAGE,AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials off ground, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect vapour retarders from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

PART 2 – PRODUCTS

2.1 SHEET VAPOUR BARRIER

.1 Exterior Wall and Ceiling Vapour Retarder:
.1 Polyethylene film: to CAN/CGSB-51.34, 6 mil thick.
.2 Joint Sealing tape: to CCMC #11862-R, 3” wide ‘Construction.
.1 Acceptable Product: Sheathing Tape 8808’ by 3M, or approved alternate.

.2 For rigid insulation, refer to Section 07 21 13 – Board Insulation.

.3 For batt insulation, refer to Section 07 21 16 – Blanket Insulation

.4 For air barrier, refer to Section 07 27 00 – Air Barriers

.5 For air / vapour barrier, refer to Section 07 28 00 – Air/Vapour Barriers

.6 For rigid insulation in built-up bituminous roofing, refer to Section 07 51 00 – Built-up Bituminous Roofing.

2.2 ACCESSORIES

.1 Sealant: Refer to Section 07 92 00 – Joint Sealants.

.2 Staples: minimum 6 mm leg.

.3 Moulded box vapour barrier: factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for vapour retarder installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Ensure services are installed and inspected prior to installation of retarder.

.2 Install sheet vapour retarder on warm side of exterior wall assemblies prior to installation of gypsum board to form continuous retarder.

.3 Use sheets of largest practical size to minimize joints.

.4 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

3.3 UNDER SLAB VAPOUR BARRIER

.1 Install sheet vapour barrier over insulation to entire interior concrete floor slab, unless otherwise indicated.

.2 Cut sheet vapour barrier to form complete coverage. Lap sheet vapour over footings and onto vertical wall surface and seal joint with tape.

.3 Overlap all both lateral and butt joints 6” and seal with Joint Sealing Tape. Ensure tape area is free from dust, dirt and moisture prior to placing tape.

.4 Prior to placing concrete slab, repair all damaged areas to manufactures recommendations.

.5 Do not permit concrete floor finishers to puncture sheet vapour barrier.

3.4 EXTERIOR SURFACE OPENINGS

.1 Cut sheet vapour retarder to form openings and ensure material is lapped and sealed to frame.

3.5 PERIMETER SEALS

.1 Seal perimeter of sheet vapour barrier as follows:
- .1 Apply continuous bead of sealant to substrate at perimeter of sheets.
- .2 Lap sheet over sealant and press into sealant bead.
- .3 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.6 LAP JOINT SEALS

.1 Seal lap joints of sheet vapour barrier as follows:
- .1 Attach first sheet to substrate.
- .2 Apply continuous bead of sealant over solid backing at joint.
- .3 Lap adjoining sheet minimum 6” and press into sealant bead.
- .4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.7 ELECTRICAL BOXES

.1 Seal electrical switch and outlet device boxes that penetrate vapour barrier as follows:
- .1 Install moulded box vapour barrier.
- .2 Apply sealant to seal edges of flange to main vapour barrier and seal wiring penetrations through box cover.

3.8 CLEANING

.1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.
- .1 Remove insulation material spilled during installation and leave work area ready for application of wall board.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Construction Documents Committee
- .1 CCDC 2-94, Stipulated Price Contract.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-19.13M-M87, Sealing Compound, One Component, Elastomeric Chemical Curing.
- .2 CAN/CGSB-19.24M-M90, Multi-Component, Chemical Curing Sealing Compound.
- .3 CGSB 19-GP-14M-84, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.3 Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications, and datasheet and include product characteristics, performance criteria, physical size, finish, and limitations.
- .2 Submit WHMIS MSDS - Material Safety Data Sheets.

.3 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 – Quality Control.
- .1 Existing Substrate Condition: report deviations, as described in PART 3 -EXAMINATION in writing to Consultant.
- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.
- .4 Submit letter from manufacturer confirming adhesion to proposed substrate.
- .5 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 – FIELD QUALITY CONTROL.

1.3 QUALITY ASSURANCE

.1 Qualifications:
- .1 Applicator: company specializing in performing work of this section with minimum five (5) years' documented experience with installation of air/vapour barrier systems.
  - .1 Completed installation must be approved by the material manufacturer.

.2 Mock-Up:
- .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
- .2 Construct typical exterior wall panel, incorporating window and frame and sill, insulation, building corner condition, junction with roof system and fascia panel; illustrating materials interface and seals.

.3 Locate where directed by Consultant.

.4 Mock-up may remain as part of finished work for Consultant approval.

.5 Allow 48 hours for inspection of mock-up by Consultant before proceeding with air barrier Work.

.3 Site Meetings: as part of Manufacturer's Services described in PART 3 – FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.

.1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.

.2 Twice during progress of Work at 25% and 60% complete.

.3 Upon completion of Work, after cleaning is carried out.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Avoid spillage: immediately notify Consultant if spillage occurs and start clean up procedures.

.4 Clean spills and leave area as it was prior to spill.

1.5 COORDINATION

.1 Ensure continuity of the water resistive air barrier throughout the scope of this section.

1.6 AMBIENT CONDITIONS

.1 Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.

.2 Ventilate enclosed spaces in accordance with Section 01 51 00 –Temporary Utilities.

.3 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

1.7 SEQUENCING

.1 Sequence work in accordance with Section 01 32 16 – Construction Progress Schedules - Bar (GANTT) Charts.

.2 Sequence work to permit installation of materials in conjunction with related materials and seals.

1.8 WARRANTY

.1 Provide manufacturer’s standard 12-year assembly warranty under provisions of Section 01 78 00 – Closeout Submittals and in accordance with General Conditions (GC) CCDC 2 GC 12.3.

.2 Warranty: include coverage of installed sealant and sheet materials which:
- .1 Fail to achieve air tight and watertight seal.
- .2 Exhibit loss of adhesion or cohesion.
- .3 Do not cure.

PART 2 - PRODUCTS

2.1 SHEET MATERIALS

.1 Self-Adhered Vapour Permeable Water Resistive Air Barrier Membrane:
- .1 Primary water resistive air barrier membrane and window flashing, self-adhering reinforced modified polyolefin tri-laminate sheet air barrier membrane for wall construction, specifically designed to be water resistant and vapour permeable with adhesive backing protected with release film to the following physical properties:
  - .1 Air leakage: <0.02L/s/m2 @ 75Pa <0.004 CFM/ft2 @ 1.57 lbs/ft2 when tested in accordance with ASTM E 2178.
  - .2 Water Vapour Permeance: 1658 ng/Pa.m².s (29 perms) to ASTM E96, Method B – Desiccant Method.
  - .3 Tested to ASTM E 2357 for Air Leakage of Air Barrier Assemblies.
  - .4 Resistance to Water Penetration: Pass ICC-ES AC 38.
  - .5 Water Penetration Resistance around Nails: Pass when tested to AAMA 711-05 & ASTM D 1970 modified.
  - .6 Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84: Flame Spread Rating of 0 and Smoke Development Classification of 105.
  - .7 Basis Weight: 120 g/m2, when tested in accordance with TAPPI Test Method T-410.
  - .8 Tensile Strength: 182N MD and 129N CD per ASTM D828.
  - .9 Average Dry Breaking Force: 565N MD, and 405N CD per ASTM D 5034.
  - .10 Cyclic and Elongation: Pass at 100 cycles, -29 deg C. per ICC-ES AC 48.
  - .11 Acceptable Product: ‘Blueskin VP 160’ as manufactured by Henry Bakor, or approved alternate.

.2 Transition Membrane:
- .1 Transition Sheet Membrane (For use with spray polyurethane [insulation, refer to Section 07 21 29 - Sprayed Insulation - Polyurethane Foam):
- .2 Plain: 1.0 mm/0.04” thick, 457 mm/18” wide modified bitumen membrane, reinforced.
  - .1 Acceptable Product: 'Blueskin SA', by Bakor or approved alternate.

.3 Membrane Flashings:
- .1 Refer to Section 07 27 00 Vapour Barriers and 07 28 00 Air / Vapour Barriers.
- .2 Rubberized reinforced asphalt compound, self-adhered membrane, 1.0 mm thick, width to suit application.
  - .1 Acceptable Product: "Blueskin TWF" by Bakor, or approved alternate.

2.2 SEALANTS

.1 Sealants in accordance with Section 07 92 00 – Joint Sealants.

2.3 ACCESSORIES

.1 Joint Sealing tape: to CCMC #11862-R, 3” wide ‘Construction Sheathing Tape 8808’ by 3M, or approved alternate.

.2 Adhesive Primer: To manufacturer's written recommendations.

.3 Membrane flashings:
- .1 Refer to Section 07 28 00 Air/Vapour Barriers.
- .2 Rubberized reinforced asphalt compound, self-adhered membrane, 1.0mm thick, width to suite application.
  - .1 Acceptable Product: "Blueskin TWF" by Bakor, or approved alternate.

.4 Termination Sealant: a moisture cure, medium modulus polymer modified sealing compound to ASTM C920 Type S, Grade NS, Class 25.
- .1 Acceptable Products: ‘HE925 BES Sealant’ manufactured by Henry Bakor, or approved alternate.

.5 Thinner and cleaner: as recommended by sheet material manufacturer.

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 datasheets.

3.2 GENERAL

.1 Perform Work in accordance with Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification requirements for materials and installation.

.2 Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program and requirements for materials and installation.

.3 Perform Work in accordance with Canadian Urethane Foam Contractor's Association - Professional Contractor Quality Assurance Program and requirements for materials and installation.

3.3 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept work of this section.

.2 Ensure surfaces are clean, dry, sound, smooth, and continuous and comply with air barrier manufacturer's requirements.

.3 Report unsatisfactory conditions to Consultant in writing.

.4 Do not start work until deficiencies have been corrected.
- .1 Beginning of Work implies acceptance of conditions.

3.4 PREPARATION

.1 Remove loose or foreign matter, which might impair adhesion of materials.

.2 Ensure substrates are clean of oil or excess dust; masonry joints struck flush, and open joints filled; and concrete surfaces free of large voids, spalled areas or sharp protrusions.

.3 Ensure substrates are free of surface moisture prior to application of self-adhesive membrane and primer.

.4 Ensure metal closures are free of sharp edges and burrs.

.5 Prime substrate surfaces to receive adhesive and sealants in accordance with manufacturer's instructions.

.6 Install Through-Wall Flashing Membrane over all foundations and shelf angles to receive exterior masonry and to other areas as indicated. Lap flashing membrane 12” vertically onto wall surface and over entire horizontal surface. Trim back all exposed to view membrane upon completion of exterior cladding.

.7 Install flashings as per Section 04 05 00 – Common Work Results for Masonry.

3.5 INSTALLATION

.1 Install materials in accordance with manufacturer's instructions.

.2 Secure Air Barrier where indicated with adhesive or tape. Caulk with acoustic sealant to ensure complete seal. Position lap seal over firm bearing.

.3 Install Air Barrier, between flashings at roof membrane and adjacent parapet and seal materials with acoustic sealant. Caulk to ensure complete seal. Position lap seal over firm bearing, as indicated.

.4 Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

.5 Parapet and Roof Junction: Lap Air Barrier 150 mm/6” with firm bearing to adjacent membranes. Seal Air Barrier to roof membrane with continuous bead of acoustic sealant Seal all joints in parapet and roof junction with tape. Provide continuous airtight seal.

3.6 INSTALLATION OF SELF-ADHERED AIR BARRIER MEMBRANE

.1 Adhesive Primer for Primary Water Resistive Air Barrier Membrane:
  .1 Conditions not typically requiring adhesive-primers: Application above 5°C to clean and dry plywood substrate. Ensure substrate and membrane temperatures are above 5°C.
  .2 Conditions requiring use of adhesive-primers:
    .1 Metal, gypsum sheathing, concrete, concrete unit masonry, and other masonry substrates.
    .2 Should appropriate adhesion not be obtained due to conditions beyond the control of the installer, the adhesion may be aided by continuous application of adhesive-primer to the substrate and laps. Ensure all primed surfaces are covered in same day.

.2 Inside and Outside Corners:

.1 Seal inside and outside corners of sheathing boards with a strip of self-adhering vapour permeable membrane extending a minimum of 75 mm/3” on either side of corner.

.2 For inside corners, pre-treat the corner with a continuous 13 mm/½" bead of termination sealant.

.3 Adhesive prime surfaces where indicated to achieve surface adhesion as per manufacturers’ instructions.

.4 Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 50 mm/2” minimum overlap at all side laps and 75 mm/3” minimum overlap at all end laps of membrane.

.5 Roll all laps and membrane with a counter top roller to ensure seal.

.3 Transition Areas:

.1 Tie-in to structural beams, columns, floor slabs, and intermittent floors, parapet curbs, foundation walls, roofing systems and at the interface of dissimilar materials as indicated in drawings with self-adhered air barrier transition membrane in accordance with Section 07 27 00 Air/Vapour Barriers.

.4 Windows, Doors and Rough Openings:

.1 Place transition membrane in accordance with Section 07 27 00 Air/Vapour Barriers across window sills. Pre-treat inside corners with a bead of termination sealant. Install window sill pan membrane and end dam terminations, seal cuts and terminations with termination sealant per window manufacturer’s instructions and ASTM E 2112.

.2 Wrap head and jamb of rough openings with transition membrane.

.3 Extend specified self-adhered air barrier membrane into rough window openings sufficient to provide a connection to interior vapour retarder.

.1 Prime surfaces where indicated to achieve surface adhesion as per manufacturers’ instructions.

.2 Align and position transition membrane, remove protective film and press firmly into place. Ensure minimum 50 mm/2” overlap at all side laps and 75 mm/3” overlap at all end laps of membrane.

.3 Roll all laps and membrane with a counter top roller to ensure seal.

.5 Through-Wall Flashing Membrane:

.1 Apply through-wall flashing membrane along the base of masonry veneer walls and over lintels as detailed.

.2 Prime surfaces and allow to dry, press membrane firmly into place, overlap minimum 50 mm/2” at all side and end laps. Promptly roll all laps and membrane to ensure the seal.

.3 Form continuous flashing membrane and extend up back-up wall minimum of 200 mm /8”.

.4 Seal the top edge of the membrane where it meets substrate using termination sealant. Trowel-apply a feathered edge to seal termination to shed water.

.5 Install through-wall flashing membrane and extend 13 mm/½" from outside edge of veneer. Provide “end dam” flashing as detailed.

.6 Sheet Air Barrier Installation:

.1 Apply self-adhering sheet air barrier membrane complete and continuous to substrate in an overlapping shingle fashion in accordance with manufacturer's recommendations and written instructions. Stagger all vertical joints.

.2 Prime surfaces where indicated to achieve surface adhesion as per manufacturers’ instructions and allow to dry.

.3 Align and position self-adhering membrane to substrate, remove top panel of protective release film and press firmly into place.

.4 Ensure alignment, hold membrane in place to avoid wrinkles and sequentially remove remaining panels of protective film and press firmly into place.

.5 Ensure minimum 75 mm /3" overlap at all end and 50 mm /3" side laps of subsequent membrane applications.

.6 Apply pressure to all membrane surfaces, laps, and flashings using an appropriate roller to provide best possible surface adhesion.

.7 At the end of each day's work seal the top edge of the membrane where it meets the substrate with termination sealant. Trowel to a feathered edge to seal termination and shed water.

.7 Application of Termination Sealant:

.1 Seal membrane terminations, heads of mechanical fasteners, masonry tie fasteners, around penetrations, duct work, electrical and other apparatus extending through the sheet air barrier membrane and around perimeter edge of membrane terminations at window and door frames with termination sealant.

3.7 FIELD QUALITY CONTROL

.1 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.

3.8 CLEANING

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools, and equipment.

3.9 PROTECTION OF WORK

.1 Protect finished work in accordance with Section 01 61 00 – Common Product Requirements.

.2 Do not permit adjacent work to damage work of this section.

.3 Permit damp substrates to dry. Do not expose the backside of the substrate to moisture or rain.

.4 Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane, including wall openings and construction activity above completed air barrier installations.

.5 Water resistive air barrier membranes are not designed for permanent exposure. Cover as soon as possible. Do not exceed 150 day exposure to the elements.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International Inc.

.1 ASTM D412-06a (2013), Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.

.2 ASTM D882-12, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.

.3 ASTM D903-98(2010), Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.

.4 ASTM D1004-13, Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.

.5 ASTM D1876-08(2015) e1, Standard Test Method for Peel Resistance of Adhesives (T-Peel Test).

.6 ASTM D1938-14, Standard Test Method for Tear-Propagation Resistance (Trouser Tear) of Plastic Film and Thin Sheeting by a Single-Tear Method.

.7 ASTM E2357-11 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

.8 ASTM D5147/D5147M-14, Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material

.9 ASTM E154-08a(2013)e1, Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

.10 ASTM E2178-13: Standard Test Method for Air Permeance of Building Materials.

.11 ASTM E283-04(2012): Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

.12 ASTM E1677-11 Specification for Air Retarder (AR) Material or System for Low-Rise Framed Building Walls

.13 ASTM E330/E330M-14: Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

.14 ASTM E331-00(2009): Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

.15 ASTM E96/E96M-15, Standard Test Methods for Water Vapor Transmission of Materials.

.2 Canadian Construction Documents Committee

.1 CCDC 2-08, Stipulated Price Contract.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-19.13M-M87, Sealing Compound, One Component, Elastomeric Chemical Curing.

.2 CAN/CGSB-19.24M-M90, Multi-Component, Chemical Curing Sealing Compound.

.3 CGSB 19-GP-14M, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.4 CGSB 37-GP-56M: Membrane, Modified, Bituminous, Prefabricated, and Reinforced.

.5 CAN/CGSB 37.58-M86, Membrane, Elastomeric, Cold-Applied Liquid, for Non-Exposed Use in Roofing and Waterproofing.

.4 Canadian Standards Association (CSA International)

.1 CSA A371-14, Masonry Construction for Buildings.

.5 Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications, and datasheet and include product characteristics, performance criteria, physical size, finish, and limitations.

.2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29–Health and Safety Requirements and manufacturer’s instructions.

.3 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 – Quality Control.

.1 Existing Substrate Condition: report deviations, as described in PART 3 -EXAMINATION in writing to Consultant.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Submit letter from manufacturer confirming adhesion to proposed substrate.

.4 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

1.3 QUALITY ASSURANCE

.1 Submit in writing, a document stating that the applicator of the primary air/vapour barrier membranes specified in this section is recognized by the manufacturer as suitable for the execution of the Work.

.2 Perform Work in accordance with the manufacturer’s written instructions of the air/vapour barrier membrane and this specification.

.3 Maintain one copy of manufacturer‘s written instructions on site.

.4 Qualifications:

.1 Applicator: company specializing in performing work of this section with minimum five (5) years documented experience with installation of air/vapour barrier systems.

.1 Completed installation must be approved by the material manufacturer.

.5 At the beginning of the Work and at all times during the execution of the Work, allow access to Work site by the air/vapour barrier membrane manufacturers' representative.

.6 Source components used in this section from one manufacturer, including sheet membrane, air/vapour barrier sealants, primers, mastics, and adhesives.

.7 Mock-Up:

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.

.2 Construct typical exterior wall panel, incorporating window and door frames c/w jamb, sill and head conditions, insulation, building corner condition, junction with foundation wall and roof system(s) and other building conditions as directed by the Consultant; illustrating materials interface and seals.

.3 Locate where directed.

.4 Mock-up may remain as part of finished work to Consultant's written approval.

.5 Allow 48 hours for inspection of mock-up by Consultant before air/vapour barrier Work.

.8 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.

.1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.

.2 Twice during progress of Work at 25% and 60% complete.

.3 Upon completion of Work, after cleaning is carried out.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.

.4 Store role materials on end in original packaging.

.5 Keep solvent away from open flame or excessive heat.

.6 Protect rolls from direct sunlight until ready for use.

.7 Avoid spillage: immediately notify Consultant if spillage occurs and start clean up procedures.

.8 Clean spills and leave area as it was prior to spill.

1.5 AMBIENT CONDITIONS

.1 Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.

.2 Ventilate enclosed spaces in accordance with Section 01 51 00 – Temporary Utilities.

.3 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

1.6 SEQUENCING

.1 Sequence work in accordance with Section 01 32 16 – Construction Progress Schedules - Bar (GANTT) Charts.

.2 Sequence work to permit installation of materials in conjunction with related materials and seals.

1.7 WARRANTY

.1 Provide manufacturer's five (5) year warranty under provisions of Section 01 78 00 – Closeout Submittals and in accordance with General Conditions (GC) CCDC 2 GC 12.3.

.2 Warranty: include coverage of installed sealant and sheet materials which:

.1 Fail to achieve air tight and watertight seal.

.2 Exhibit loss of adhesion or cohesion.

.3 Do not cure.

PART 2 - PRODUCTS

2.1 AIR/VAPOUR BARRIER SYSTEMS

.1 Obtain air/vapour barrier membrane components and accessories as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.

.2 Use one of the following wall air/vapour barrier that best suits the application as per manufacturers written recommendations:

.1 Self-Adhered Sheet Membrane.

.2

2.2 SELF-ADHERED SHEET MEMBRANE

.1 Primary sheet air/vapour barrier membrane, a SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film to the following physical properties:

.1 Thickness: 40 mils.

.2 Air leakage: <0.005 L/s.m² @ 75 Pa to ASTM E283-91.

.3 Tested to ASTM E 2357 for the air barrier assembly.

.4 Water vapour permeance: 1.6 ng/Pa.m².s/0.03 perms to ASTM E96.

.5 Low temperature flexibility: -30°C to CGSB 37-GP-56M.

.6 Elongation: 200% to ASTM D412-modifed.

.7 Acceptable material:

.1 For temperatures 4º and greater: 'Blueskin SA' as manufactured by Henry Bakor or approved alternate.

.2 For temperatures >4ºC to -12ºC: for application temperatures down to -12°C use Blueskin SA LT by Henry Bakor, or approved alternate.

2.3 TRANSITION SHEET MEMBRANE

.1 Transition Sheet Membrane (for use with spray polyurethane insulation, refer to Section 07 21 29 - Sprayed Insulation - Polyurethane Foam):

.1 Thickness: 40 mils.

.2 Air leakage: <0.005 L/s.m² @ 75 Pa to ASTM E283-91.

.3 Tested to ASTM E 2357 for the air barrier assembly.
.4 Water vapour permeance: 1.6 ng/Pa.m².s/0.03 perms to ASTM E96.
.5 Low temperature flexibility: -30°C to CGSB 37-GP-56M.
.6 Elongation: 200% to ASTM D412-modifed.
.7 Acceptable product: 'Blueskin SA', by Bakor or approved alternate.

2.4 THROUGH-WALL FLASHING MEMBRANE

.1 Through-Wall Flashing Membrane:
.1 Rubberized reinforced asphalt compound, self-adhered membrane, width to suite application.
.2 Thickness: 40 mils.
.3 Puncture Resistance - Membrane to ASTM E154: 180N minimum/40 lbf.
.4 Tear resistance: 200N /13 lbs. MD, to ASTM D1004.
.5 Tested to ASTM E 2357 for the air barrier assembly.
.6 Water vapour permeance: 1.6 ng/Pa.m².s/0.03 perms to ASTM E96 Method B.
.7 Low temperature flexibility: -30°C to CGSB 37-GP-56M.
.8 Lap Peel Strength at -4°C to (ASTM D1876): 8.75N/cm/5 lbf/in width.
.9 Adhesion to Concrete to ASTM D903: 8.75N/cm/5.0 lb/in. width
.10 Elongation: 200% to ASTM D412-modifed.
.11 Acceptable Product: "Blueskin TWF" by Bakor, or approved alternate.

2.5 PRIMERS AND ADHESIVES

.1 Adhesives and Primers: as recommended by air/vapour barrier manufacturer to suit application.

2.6 SEALANTS

.1 Sealants in accordance with Section 07 92 00 – Joint Sealants unless otherwise indicated.

.2 Termination Sealant in exposed locations: a sealing compound having the following physical properties:
.1 Compatible with sheet air barrier, roofing and waterproofing membranes and substrate.
.2 Complies with Fed. Spec. TT-S-00230C, Type II, Class A.
.3 Complies with ASTM C 920, Type S, Grade NS, Class 25.
.4 Elongation: 450 – 550%.
.5 Remains flexible with aging.
.6 Seals construction joints up to 1” wide.
.7 Colour: as later selected by Consultant from manufacture’s standard colour range.
.8 Acceptable material: ‘HE925 BES Sealant’ manufactured by Henry Bakor, or approved alternate.

.3 Termination Sealant in locations concealed from UV exposure: a sealing compound having the following characteristics:
.1 Compatible with sheet waterproofing membrane and substrate.
.2 Solids by volume: 70%.
.3 Vapour permeance: 2.9 ng/Pa.m².s, ASTM E96.

.4 Complies with CGSB 37.29.
.5 Remains flexible with ageing.
.6 Adheres to wet surfaces.
.7 Chemical resistance: Alkalis, calcium chloride, mild acid and salt solutions.
.8 Colour: black.
.9 Acceptable material: 'Polybitume 570-05' Polymer Modified Sealing Compound manufactured by
.10 Henry Bakor, or approved alternate.

2.7 ACCESSORIES

.1 Thinner and cleaner for Butyl and Neoprene Sheet: recommended by sheet material manufacturer.

.2 Attachments: galvanized steel bars and anchors, as recommended by membrane manufacturer.

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 datasheets.

3.2 GENERAL

.1 Perform Work in accordance with Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification requirements for materials and installation.

.2 Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program and requirements for materials and installation.

.3 Perform Work in accordance with Canadian Urethane Foam Contractor's Association - Professional Contractor Quality Assurance Program and requirements for materials and installation.

3.3 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept work of this section.

.2 Ensure surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.

.3 Report unsatisfactory conditions to Consultant in writing.

.4 Do not start work until deficiencies have been corrected.
.1 Beginning of Work implies acceptance of conditions.

3.4 PREPARATION

.1 Remove loose or foreign matter, which might impair adhesion of materials.

.2 Ensure substrates are clean of oil or excess dust; masonry joints struck flush, and open joints filled;

and concrete surfaces free of large voids, spalled areas or sharp protrusions.

.3 Ensure substrates are free of surface moisture prior to application of self-adhesive membrane and primer.

.4 Ensure metal closures are free of sharp edges and burrs.

.5 Prime substrate surfaces to receive adhesive and sealants in accordance with manufacturer's instructions.

3.5 AIR/VAPOUR BARRIER VOID COVERINGS

.1 At open joints in substrate exceeding 319 mm/¾"/4" in width, and at other locations shown to receive air/vapour barrier membranes, provide 26 ga. galvanized metal backing for air barrier membrane, securely fastened to each side of joint.

.1 Examples of gaps and voids required to be covered, but not limited to are:

.1 Control joints.

.2 Expansion joints.

.3 Gaps between dissimilar materials.

.4 Gaps resulting from structural steel erection.

.5 Other similar gaps and voids.

3.6 SELF-ADHERED SHEET MEMBRANE

.1 Adhesive or Primer for Transition and Through-wall Flashing Membrane (Self-Adhering):

.1 Apply adhesive or primer for self-adhering membranes at rate recommended by manufacturer.

.2 Apply to all areas to receive air/vapour barrier membrane, transition sheet and through-wall flashing membrane, as indicated on drawings by roller or spray and allow minimum 30 minute open time. Surfaces not covered by self-adhering transition membrane or self-adhering through-wall flashing membrane during the same working day must be re-applied.

.2 Through-Wall Flashing Membrane (Self-Adhering):

.1 Apply through-wall flashing membrane to prepared surfaces as indicated.

.2 Apply through-wall flashing membrane to masonry surfaces in accordance with CSA A371 Masonry Construction for Buildings

.3 Apply through-wall flashing onto exterior wall substrate membrane and lap over prefinished metal drip plates or flashings:

.1 on top of foundation walls,

.2 along the base of masonry veneer walls,

.3 over windows, doors, louvers and other wall openings required to be protected,

.4 other locations as indicated.

.4 Form flashing membrane applications continuous and extend up exterior wall substrate a minimum 200 mm/8" and to edge of edge of prefinished metal drip plate or flashing.

.5 At the end of each day's work seal the top edge of the membrane where it meets the substrate using liquid air seal mastic. Trowel apply a feathered edge to seal termination and shed water.

.6 Align and position leading edge of through-wall flashing membrane with the front horizontal edge of prefinished metal drip plate or flashing to the exterior face of the exterior masonry veneer and other exterior finishes to Consultant approval. Trim all material back from drip plate or flashing so as it is not visible after installation of exterior finishes.

.7 At locations where flashing terminates or intersects wall openings including door frames, seal

over “end dam” flashing to protect openings and redirect water out. Trim off excess material so as it is not visible after installation of exterior finishes to Consultant approval.

.8 Partially remove protective film and roll membrane over surface and up vertically.

.9 Press firmly into place. Ensure minimum 2” overlap at all end and side laps. Promptly roll all laps and membrane to a positive seal.

.10 Ensure all preparatory work is complete prior to applying self-adhering through-wall flashing membrane.

.3 Transition Membrane (Self-Adhering):

.1 Apply transition membranes in accordance with spray polyurethane foam insulation and air/vapour manufactures’ written recommendations as required to provide a complete building air/vapour system.

.2 Apply transition sheet membrane to prepared surfaces as indicated.

.3 Apply transition sheet membrane over all adjoining dissimilar substrate materials such as but not limited to connections of existing masonry block to steel or concrete; drywall or plywood to steel or concrete and all beams, columns, window and door frames etc. using strips as required, lapped a minimum of 3" on both substrates and centered over joint.

.4 Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2” overlap at all end and side laps.

.5 Tie-in to window frames, aluminum screens, hollow metal doorframes, spandrel panels, roofing system and at the interface of dissimilar materials as indicated on drawings.

.6 At tops of foundation walls, lap transition sheet membrane onto vertical wall substrate 8" minimum, and over top of foundation wall to outside edge. Trim all overhanging material.

.7 Promptly roll all laps and membrane with a counter top roller to effect seal.

.8 Ensure all preparatory work is complete prior to applying liquid applied air/vapour barrier membrane.

.4 Air/Vapour Barrier Membrane:

.1 Apply self-adhering membrane complete and continuous to prepared and primed substrate in an overlapping shingle fashion and in accordance with manufacturer's recommendations and written instructions. Stagger all vertical joints.

.2 Align and position self-adhering membrane, remove protective film and press firmly into place. Ensure minimum 2” overlap at all end and side laps. Promptly roll all laps and membrane with a counter top roller to provide a positive seal.

.3 At the end of each day’s work seal the top edge of the membrane where it meets the substrate using liquid air seal mastic or termination sealant to seal termination and shed water.

.4 Tie-in to window frames, aluminum screens, hollow metal doorframes, spandrel panels, roofing system and at the interface of dissimilar materials as indicated on drawings. Refer also to manufacturers’ standard details.

.5 Ensure all projections, including wall ties, are properly sealed with a caulk application of liquid air seal mastic.

.6 Mechanically fasten membrane through securement bars to all window, door, louvers and curtain wall sections as recommended by membrane manufacturer where proper adhesion and bonding cannot be maintained.

.7 For membrane to be applied to underside of substrate surfaces provide special attention to ensure maximum surface area adhesion is obtained.

3.7 FIELD QUALITY CONTROL

.1 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.

3.8 CLEANING

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.9 PROTECTION OF WORK

.1 Protect finished work in accordance with Section 01 61 00 – Common Product Requirements.

.2 Do not permit adjacent work to damage work of this section.

.3 Ensure finished work is protected from climatic conditions.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 The Aluminum Association, Inc. (AA)

.1 AA DAF45-03, Designation System for Aluminum Finishes.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A 240/A 240M-15a, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

.2 ASTM A 480/A 480M-15, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.

.3 ASTM A 653/A 653M-15, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.

.4 ASTM B 209-14, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.

.5 ASTM B 211-12e1, Standard Specification for Aluminum and Aluminum Alloy Rolled or Cold Finished Bar, Rod, and Wire.

.6 ASTM B 221-14, Standard for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

.7 ASTM C 1166-06(2011), Standard Test Method for Flame Propagation of Dense and Cellular Elastomeric Gaskets and Accessories.

.8 ASTM D 395-14, Standard Test Methods for Rubber Property Compression Set.

.9 ASTM D 412-06a (2013), Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers Tension.

.10 ASTM D 523-14, Standard Test Method for Specular Gloss.

.11 ASTM D 624-00(2012), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

.12 ASTM D 822-13, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.13 ASTM D 1149-07(2012), Standard Test Methods for Rubber Deterioration Cracking in an Ozone Controlled Environment.

.14 ASTM D 2240-05(2010), Standard Test Method for Rubber Property Durometer Hardness.

.15 ASTM D 2395-14, Standard Test Methods for Specific Gravity of Wood and Wood Based Materials.

.16 ASTM D 4442-15, Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood Based Materials.

.17 ASTM E 84-15a, Standard Test Method for Surface Burning Characteristics of Building Materials.

.3 Canadian General Standards Board (CGSB)

.1 CGSB 19-GP-14M-76(R1984), Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.5 Underwriter Lavatories of Canada (ULC):

.1 CAN/ULC-S102-10, Surface Burning Characteristics of Building Materials and Assemblies

.2 ULC-S114-05, Standard Method of Test for Determination of Non-combustibility in Building Materials

.3 CAN/ULC-S134-92, Fire Test for Exterior Wall Assemblies

.4 ULC-S135-04, Standard Test Method for the Determination of Combustibility Parameters of Building Materials Using an Oxygen Consumption Calorimeter (Cone Calorimeter), Includes Amendment 1.

1.2 DESIGN REQUIREMENTS

.1 Design composite , and aluminum cladding panels to allow for thermal movement of component materials caused by variation in ambient temperature range of 80 degrees C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

.2 Maximum deviation from vertical and horizontal alignment of erected panels: 1 to 1000.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature for cladding system materials, specifications, and datasheet and include product characteristics, performance criteria, physical size, finish, and limitations.

.2 Submit two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29 – Health and Safety Requirements and Manufacturer’s Instructions.

.3 Shop Drawings:

.1 Indicate dimensions and thickness of panels, fastening and anchoring methods, detail, and location of joints and gaskets, thermal movement provision, wall openings, head, jamb, and sill details, materials and finish, compliance with design criteria and requirements of related work. Provide engineering stamped drawings for the design of anchoring structure and installation.

.4 Samples:

.1 Submit duplicate 100 x 100 mm samples of wall and soffit system, representative of materials, finishes, and colours.

.5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.

.1 Certificates: submit certificates signed by manufacturer certifying that composite wall panels comply with specified performance characteristics and physical properties.

.2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

.3 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.4 QUALITY ASSURANCE

.1 Manufacturer: company specializing in producing composite wall panels with 5 years documented experience with sufficient capacity to produce and deliver required units without causing delay in work.

.2 Installer: person specializing in composite wall panel installations with 5 years documented experience approved by manufacturer.

.3 Mock-ups: construct mock-ups in accordance with Section 01 45 00 - Quality Control and to requirements supplemented as follows:

- .1 Provide mock-up for evaluation of surface finishes and workmanship.
- .2 Provide initial production units for job-site assembly with other materials for review.
- .3 Coordinate type and location of mock-ups with project requirements.
- .4 Accepted units will be used as standard for acceptance of production units.
- .5 Remove and replace units which are not accepted.
- .6 Do not proceed with remaining work until workmanship, colour, and finish are reviewed by Consultant.
- .7 Refinish mock-up area as required to produce acceptable work.
- .8 When accepted, mock-up will demonstrate minimum standard of quality required for this work.

.4 Approved mock-up may remain as part of finished work to Consultant approval. Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section and on-site installation], with contractor's representative and with other trades affected by the work in accordance with Section 01 32 16 - Construction Progress Schedule - Bar (GANTT) Chart to:

- .1 Verify project requirements.
- .2 Review installation and substrate conditions.
- .3 Coordination with other building subtrades.
- .4 Review [manufacturer's] installation instructions and warranty requirements.

.5 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.

- .1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
- .2 Twice during progress of Work at 25% and 60% complete.
- .3 Upon completion of Work, after cleaning is carried out.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Deliver, store and protect material in accordance with panel manufacturer's recommendations.

.3 Deliver Materials to site in Manufacturer's original, unopened packaging, with labels clearly identifying product name and manufacturer.

.4 Storage and Handling Requirements:

- .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect composite panel materials from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.5 Handling: Open crate within 72 hours of material delivery. Remove extra top panel and inspect contents by lifting each panel vertically to prevent chafing of the decorative face. Protect materials during handling to prevent damage.

.6 Do not expose panels with strippable film to direct sunlight or extreme heat. Protective strippable peel-off film must be removed immediately after panel is installed.

1.6 PROJECT CONDITIONS

.1 Do not install composite wall materials under environmental conditions where it is likely to be immersed in water or where the temperature is likely to exceed 50 degrees C for extended periods of time.

1.7 WARRANTY

.1 Manufacturer's Warranty: Furnish panel manufacturer's standard limited warranty document executed by an authorized company official. Manufacturer's warranty is in addition to and not a limitation of other rights Owner may have under the Contract Documents.

.2 Panel Lamination Warranty: Provide manufacturer's extended ten (10) year warranty commencing on Date of Substantial Completion to maintain the mechanical qualities, water tightness and frost resistance, providing the panels are correctly installed on a ventilated construction according to the installation procedures of the manufacturer.

.3 Finish Warranty: Thirty (30) years.

.4 Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owners may have under Contract Documents.

1.8 PERFORMANCE REQUIREMENTS

.1 Provide 25 mm / 1" minimum air space at top and bottom of building, or each wall termination, to facilitate airflow from behind the panels. Do not block vertical airflow at windows, doors, eaves, or at the base of the building. Provide continuous airflow from bottom to top to permit air movement behind each panel. Air flow behind the panels is critical to the performance of the Rear Ventilated Rain Screen design.

.2 Perforated aluminum bird screen to allow minimum 50% free airflow.

.3 Provide fasteners that will accommodate thermal expansion/ contraction without excessive stress to the panel. Provide each panel with central lock points to support gravity loads.

.4 Design and install cladding system to allow for thermal movement of local climate with at least 60 degrees C ambient or panel temperature fluctuations, without causing undue stress on fasteners or panel or other detrimental effects.

.5 Design to accommodate, by means of control joints, movement in wall system and between wall system and building structure, caused by structural movements, without permanent distortion, damage to in fills or racking of joints.

.6 Design members and suspension system to withstand gravity load, live loads, including negative loads, as calculated in accordance with the Ontario building code.

.7 Provide structural panel supports to provide minimum L/300 deflection stiffness as required by panel manufacturer. Panels themselves shall not reflect more than L/180 maximum at serviceability limit states.

PART 2 - PRODUCTS

2.1 COMPOSITE ALUMINUM PANELS

.1 Acceptable Product: Citadel Architectural Products or approved equal.

.2 Thickness: 0.236”.

.3 Product Performance:

.1 Bond Integrity: When tested for bond integrity, in accordance with ASTM D1781 (simulating resistance to panel delamination), there shall be no adhesive failure of the bond a) between the core and the skin nor b) cohesive failure of the core itself below the following values:

.1 Peel Strength:

.1 115 N mm/mm (22.5 in lb/in) as manufactured.

.2 115 N mm/mm (22.5 in lb/in) after 21 days soaking in water at 70°F.

.2 Fire Performance:

.1 ASTM E 84 Flame Spread Index must be less than 25, Smoke Developed Index must be less than 450.

.2 ASTM D 1929 A self ignition temperature of 650°F or greater.

.3 ASTM D-635 Requires a CC1 classification.

.4 Finishes:

.1 Coil coated KYNAR® 500 or HYLAR® 5000 based Polyvinylidene Fluoride (PVDF) or Fluoro Ethylene – Alkyl Vinyl Ether (FEVE) resin in conformance with the following general requirements of AAMA 2605.

.1 Colour:

.1 Colour as selected by the Consultant from manufacturer's full colour palette in Standard Metallic, Standard Kynar, and Premium Kynar. Allow for up to five (5) colours.

.2 Custom colour to match Pantone RGB colour R 225, G 100, B 30.

.1 Provide sample for approval by Consultant.

.2 Coating Thickness:

.1 Colours: 1.0 mil (±0.2 mil).

.3 Hardness: ASTM D-3363; HB minimum using Eagle Turquoise Pencil.

.4 Impact:

.1 Test method: ASTM D-2794; Gardner Variable Impact Tester with 5/8" mandrel.

.2 Coating shall withstand reverse impact of 1.5"/pounds per mil substrate thickness.

.3 Coating shall adhere tightly to metal when subjected to #600 Scotch Tape pick-off test. Slight minute cracking permissible. No removal of film to substrate.

.5 Adhesion:
  .1 Test Method: ASTM D-3359.
  .2 Coating shall not pick off when subjected to an 11" x 11" x 1/16" grid and taped with #600 Scotch Tape.
.6 Humidity Resistance:
  .1 Test Method: ASTM D-2247.
  .2 No formation of blisters when subject to condensing water fog at 100% relative humidity and 100°F for 4000 hours.
.7 Salt Spray Resistance:
  .1 Test Method: ASTM B-117: Expose coating system to 4000 hours, using 5% NaCl solution.
  .2 Corrosion creepage from scribe line: 1/16" max.
  .3 Minimum blister rating of 8 within the test specimen field.
.8 Weather Exposure:
  .1 Outdoor:
    .1 Ten-year exposure at 45° angle facing south Florida exposure.
    .2 Maximum colour change of 5 Delta E units as calculated in accordance with ASTM D-2244.
    .3 Maximum chalk rating of 8 in accordance with ASTM D-4214.
    .4 No checking, crazing, adhesion loss.
.9 Chemical Resistance:
  .1 ASTM D-1308 utilizing 10% Muriatic Acid for an exposure time of 15 minutes. No loss of film adhesion or visual change when viewed by the unaided eye.
  .2 ASTM D-1308 utilizing 20% Sulfuric Acid for an exposure time of 18 hours. No loss of film adhesion or visual change when viewed by the unaided eye.
  .3 AAMA 2605 utilizing 70% reagent grade Nitric Acid vapor for an exposure time of 30 minutes. Maximum colour change of 5 Delta E units as calculated in accordance with ASTM D-2244.

2.2 PANEL FABRICATION

.1 Composition: Two sheets of aluminum sandwiching a solid core of extruded thermoplastic material formed in a continuous process with no glues or adhesives between dissimilar materials. The core material shall be free of voids and/or air spaces and not contain foamed insulation material. Products laminated sheet by sheet in a batch process using glues or adhesives between materials shall not be acceptable.

.2 Aluminum Face Sheets:
  .1 Thickness: 0.0197" (nominal).

.3 Panel Weight:
  .1 0.236": 1.59 lbs./ft².

.4 Tolerances:
  .1 Panel Bow: Maximum 0.8% of any 72” panel dimension.
  .2 Panel Dimensions: Field fabrication shall be allowed where necessary, but shall be kept to an absolute minimum. All fabrication shall be done under controlled shop conditions when possible.
  .3 Panel lines, breaks, and angles shall be sharp, true, and surfaces free from warp and buckle.

2.3 COMPOSITE WOOD VENEER PANELS

.1 Acceptable Manufacturer:

.1 'Prodema' as distributed by Sound Solution, Inc., Deerhurst, ON, phone: 800-667-2776, or 416-740-0303, email mail@soundsolutions.ca, web site www.soundsolutions.ca.Equivalent systems, single sourced from the following manufacturers are also acceptable for use:

.1 'Parklex Façade' as manufactured by Composites Gurea, S.A. and distributed by SRP Building Products Inc. phone 705-495-0927, web site www. srpinc.ca. or approved alternate.

.2 Composite Wood Veneer Exterior Wall Panels:

.3 Panels: laminated wood panel, single-face surfacing, outer ply Ayous or Boak wood coated with phenolic resins, inner core paper fibers treated with thermo-hardened resins.

.1 Exposed Finish: Not more than one (1) colour as later selected by Consultant from panel manufacturer's complete range.

.2 Total panel thickness: 8 mm / 5/16" thick.

.3 Panel size: As indicated on the drawings.

.4 Fire Rating: Class A in accordance with:

.1 Meet requirements of ULC S-134-92.

.2 ULC S102 – FSC1of 14 and Smoke development of 24.

.5 Flame Spread Rating: ASTM E-84 criteria for flame spread 0 and smoke development 125.

.4 Panel Fixation System:

.1 Factory mounted, fully adhered to panel, die cast aluminum extruded HF (Hidden Fastener) top and bottom clips by Engineered Assemblies.

.2 Die cast aluminum extruded HF horizontal receiver rail locations as determined and approved by structural engineer, to align with factory mounted die cast aluminum extruded HF top and bottom clips.

.3 Receiver rail to start and terminate 10 mm / 3/8" from all vertical panel reveals to conceal rails from view.

2.4 FRAMING SYSTEM

.1 Sub-girt System: structural quality steel with Z275 zinc coating to ASTM A653/A653M, capable of accepting exterior sheet, with structural attachment to building frame, minimum base metal thickness and spacing as required for a complete system to withstand required wind loading/uplift.

.1 Attachment System: Mechanical Concealed Fasteners with colour matched caps to an Aluminum Subframe by Prodema. Continuous Horizontal Z-girts: width as indicated on drawings, minimum 1.2 mm / 18 gauge thick, galvanized zinc-coated steel to ASTM A653 with Grade A coating Z275.

.2 Continuous Vertical Hat Bar: 80 mm / 3 1/4" wide x 22 mm deep, minimum 1.2 mm / 18 gauge thick, galvanized zinc-coated steel to ASTM A653 with Grade A coating Z275, painted black. Perforated at horizontal applications.

.3 Locations and spacing for framing system members as determined by shop drawing structural engineer, to align with modular panel fasteners spaced based on manufacturer's panel load data.

.4 Cavity behind panel: Minimum 25 mm / 1" of unrestricted space.

.5 Gap between panels: Minimum of 8 mm / 5/16" to allow for expansion and contraction.

.6 Plans, elevations, details, characteristics, and other requirements indicated are based upon standards by one manufacturer. It is intended that other manufacturers, receiving prior approval, may be acceptable, provided their details and characteristics comply with size and profile requirements, and material/performance standards.

.7 System must not generally have any visible fasteners, telegraphing or fastening on the panel faces or any other compromise of a neat and flat appearance.

.8 System shall comply with the applicable provisions of the "Metal Curtain Wall, Window, Storefront, and Entrance Guide Specifications Manual" by AAMA and ANSI/AAMA 302.9 requirements for aluminum windows.

.9 Fabricate panel system to dimension, size, and profile indicated on the drawings based on a design temperature of 70°F.

.10 Fabricate panel system so that no restraints can be placed on the panel, which might result in compressive skin stresses. The installation detailing shall be such that the panels remain flat regardless of temperature change and at all times remain air and water tight.

.11 The finish side of the panel shall have a removable plastic film applied prior to fabrication, which shall remain on the panel during fabrication, shipping, and erection to protect the surface from damage.

.2 System Type:

.1 Rear Ventilated Rain Screen:

.1 System must provide a reveal joint as detailed on drawings. Provide moisture barrier and sheathing as shown on drawings.

.3 System Performance:

.1 Wind Load:

.1 If system tests are not available, mock-ups shall be constructed and tests performed under the direction of an independent third party laboratory, which show compliance to the following minimum standards:

.1 Panels shall be designed to withstand the Design Wind Load based upon the local building code, but in no case less than 20 pounds per square foot (psf) and 30 psf on parapet and corner panels. Wind load testing shall be conducted in accordance with ASTM E330 to obtain the following results.

.2 Normal to the plane of the wall between supports, deflection of the secured perimeter-framing members shall not exceed L/175 or 3/4", whichever is less.

.3 Normal to the plane of the wall, the maximum panel deflection shall not exceed L/60 of the full span.

.4 Maximum anchor deflection shall not exceed 1/16".

.5 At 1-1/2 times design pressure, permanent deflections of framing members shall not exceed L/100 of span length and components shall not experience failure or gross permanent distortion. At connection points of framing members to anchors, permanent set shall not exceed 1/16".

.2

.3 Air/Water System Test

.1 If system tests are not available, mock-ups shall be constructed and tests performed under the direction of an independent third party laboratory, which show compliance to the following minimum standards:

.1 Air Infiltration - When tested in accordance with ASTM E283, air infiltration at 1.57 psf must not exceed 0.06 cfm/ft² of wall area.

.2 Water Infiltration - Water infiltration is defined as uncontrolled water leakage through the exterior face of the assembly. Systems not using a construction sealant at the panel joints (i.e. Rout and Return Dry and Rear Ventilated Systems) shall be designed to drain any water leakage occurring at the joints. No water infiltration shall occur in any system under a differential static pressure of 6.24 psf after 15 minutes of exposure in accordance with ASTM E331.

.3 Pressure Equalized Rain Screen Systems shall comply with AAMA 508-05 Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems.

2.5 ACCESSORIES

.1 Concealed fasteners and moldings as required for panel system's design by panel system manufacturer stainless steel.

.2 Bird and Vent Screen:

.1 Continuous vent screen, with minimum 50% free air flow, from perforated 0.012” thick aluminum, painted black located at top and bottom of panel system, where opening is minimum 1" wide.

.1 Finish: colour and finish to match composite wall panel.

.3 Flashings: refer to Section 0 762 00 Sheet Metal Flashing and Trim.

.4 Insulation: Refer to Section 07 21 13 Board Insulation 07 21 29 Sprayed Insulation - Polyurethane Foam

.5 Air/Vapour Barrier Transition Membranes: Refer to Section 07 27 00 Air-Vapour Barriers.

.6 Gypsum Sheathing: Refer to Section 09 21 16 Gypsum Board Assembles.

.7 Adhesive: in accordance with manufacturers written recommendations.

.8 Thermal Tape: low to medium pressure gasket from neoprene rubber and cork blend with a high-strength acrylic adhesive on one side, protected by siliconized liner, with anti-skid properties, 38 mm / 1 1/2" wide x length to suit.

.9 Scupper: same material as composite panels. [Size and profile as indicated on drawings].

.10 Exposed sealants: as recommended by manufacturer in accordance with Section 07 92 00 – Joint Sealants, colour to match panel.

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 datasheets.

3.2 EXAMINATION

.1 Prior to installation:

.1 Examine alignment of substrate.

.2 Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings where materials outlined in this Section are indicated to fit walls and other construction.

.3 Establish dimensions and proceed with materials outlined in this Section where field measurements cannot be made without delaying the work; allow for site trimming and fitting.

.4 Notify Consultant in writing if substrate does not comply with requirements of panel installer.

.5 Do not start work until deficiencies have been corrected.

.1 Beginning of Work implies acceptance of conditions.

3.3 PREPARATION - GENERAL PREPARATION

.1 Prepare substrate surfaces using the methods recommended by the manufacturer.

.2 Field measure and verify dimensions as required.

.3 Protect adjacent areas or surfaces from damage as a result of the Work of this Section.

.4 Air Barrier Membrane System for Open Joint Cladding: Install air barrier membrane system for open joint cladding system where indicated complete with all purpose made accessories such as, but not limited to sheathing tape, washers, fasteners, flashings and ‘rain screen’ design components, as required for a complete installation system in accordance with manufacturer’s written instructions.

.5 Metal furring and Metal Furring and Sub-girt System: Erect metal furring and sub-girt system plumb, aligned and securely attached building framing:

.1 Minimum thickness metal furring and sub-girt steel - 1.6 mm / .060” (16 ga.).

.2 Provide flat black finished sub-girt framing with matching fasteners in locations to receive open joint cladding systems.

.6 Thermal Tape: install thermal tape between metal subgirt clips and metal framing members as required to prevent cold bridging from exterior to interior building surfaces.

.7 Protect metal surfaces in contact with concrete, masonry mortar, plaster or other cementitious surfaces with isolation coating.

.8 Do not use caulking, gaskets or sealants on panel face or edges.

3.4 INSTALLATION OF COMPOSITE ALUMINUM WALL PANELS

.1 Install composite panels in accordance with manufacturer's written instructions and approved shop drawings.

.2 Erect panels plumb, level, and true.

.3 Attachment system shall allow for the free and noiseless vertical and horizontal thermal movement due to expansion and contraction for a material temperature range of -20°F to +180°F. Buckling of panels, opening of joints, undue stress on fasteners, failure of sealants or any other detrimental effects due to thermal movement will not be permitted. Fabrication, assembly, and erection procedure shall account for the ambient temperature at the time of the respective operation.

.4 Anchor panels securely per engineering recommendations and in accordance with approved shop drawings to allow for necessary thermal movement and structural support.

.5 Conform to panel fabricator's instructions for installation of concealed fasteners.

.6 Do not install component parts that are observed to be defective, including warped, bowed, dented, abraised, and broken members.

.7 Do not cut, trim, weld, or braze component parts during erection in a manner which would damage the finish, decrease strength, or result in visual imperfection or a failure in performance. Return component parts which require alteration to shop for refabrication, if possible, or for replacement with new parts.

.8 Separate dissimilar metals and use gasketed fasteners where needed to eliminate the possibility of corrosive or electrolytic action between metals.

3.5 INSTALLATION OF COMPOSITE WOOD VENEER WALL PANELS

.1 Install composite wood veneer framing system to ‘rainscreen principals’ [as detailed] in accordance with manufacturer's written instructions and shop drawings. Provide:

.1 25 mm / 1” minimum airspace[as indicated between substrate and the back surface of the composite wood veneer panels.

.2 9 mm / 3/8” minimum gap between panels and along perimeter edges.

.3 20 mm / 0.8” at base and top to all ventilated facades.

.2 Centre vertical panel joints over black vertical girt framing members.

.3 Prior to mounting, pre-drill [14 mm diameter holes for metal furring. Install composite wood veneer panels with purposed made screws as supplied by panel manufacturer.

.1 Place holes in consistent pattern to Consultant approval within 15 mm / 0.6” to 38 mm / 1.5” from the panel edge.

.2 Do not over tighten fasteners to prevent thermal expansion and damage to outer coating.

.4 Holes to be filled with manufacturer supplied silicone sealant and colour matched cap.

.5 Maximum distances between fasteners to suit panel thickness as follows:

Panel Thickness	Distance Between Fasteners
8 mm / 5/16"	600 mm / 24"
10 mm / 3/8”	600 mm / 24"
12 mm / 7/16"	800 mm / 32"
14 mm / 9/16"	1000 mm / 40"
16 mm / 5/8"	1000 mm / 40"
18 mm / 11/16"	1000 mm / 40"
20 mm / 13/16"	1000 mm / 40"
22 mm / 7/8"	1000 mm / 40"

.6 Erect composite wood panels in straight lines, true, level and plumb. Maintain dimensions required by manufacturer for minimum distances from edge for holes and penetrations with minimum unobstructed vertical airspace to ensure proper air circulation.

.7 Space at top and bottom of each wall minimum 25 mm / 1", as per manufacturer's details.

.8 Install continuous bird/insect and vent screen located at top and bottom of panel system and in any open openings/spaces exceeding 2mm in panel system.

.9 Obtain manufacturer's written instructions should cutting of composite wood veneer panels be required.

.10 Remove strippable coating from panels as they are erected.

3.6 FIELD QUALITY CONTROL

.1 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.

3.7 CLEANING

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.2 Progress Cleaning: Leave work area clean at the end of each work day, ensuring safe movement of passing pedestrians.

.3 Restore panels and accessory components damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by the Consultant, remove and replace damaged panels with new at no additional cost to the Owner.

.4 Ensure weep holes and drainage channels are unobstructed and free of dirt and sealants.

.5 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.6 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society of Mechanical Engineers (ASME).
- .1 ANSI/ASME B18.6.3-2013, Machine Screws, Tapping Screws, and Metallic Drive Screws.

.2 American Society for Testing and Materials International, (ASTM).
- .1 ASTM D2369-10e1, Standard Test Method for Volatile Content of Coatings.
- .2 ASTM D 2832-92(2011), Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
- .3 ASTM D 5116-10, Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.

.3 Canadian General Standards Board (CGSB).
- .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
- .2 CAN/CGSB-93.2-M91, Prefinished Aluminum Siding, Soffits and Fascia, for Residential Use.
- .3 CAN/CGSB-93.3-M91, Prefinished Galvanized and Aluminum-Zinc Alloy Steel Sheet for Residential Use.
- .4 CAN/CGSB-93.4-92, Galvanized and Aluminum-Zinc Alloy Coated Steel Siding Soffits and Fascia, Prefinished, Residential.
- .5 CGSB 93.5-92, Installation of Metal Residential Siding, Soffits and Fascia.

.4 Canadian Standards Association (CSA International).
- .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

.5 Underwriters' Laboratories of Canada (ULC).
- .1 CAN/ULC-S706-09, Wood Fibre Thermal Insulation for Buildings.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for metal siding and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29 – Health and Safety Requirements.

.3 Shop Drawings:
- .1 Indicate dimensions, profiles, attachment methods, schedule of wall elevations, trim and closure pieces, soffits, fascia, metal furring, and related work.
- .2 Include anchorage details for each metal cladding wall, framing system, framing member sizes, spacing, material thickness exclusive of coatings and wind loading / uplift.

.4 Samples:
- .1 Submit duplicate 300 x 300 mm / 12” x 12” samples of siding material, of colour and profile specified.

1.3 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

.4 Mock-ups:

.1 Construct mock-up in accordance with Section 01 45 00 – Quality Control for each cladding profile.

.2 Construct mock-up 100 sq. ft. minimum size showing typical lap joint, one inside corner and one outside corner. Accepted mock-up may form part of complete work.

.3 Allow 48 hours for inspection of mock-up by Consultant before proceeding with siding and roofing work.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect metal siding from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.5 WARRANTY

.1 Provide a five (5) year manufacturer’s warranty complete with lawsuit liability insurance against snow and ice retention system failure, commencing from the date of Substantial Performance. Warranty to include:

.1 Design, defects in materials and workmanship.

.2 At no cost to Owner, full replacement including substrate, damaged system resulting from failure of snow and ice retention system, stops, trims, paint, caulking, sealants, and other snow and ice retention system components.

.2 Provide manufacturer’s written warranty commencing from the date of Substantial Performance. Warranty to include:

.1 Failure of factory-applied exterior finish for 40 years warranty period as follows:

.1 Will not crack, chip, or peel (lose adhesion).

.2 Will not chalk in excess of a number six (6) rating, in accordance With ASTM D-4214-98 method D659 at any time.

.3 Will not change colour more than eight (8.0) Hunter ΔE units as determined by ASTM method D-2244-02.

.4 Warranty excludes minute fracturing that may occur during the normal fabrication process.

PART 2 - PRODUCTS

2.1 METAL WALLCLADDING COMPONENTS

.1 Horizontal Steel Sub-Girts:
- .1 Minimum 1.21 mm / 18 ga. thick formed galvanized steel, ASTM A653M Grade 230 with Z275 zinc coating. Full depth of wall system, factory notched and formed to match liner.

.2 Preformed Metal Wall Cladding: Prefinished, to CAN/CGSB 93.4, Type A vertical, Class Plain, as follows:
- .1 Metal Cladding:
  - .1 Profile AD300 by Vicwest.
  - .2 Fabricated from Z275 galvanized sheet steel conforming to ASTM A653M grade 230 or AZ150 galvalume, sheet steel conforming to ASTM A792M grade 230, having a nominal core thickness of 22 gauge.
- .2 Acceptable Finish: 'Weather X' by Vicwest.
- .3 Colour:
  - .1 Not more than one (1) colours as later selected by Consultant from manufacturer's standard colour range.

.3 Galvanized Metal Liner Panel:
- .1 Acceptable Product: 'Channel Wall' by VicWest.

2.2 METAL FRAMING

.1 Continuous Vertical Z-girts: width as indicated on drawings, minimum 1.2 m / 18ga. thick, galvanized zinc-coated steel to ASTM A653 with Grade A coating Z275.

.2 Continuous Vertical Hat Bar: 80 mm / 3 1/4" wide x 22 mm deep, minimum 1.2 mm / 18 gauge thick, galvanized zinc-coated steel to ASTM A653 with Grade A coating Z275, painted black. Perforated at horizontal applications.

.3 Locations and spacing for framing system members as determined by shop drawing structural engineer, to align with modular panel fasteners spaced based on manufacturer's panel load data.

.4 Provide thermal tape on building substrate side of z-girt.

2.3 ACCESSORIES

.1 Exposed trim: inside corners, outside corners, cap strip, drip cap, undersill trim, starter strip and window/door trim of same material, colour and gloss as cladding, with fastener holes pre-punched.
- .1 In addition to manufacturer's standard, provide custom shapes to suit profiles as indicated.

.2 Non-exposed accessories: galvanized sheet metal.

.3 Thermal Tape: low to medium pressure gasket from neoprene rubber and cork blend with a high-strength acrylic adhesive on one side, protected by siliconized liner, with anti-skid properties, 38 mm / 1 1/2" x length to suit.

2.4 METAL FLASHINGS

.1 Metal Flashings: Refer to Section 07 62 00 – Sheet Metal Flashing and Trim.

2.5 INSULATION

.1 Insulation: Refer to Section 07 21 13 – Board Insulation, 07 21 29 Sprayed Insulation – Polyurethane Foam.

2.6 FASTENERS

.1 Screws: ANSI B18.6.4. Purpose made, self-drilling fasteners #12-14 c/w galvanized heads and neoprene washers, colour to match cladding.

2.7 CAULKING

.1 Sealants: Refer to Section 07 92 00 – Joint Sealants

2.8 AIR / VAPOUR BARRIER

.1 Refer to Section 07 27 00 Air Barriers.

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 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.2 Examine exterior cladding sheets to be installed. Cull out and remove from site all damaged or marred surfaces and sheets with exposed cut raw edges.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.3 FLASHINGS

.1 Install continuous starter flashings, drips and other flashings as indicated.

3.4 SUB-GIRT FRAMING SYSTEM

.1 Install metal sub-girt framing system level, plumb and tight to substrate over air/vapour barrier transition membrane as follows, using approved fasteners:

.1 Install cleats (clip angles) over substrate and air / vapour barrier transition membrane as indicated to accommodate adjustability of second layer of continuous metal angle.

.2 Mechanically fasten front section of continuous angle to clip angles to form an adjustable z-girt system. Install and adjust to ensure finished siding is plumb and level and fully supported.

3.5 INSTALLATION

.1 Install cladding in accordance with CGSB 93.5, and manufacturer's written instructions

.2 Install continuous starter strips, inside and outside corners, edgings, soffit, drip, cap, sill and window/door opening flashings as indicated.

.3 Install outside corners, fillers and closure strips with carefully formed and profiled work.

.4 Install exterior finish cladding to continuous subgirt with coloured fasteners to match exterior finish.

.5 Provide both notched and formed top neoprene and prefinished metal closures, sealed to arrest direct weather penetration at vertical profiles for exterior cladding.

.6 Install preformed metal cladding system using ‘rain screen principals to drain out moisture penetration and to ensure continuity of "pressure equalization".

.7 Provide U-bars, alignment bars, brackets, clips, inserts, shims as required to securely and permanently fasten exterior cladding to building structure.

.8 Install soffit and fascia cladding as indicated.

.9 Maintain joints in exterior cladding, true to line, tight fitting, hairline joints.

.10 Attach components in manner not restricting thermal movement.

.11 Caulk junctions with adjoining work with sealant. Do work in accordance with Section 07 92 00 – Joint Sealants.

3.6 CLEANING

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by preformed metal siding installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American National Standards Institute (ANSI)
  .1 ANSI A135.6-06, Hardwood Wood Siding and Trim.

.2 ASTM International
  .1 ASTM C1185-08(2012), Standard Test Methods for Sampling and Testing Non-Asbestos Fibre-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards.
  .2 ASTM C1186-08(2012), Standard Specification for Flat Fibre-Cement Sheets.
  .3 ASTM D3359-09e2, Standard Test Methods for Measuring Adhesion by Tape Test.
  .4 ASTM E72-15, Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
  .5 ASTM E84-15a, Standard Test Method for Surface Burning Characteristics of Building Materials
  .6 ASTM E136-12, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 deg. C.

.3 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.

.4 CSA International
  .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
  .2 CSA O121-08(R2013), Douglas Fir Plywood.
  .3 CSA O151-09 (R2014), Canadian Softwood Plywood.
  .4 CAN/CSA-Z809-08, Sustainable Forest Management.

.5 National Lumber Grading Authority (NLGA)
  .1 NLGA Standard Grading Rules for Canadian Lumber 2010.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
  .1 Submit manufacturer's instructions, printed product literature and data sheets for extruded concrete cladding and include product characteristics, performance criteria, physical size, finish and limitations, preparation instructions, storage and handling requirements and installation methods.
  .2 Submit electronic copy of WHMIS MSDS in accordance with Section 01 35 29 - Health and Safety Requirements.

.3 Shop Drawings:
  .1 Provide detailed drawings of atypical non-standard applications of cementitious siding materials which are outside the scope of the standard details and specifications provided by the manufacturer.
  .2 Indicate dimensions, profiles, attachment methods, schedule of wall elevations, trim and closure pieces, metal furring, and related work.

.4 Samples:
  .1 Submit duplicate 12” x 12” size for each profile specified.

1.3 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Installer Qualifications: Minimum of five (5) years' experience with installation of similar products.

.4 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions, and manufacturer's warranty requirements.

.5 Mock-Up:
- .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
- .2 Locate where directed by Consultant.
- .3 Construct mock-up 100 ft^2 minimum size showing typical lap joint, one inside corner and one outside corner.
- .4 Allow 48 hours for inspection of mock-up by Consultant before proceeding with siding work.
- .5 Accepted mock-up may form part of complete work to Consultant approval.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store, and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect extruded concrete cladding from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

.4 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.5 WARRANTY

.1 Provide non-pro-rated product warranty for 30 years for extruded concrete cladding material and trim.

.2 Finish:
- .1 Provide product warranty against manufacturing finish defects for a period of 15 years from the date of substantial performance.
- .2 Warranty to include:
  - .1 Cladding will not peel, crack or chip.
  - .2 Labour and material.

.3 Workmanship Warranty: warranty labour and material application for two (2) years.

PART 2 - PRODUCTS

2.1 MANUFACTURER

.1 Acceptable Manufacturers:
  .1 'fibreC' by Rieder Smart Elements GmbH as distributed by Sound Solutions.
    Tel: 1-800-667-2776
    www.soundsolutions.ca
    Contact: Jadranka Maradin

2.2 MATERIALS

.1 'fibreC' extruded, fibre reinforced concrete panel
  .1 Panels: Glass fibre concrete panels made from pure mineral raw materials, (sand, cement, aggregate, water). Reinforced through AR(alkali-resistant) glass fibre matt and short fibres in matrix. Concrete matrix to be extruded.
  .2 Colour: Off-White.

.2 Surface types
  .1 Unless otherwise noted, surface will be 'MA' Matt/brushes/smooth surface.

.3 Panel Size: as indicated.
  .1 L-formpart profile: where indicated.

.4 Mounting: Concealed Fasteners to a Galvanized Steel Subframe. Continuous perforated hate bar in horizontal applications.

.5 Pattern: as indicated.

.6 Air Barrier Membrane System for Open Joint Cladding: Purpose made black, UV stable, water resistive, vapor permeable air barrier membrane system for use with open joint cladding systems.
  .1 Accessories: purpose made sheathing tape, washers, fasteners, flashings and 'rain screen' design components from same manufacturer as air barrier, as required for a complete installation system.
  .2 Colour: black.
  .3 Acceptable product: 'Reveal Shield' as manufactured by Vapro Shield Canada.

.7 Prefinished metal Flashings: refer to Section 07 62 00 Sheet Metal Flashing and Trim.

.8 Accessories:
  .1 Thermal break membrane: EPDM Rubber, UV resistant, width to suit width of applicable sub-girt system where being applied, colour flat black.

.9 Fasteners: to CSA B111, stainless steel, type and size as required and as recommended by manufacturer for intended use.

.10 Sealants: Refer to Section 07 92 00 – Joint Sealing.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable in accordance with manufacturer's written instructions.
  .1 Visually inspect substrate in presence of Consultant.
  .2 Inform Consultant of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 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.

3.3 PREPARATION

.1 Clean surfaces thoroughly prior to installation.

.2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.4 INSTALLATION

.1 Protect all sub-surfaces with specified air barrier prior to mounting the rainscreen subframe.

.2 A ventilated minimum airspace of ¾” is required between the structural wall and the back surface of the panels. A minimum gap of 3/8” between panels is also required along all perimeter edges.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
  .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by fibre cement siding installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International Inc.:
- .1 ASTM A 312/A312M-15, Standard Specification for Asphalt Used in Roofing.
- .2 ASTM C 726-12, Standard Specification for Mineral Fibre Roof Insulation Board.
- .3 ASTM C 728-05, Standard Specification for Perlite Thermal Insulation Board.
- .4 ASTM C 931/931M-01: Standard Specification for Exterior Gypsum Soffit Board.
- .5 ASTM C1177/C1177M-17, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- .6 ASTM C 1186-12, Standard Specification for Flat Fibre-Cement Sheets.
- .7 ASTM C 1396/C1396M-17, Standard Specification for Gypsum Board.
- .8 ASTM D 41/D41M-11, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
- .9 ASTM D 226-06, Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
- .10 ASTM D 448-12, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
- .11 ASTM D 450-07, Standard Specification for Coal-Tar Pitch Used in Roofing, Dampproofing, and Waterproofing.
- .12 ASTM D 1863-05, Standard Specification for Mineral Aggregate Used on Built-Up Roofs.
- .13 ASTM D 1970 / D1970M-17a, Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dame Protection
- .14 ASTM D 2178/D2178M-15, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
- .15 ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- .16 ASTM D 4601-98, Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.
- .17 ASTM D 6380-03, Standard Specification for Asphalt Roll Roofing (Organic Felt).
- .18 ASTM E 84-15a, Standard Test Method for Surface Burning Characteristics of Building Materials.

.2 Canadian General Standards Board (CGSB):
- .1 CGSB 37-GP-9Ma, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
- .2 CAN/CGSB-51.33-[M89], Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

.3 Canadian Roofing Contractors Association (CRCA):
- .1 CRCA Roofing Specifications Manual-1997.

.4 Canadian Standards Association (CSA International):
- .1 CAN/ULC S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .2 CAN/ULC-S704-2001: Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
- .3 CAN/ULC-S706-02: Standard for Wood Fibre Thermal Insulation for Buildings.
- .4 CGSB 37-GP-52M: Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric.
- .5 CSA A123.2-03, Asphalt-Coated Roofing Sheets.
- .6 CSA-A123.3-[05](2010), Asphalt Saturated Organic Roofing Felt.

.7 CAN/CSA A123.4-04 (R2008), Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
.8 CSA A123.3-05, Asphalt Saturated Organic Roofing Felt.
.9 CSA A123.16-04, Asphalt-Coated Glass Base Sheet.
.10 CSA A123.17-05, Asphalt Glass Felt Used for Roofing and Waterproofing.
.11 CSA A123.21-10, Standard Test Method for the Dynamic Wind Uplift Resistance of Mechanically Attached Membrane-Roofing Systems
.12 CSA A123.4-M1979: Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems.
.13 CSA A231.1-06/A231.2-06 (R2010), Precast Concrete Paving Slabs/Precast Concrete Pavers.
.14 CSA O121-[08], Douglas Fir Plywood.
.15 CSA O151-09, Canadian Softwood Plywood.
.16 CAN/CSA-ISO 9001-00, Quality Management Systems - Requirements.

.5 Factory Mutual (FM Global):
.1 FM Approvals - Roofing Products.
.2 FM APPROVALS 4470, Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Non-combustible Roof Deck Construction.

.6 Health Canada / Workplace Hazardous Materials Information System (WHMIS):
.1 Material Safety Data Sheets (MSDS).

.7 National Fire Protection Association:
.1 NFPA (FIRE) 276, Standard Method of Fire Test for Determining the Heat Release Rate of Roofing Assemblies with Combustible Above-Desk Roofing Components, 2011 Edition.

.8 National Research Council Canada (NRC) - Canadian Construction Materials Centre (CCMC)
.1 CCMC Registry of Product Evaluations.

.9 Underwriters Laboratories' of Canada (ULC):
.1 CAN/ULC S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
.2 CAN/ULC S107-10, Methods of Fire Tests of Roof Coverings.
.3 CAN/ULC S114-05, Standard Method of Test for Determination of Non-Combustibility in Building Materials.
.4 CAN/ULC S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
.5 CAN/ULC S702-09-AM1, Standard for Thermal Insulation Mineral Fibre for Buildings.
.6 CAN/ULC-S704-11, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced.
.7 CAN/ULC-S706-09, Standard for Wood Fibre Thermal Insulation for Buildings.
.8 CAN/ULC S126-14, Standard Method of Test for Fire Spread under Roof-Deck Assemblies.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Convene pre-installation meeting one week prior to beginning roofing Work, with the Authorized representatives of the Contractor, Construction Manager, Owner, Consultant, roofing Subcontractor, roofing manufacturer, and installers of roof accessories and roof-mounted equipment. Establish a report for this meeting.

.2 The Manufacture is to conduct pre-installation meeting in accordance with Section 01 32 16 - Construction Progress Schedules - Bar (GANTT) Chart to:
  .1 Verify project requirements.
  .2 Review installation and substrate conditions.
  .3 Co-ordination with other building subtrades.
  .4 Review structural loading conditions and limitations of roof deck both during and after roofing application.
  .5 Review manufacturer's installation instructions and warranty requirements.
  .6 Review construction schedule and confirm availability of Products, Subcontractor personnel, equipment and facilities.
  .7 Review deck installation criteria and finishes for conformance with roofing system criteria, including issues of flatness and fastening.
  .8 Review flashing details, special roofing details, roof drainage, roof penetrations, equipment curbs, and other conditions affecting roofing installation.
  .9 Review governing regulatory requirements, and requirements for insurance and certificates as applicable.
  .10 Review safety requirements, including temporary fall-arrest measures.
  .11 Review field quality control procedures.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
  .1 Provide electronic copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.
  .2 Provide electronic copies of WHMIS MSDS in accordance with Section 01 35 29 – Health and Safety Requirements, 01 35 43- Environmental Procedures, and indicate VOC content for:
    .1 Primers.
    .2 Asphalt.
    .3 Sealers.
    .4 Filter fabric.

.3 Provide shop drawings:
  .1 Indicate flashing, control joints, tapered insulation details.
  .2 Include plans, sections, details in accordance with performance requirements, and for attachment to other portions of the Work.
  .3 Provide layout for tapered insulation. Indicate degree of slope and layout of sloping insulation on roof surfaces. Ensure positive drainage to roof drains.

.4 Manufacturer's Certificate: certify that products meet or exceed specified requirements.

.5 Test and Evaluation Reports: submit laboratory test reports certifying compliance of bitumen and roofing felts and membrane with specification requirements.

.6 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.

.7 Manufacturer's field report: in accordance with Section 01 45 00 – Quality Control.

.8 Reports: indicate procedures followed and ambient temperatures and wind velocity during application.

1.4 QUALITY ASSURANCE

.1 Installer qualifications: company or person specializing in application of modified bituminous roofing systems with 5 years documented experience approved by manufacturer.

.2 Conform to CRCA Roofing Specifications and roofing membrane manufacturer's instructions.

.3 Only qualified, certified installers employed by a company with the appropriate equipment may execute roofing work.

.4 The manufacturer of elastomeric bitumen products will provide proof of ISO 9001 and ISO 14001 Certifications.

.5 Manufacturer: qualified manufacturer having roofing systems listed by UL/ULC.

.6 Mock-ups:
- .1 Construct mock-up in accordance with Section 01 45 00 – Quality Control.
- .2 Construct mock-up 10 m² minimum size showing typical lap joint, one inside corner] [and] [one outside corner]..
- .3 Accepted mock-up may form part of complete work.
- .4 Allow 48 hours for inspection of mock-up by Consultant before proceeding with roofing work.

.7 Manufacturer’s Field Services: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits with manufacturer’s representative, to review Work, at stages listed.
- .1 After delivery and storage of products, and when preparatory Work and mock-up is complete, but before installation begins.
- .2 As required by membrane manufacture to obtain roof warranty, but as a minimum twice during progress of Work at 25% and 60% complete.
- .3 Upon completion of Work, after cleaning is carried out.

.8 Third-Party Inspection: In addition to Manufacturer’s Field Services, site inspections to ensure conformance with this Section to be conducted by a third-party inspection firm engaged and paid for by the Contractor.
- .1 Third-party site inspections to be performed only by a firm registered and in good standing with the Roof Consultants Institute (RCI Inc.) and experienced in the inspection of similar roof systems.
- .2 Third-party site inspections shall be conducted to verify and visually inspect the roof system installation. The third-party site inspections shall include review of operational details including set-up, safety requirements, work schedules, crew deployment and general housekeeping items. Third-party inspections of the roof system installation shall also include inspection of deck substrate prior to start of installation, membrane and flashing installation, insulation, and roofing installation
- .3 Allow for a minimum of fifteen (15) site visits by the third-part inspection firm. Additional site visits may be required to suit the Contractor’s planned sequence of Work and are to be accounted for in the Contract price.
- .4 Provide copy of Third-Party Inspection report to the Consultant within 48 hours of inspection being carried out.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.

.2 All materials must remain in their original packaging, displaying the manufacturer's name, product name, weight, and reference standards, as well as all other indications or references considered standard.

.3 Storage and Handling Requirements:
- .1 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.
- .2 At all times, materials will be adequately protected and stored in a dry, off-ground, weatherproof.and properly ventilated area, away from any welding flame or spark and sheltered from the elements or any harmful substance. Only materials destined for same-day use can be removed from this storage area. In cold weather, these materials should be stored in a heated area at a minimum temperature of 5oC and removed prior to application. If rolls cannot be stored in a heated environment, they may be pre-conditioned before installation. For precise description, consult material manufactures specifications on membrane application procedures.
- .3 Store adhesives and emulsion-based waterproofing mastics at a minimum 5^{o}C. Store adhesives and solvent-based mastics at sufficiently high temperatures to ensure ease of application.
- .4 Materials delivered in rolls will be carefully stored upright; flashing will be stored to avoid creasing, buckling, scratches or any other possible damage.
- .5 Avoid material overloads which may affect the structural integrity of specific roof areas.
- .6 Store rolls of felt and membrane in upright position. Store membrane rolls with salvage edge up.
- .7 Remove only in quantities required for same day use.
- .8 Place plywood runways over completed Work to enable movement of material and other traffic.
- .9 Store materials unless otherwise indicated in accordance with manufacturer's written instructions.
- .10 Store insulation protected from daylight and weather and deleterious materials.
- .11 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.
- .12 Fold up metal banding, flatten and place in designated area for recycling.

1.6 SITE CONDITIONS

.1 Ambient Conditions
- .1 Temperatures during application shall not be less than the minimum recommended by the material manufacturers. Work shall not be carried out during inclement weather conditions.
- .2 Do not install roofing when temperature remains below -18°C for torch application, or -5°C to manufacturers' recommendations for mop application.
- .3 Minimum temperature for solvent-based adhesive is -5°C.
- .4 Or as specified by the manufacturer.

.2 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

.3 Before commencing work each day, ensure that all surfaces to receive material or underlayment are clean, smooth, solid and dry.

.4 Use only dry materials and apply only during weather that will not introduce moisture into roofing system.

1.7 CONTRACTOR QUALIFICATIONS

.1 Roofing contractors and sub-contractors must, when tendering or performing work, possess a roofing contractor operating license.

.2 If material manufactures warranty (Systems & Workmanship) is required, Roofing contractors and sub-contractors must be an approved applicator and registered with Material Manufacturer and provide the Owner with applicable documentation to this effect before beginning any roofing work.

.3 Only qualified, certified installers employed by a company with the appropriate equipment may execute the roofing work.

.4 Contractors tendering this project must be approved by the University of Guelph.

1.8 MANUFACTURER'S FIELD SERVICES

.1 The roofing product manufacturer must provide a designated technical representative to visit the work site at the start of roofing installation and during the progress of the installation on a daily basis. Arrange for initial job start-up site attendance, periodic site attendance of membrane manufacturer's technical representative during installation work, together with written report.

.2 The Contractor must at all times enable and facilitate access to the work site by said representative.

.3 Notify Consultant of date and time of inspection, a minimum of 24 hours prior to inspection. Provide one copy of manufacturer's report to the Consultant within 48 hours of inspection being carried out.

1.9 WARRANTY

.1 Installers Extended Warranty: Standard two (2) years following the date of Substantial Performance.
  .1 Prior to the expiration of the 2 Year Contractor Warranty, the Manufacturer shall conduct an Infra-Red Analysis of the warranted roof at no additional cost to the University.

.2 At no cost to Owner, Contractor shall remedy any defects in Work, including Work of this and other Sections, due to faults in materials or workmanship provided under this Section of Specifications appearing within a period of two (2) years from date of Substantial Performance. CRCA Standard Form of Guarantee is not acceptable.

.3 Manufacturer's Extended Warranty: A written guarantee that the manufacturer will replace, at no cost to the Owner, any portion or all of the roofing system down to the existing roof deck including watertightness for a minimum period of twenty (20) years, commencing from the date of Substantial Performance of the Work. This warranty shall be non-prorated.

1.10 MAINTENANCE

.1 The Manufacturer shall issue a non-prorated warranty for a period of Twenty (20) Years. All components of the roof system (not including the deck) shall be covered under this warranty. Perimeter metal edge details shall also be included in this warranty.

.2 Manufacturer to provide inspections and maintenance of the roofing system in years 2, 5, 10 and 15 of the warranty period.
  .1 The following duties, at a minimum, shall be carried out at no extra cost to the Owner as required, by a qualified contractor retained by the Manufacturer:
    .1 Sealing of flashing seams
    .2 Filling of pitch pockets
    .3 Repairs to blisters and ridges
    .4 Caulking at metal details as required
    .5 Written inspection report
    .6 Removal of vegetation and debris from the roof and premises
    .7 Cleaning of drain screens
  .2 Documentation shall be provided that the manufacturer has personnel to carry out above noted warranty requirements and has a history of providing these services for a minimum of 5 years.
  .3 Manufacturer shall update the University's Online Roof Management Program with all new information upon satisfactory completion of the roofing project at no charge to the University.

.3 Roofing/Waterproofing contractor must include with his tender, proof from the manufacturer that they can supply specified manufacturers material and workmanship warranty. Failure to submit may result in tender disqualification.

.4 Upon satisfactory completion, the warranty and all construction information regarding the roof installation shall be placed on an Online Roof Management Program at no additional cost to the Owner. This Online Roof Management Program shall have the following features;
  .1 Store roof plans, roof dimensional information, roof assembly types, roof inspection reports, roofing budgets, roof specs, etc. all per building
  .2 Generate roof replacement budgets and capital plans
  .3 Schedule inspections and recommended roof replacements
  .4 Provide designated University of Guelph employees secure access to this inventory system through a username and password. Once access is granted, all information and functions should be accessible and retrievable to the U of G employee.
  .5 Provide training to the U of G employee to use the Online Roof Management Program.
  .6 The supplier must provide examples of web-based roof inventory systems they have created for other clients.

.5 The Online Roof Management Program must be able to provide the following:
  .1 Roof condition by category
  .2 Accurate future budgetary reports for a minimum of 20 years
  .3 Condition photos on a per roof basis
  .4 Aerial images via Google Satellite
  .5 Service Activity – what was done and by whom
  .6 Warranty information
  .7 Leak history/sensitivity
  .8 Leak reporting service
  .9 Square footage reports of all roof areas
  .10 CAD Drawings
  .11 Specifics on drainage, perimeter and interior projection flashings, slope and drainage.
  .12 Supporting documents.
  .13 Emergency Leak call service.
  .14 Infra-Red analysis by means of Drone.
  .15 Hand Held Infra-red analysis reports.

1.11 ADDITIONAL REQUIREMENTS

.1 Roofing to be supplied and installed in conformance with the University's Roofing Standard.

.2 Provide Products that are compatible with one another under field conditions, as demonstrated by roofing manufacturer.

.3 Provide watertight roofing system capable of resisting specified uplift pressures, thermally induced movement and exposure to weather without failing during the specified warranty period.

.4 Where reroofing work is to take place, the replacement roof system must be compatible with any adjacent roofing that is presently under warranty to the University of Guelph. Should an existing warranty be rendered void, the warranty liabilities shall become the burden and responsibility of the Contractor and their chosen Manufacturer.

.5 Prior to fastening roof sheathing and or other roof system components, inspect underside of deck for conduit locations, fire-proofing material and other potential hazards.

.1 If mechanical fastening is not specified, utilize specified insulation adhesive in these areas. Where adhesive is not specified, utilize adhesive as recommended by the manufacturer of the material being adhered.

.2 If mechanical fastening is specified, assume full responsibly to avoid damaging existing conduits within the interior space, and utilize all available means to ensure continued uninterrupted function of electrical/electronic items, including visual reviews and available electronic detection devices.

.3 Assume full responsibility for damages occurring as a result of fastening through the deck and shall make good all such damages at no additional cost to the Owner.

.6 Disconnect and temporarily relocate all existing mechanical and electrical work including existing conduits, cables, wiring, piping, gas lines and similar items to facilitate roof replacement and to re-instate to original working condition and in accordance with Contract Documents.

.7 Remove and dispose existing sheet metal flashings, sleeves, pitch pans, redundant equipment, ballast, roof membrane and flashings, insulation and vapour retarder and all other roofing components not required to remain as part of the new work.

.8 Remove all debris and sweep clean existing substrate.

.9 Supply and install roof drain inserts, roof drain sleeves, collars, pitch pans, gas line support, concrete pavers and miscellaneous items in accordance with Contract Documents.

.10 Reinstall and connect all mechanical and electrical equipment to original function.

.11 Supply and install all pre-finished sheet metal flashings in accordance with Contract Documents. Colour and profile samples to match existing.

.12 Supply and install joint sealants in accordance with Section 079200 Joint Sealants.

.13 Seal air intakes as required to Owner approval to ensure no smoke or fume entry.

.14 Utilize only single source supplier of membrane and related primary materials.

.15 Ensure proper tie-ins as indicated.

.16 Dispose of all debris/ waste in approved containers and transfer to approved municipal and/or provincial disposal site(s).

.17 Install walkways at all roof access and ladder locations.

.18 Provide tapered insulation as noted according to Contract Documents.

.19 Remove all unused/redundant equipment as shown on roof plans and as identified by the Owner. Provide metal deck closures prior to roofing over.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

.1 A minimum 2% slope must be maintained to all roof drains, unless otherwise noted

.2 Installed built-up roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Built-up roofing and base flashings shall remain watertight.

.3 Provide base flashings, perimeter flashings, detail flashings and component materials and installation techniques that comply with the requirements and recommendations of the most current addition of the NRCA Roofing and Waterproofing Manual.

.4 Compatibility between components of roofing system is an essential requirement of the contract for the purpose of obtaining a manufacturer's system warranty.

.1 Provide written declaration to Consultant stating that materials and components, as assembled in system to existing conditions, meet this requirement.

.2 Products specified within this specification section by Tremco, unless otherwise noted are to be used for this project.

.5 Provide a roofing membrane identical to component systems that have been successfully tested by a qualified independent testing and inspecting agency to meet the following minimum load-strain properties at membrane failure when tested according to ASTM D 2523:

.1 Tensile strength at failure, at -18 deg. C (0 deg. F): 78.8 kN/m (450 lb./in) machine direction, minimum; 3.0 percent elongation, maximum.

.2 Tensile strength at failure, at -18 deg. C. (0 deg. F. 70.1 kN/m (400 lb. /in) cross machine direction, minimum; 2.7 percent elongation, maximum.

.6 Roofing System: to CSA A123.21 for wind uplift resistance.

2.2 DESCRIPTION – ROOFING SYSTEM

.1 Roofing System: Three (3) ply cold-applied built-up roofing system with peel and stick vapor barrier, rigid board insulation, mineral wool tapered insulation, composite ply roofing membranes, roof pavers and aggregate surfacing.

2.3 DECK SHEATHING

.1 Fibreglass mat-faced gypsum board sheathing: to ASTM C ASTM C 117/C1177M, Standard thickness as indicated.

.1 Acceptable product: GP Gypsum, "Dens-Deck Roofboard" by Georgia Pacific, or "Securock Roof Board" by CGC, or "GlasRoc Roof Board" by Certainteed, or approved alternate.

2.4 DECK PRIMER

.1 Asphalt primer: to CGSB 37-GP-9M.

.1 Primer: non-fibrated, asbestos free, water-based, low-VOC formulation; to CGSB 37-GP-9Ma.
.1 Asbestos Content: None Ref , ASTM D276-87
.2 Viscosity 25°C: 50Ku , ASTM D562-87
.3 Density 25°C: 1.018 g/cc(8.5 lb/gal), ASTM D1475-85
.4 Nonvolitile Content: 32%, ASTM D2823-90
.5 Flash Point : Not Applicable, ASTM D3278-82
.6 pH: 9.2, ASTM E70-97
.7 VOC: 65g/l, ASTM D3960-98
.8 Colour: Brown/Black

.2 Acceptable product: as recommended by the manufacturer.

2.5 VAPOUR BARRIER/RETARDER

.1 Vapour Barrier / Vapour Retarder definition: the terms vapour barrier and vapour retarder are to be considered as one in the same throughout these documents.

.2 Self-adhesive Vapour Barrier: composed of SBS rubberized asphalt laminated to slip-resistant, cross-laminated polyethylene surface film, with release-paper backing.
.1 Thickness: 1 mm.
.2 Compliance: ASTM D 1970/ D 1970M-17a.
.3 Permeance: ASTM E96, 0.5 perm.
.4 Tensile Strength at 0 deg. F (-18 deg. C), minimum, ASTM D2523: 25 lbf/in (43 kN/m).
.5 Adhesion (to plywood), minimum, ASTMD903: 6lbf/in (1000N/m).
.6 Elongation, ASTM D412: 250%

.3 Provide substrate primer when recommended by vapour-retarder manufacturer.

.4 Acceptable product: ‘AVC Membrane’ by Tremco.

2.6 POLYISOCYANURATE INSULATION AND TAPERED INSULATION

.1 Refer to Section 07 21 13 – Board Insulation.

.2 Accessories:
.1 General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with built-up roofing.
.2 Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
.3 Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
.4 Cover Board/Overlay Board: ASTM C726, non-combustible, single layer, mineral wool insulation board with a bitumen coated upper surface:
.1 Mineral Wool, CAN/ULC S704-01, Mineral wool fiber with bitumen saturated surfacing.
.2 Fire Rating: UL790 (CAN/ULC S107), Class A
.3 Compressive Strength: ASTM C165, 28 psi (190 kPa) @ 25%
.4 Thermal Resistance: RSI value/ 25.4mm, 0.77 m²K/W @ -4° C
.5 Thickness: 25mm (R-value, 3.8)
.5 Substrate Joint Tape: 200-mm / 6” wide, coated, self-adhereing, glass fiber.

2.7 BITUMEN MATERIALS

.1 General: Adhesive and sealant materials recommended by roofing manufacturer for intended use and compatible with built-up roofing.

.2 Liquid-type materials shall comply with VOC limits of authorities having jurisdiction.

.3 Adhesives and sealants that are on the interior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

- .1 Plastic Foam Adhesives: 50 g/L.
- .2 Gypsum Board and Panel Adhesives: 50 g/L.
- .3 Multipurpose Construction Adhesives: 70 g/L.
- .4 Fiberglas Adhesives: 80 g/L.
- .5 Contact Adhesives: 80 g/L.
- .6 Other Adhesives: 250 g/L.
- .7 None membrane Roof Sealants: 300 g/L.
- .8 Sealant Primers for Nonporous Substrates: 250 g/L.
- .9 Sealant Primers for Porous Substrates: 775 g/L.

2.8 GLASS-FIBER FABRIC

.1 Woven glass-fiber cloth, treated with asphalt, complying with ASTM D 1668, Type I.

2.9 ROOFING MEMBRANE PLIES

.1 Burmastic Composite Ply: Non-perforated, asphalt-coated, polyester/fiberglass/polyester tri-laminated reinforced asphalt-coated sheet dusted with fine mineral surfacing on both sides which meets the requirements of ASTM D 4601,Type II, suitable for application method specified, and as follows:

- .1 Breaking Strength: minimum, ASTM D 146: machine direction, 22 kN/m (130 lab/in); cross machine direction, 22 kN/m (130 lb. /in).
- .2 Resistance to Puncture 530 N, ASTM E154
- .3 Tear Strength: minimum, ASTM D 4073: machine direction, 979 N (220 lb.); cross machine direction, 930 N (210 7 lb.).
- .4 Pliability: 12.7 mm (1/2-inch) radius bend, ASTM D 146: No failures.
- .5 Thickness: minimum, ASTM D 146: 1.4 mm (0.050 inch).
- .6 Weight: minimum, ASTM D 228: 1. 5 kg/sq. m. (30 lb./100 sq. ft.)
- .7 Mass of desaturated polyester/glass/polyester mat: ASTM D 228: 107 g/sq. m. (2.2 lb. /100 sq. ft.)
- .8 Asphalt: minimum, ASTM D 228: 488 g/sq. m. (10 lb. /100 sq. ft.).

.2 Acceptable product: Tremco, Burmastic Composite Ply.

2.10 BASE FLASHING SHEET MATERIALS

.1 Flashing Sheet: TRA Elastomeric Sheeting: Elastomeric, polyester-reinforced sheet with EPDM and SBR elastomers and the following physical properties:

- .1 Breaking Strength: minimum, ASTM D 751: machine direction 43 kN (250 lb.; cross machine direction 26 kN (150 lb.).
- .2 Tear Strength: minimum, ASTM D 751: machine direction 400 N (90 lb.); cross machine direction 220 N (50 lb.).

.3 Elongation at Failure: ASTM D 751: 25 percent minimum.
.4 Low Temperature Flexibility: minimum, ASTM D 2136: -40 deg. C (-40 deg. F).
.5 Thickness: minimum, ASTM D 751: 1.0 mm (0.040 inch).
.6 Weight: ASTM D228: 1.3 kg/sq. m. (4.5 oz. /sq. ft.)

.2 Flashing membrane adhesive as recommended by the manufacturer.

.3 Acceptable product: Tremco TRA Elastomeric Sheeting.

2.11 COLD-APPLIED ADHESIVES

.1 Cold Applied Adhesive (Type 1):
.1 One-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with specified roofing membranes and flashings, with the following physical properties:
.1 Asbestos Content: EPA 600 R-93/116: None.
.2 Volatile Organic Compounds (VOC): maximum, ASTM D 6511: 340 g/L.
.3 Nonvolatile Content: minimum, ASTM D 6511: 65 percent.
.4 Flash Point: minimum ASTM D 93: 38 deg. C (100 deg. F).
.5 Density at 25 deg. C (77 deg. F): minimum, ASTM D 6511: 1.0 kg/L (8.0 lb./gal).
.6 Uniformity and Consistency: ASTM D 6511: Pass.
.7 Asphalt Content: minimum, ASTM D 6511: 40 percent.
.2 Acceptable product: Tremco, Burmastic Adhesive.

.2 Cold-Applied Adhesive (Type 2):
.1 One-part, cold-applied bitumen modified polyurethane waterproofing adhesive specifically formulated for adhering TRA/elastomeric membrane sheet, with the following physical properties:
.1 Tensile Strength: ASTM D 412: 2060 map 1.7MPa (250 psi).
.2 Low Temperature Elongation at -20 deg. C (29 deg. F): ASTM D 412: 500 percent.
.3 Elongation: ASTM D 412: 700 percent.
.4 Asbestos Content: ASTM D276, None.
.5 Viscosity at 25 deg. C (77 deg. F): ASTM D2196-86, 400-1760pa-s
.6 Density at 25 deg. C (77 deg. F): ASTM D2196-86, 1042 kg/m3
.2 Acceptable product: Tremco, Tremlar/TP-60 Vertical Grade.

.3 Cold-Applied Adhesive (Type 3):
.1 One-part, Solvent Free Rubberized Elastomer
.1 Asbestos Content: EPA 600/R-93/116, None
.2 Viscosity at 25 deg. C (77 deg. F): ASTM D2196-86, 600-2000pa/s
.3 Elongation: ASTM D412-87, 1000%
.4 Tensile Strength: ASTM D412-87, 207-345kPa

.4 Cold Applied Adhesive (Type 4):
.1 Adhesive for Roofing Felts: Asbestos-free, cold-process asphalt adhesive.
.1 Viscosity at 25 deg. C (77 deg. F): ASTM D2196-86, 25,000cp – 75,000cp
.2 Non Volatile Content: ASTM D6511-00, 67%
.3 Density at 25 deg. C (77 deg. F): ASTM D6511-00, 1.0kg/l
.4 Flash Point: ASTM D93, >60^{o}C

2.12 ADHESIVE FOR AGGREGATE BALLAST

.1 Asbestos-free, cold-process asphalt adhesive.
  .1 Viscosity at 25 deg. C (77 deg. F): ASTM D2196-86, 25,000cp – 75,000cp
  .2 Non Volatile Content: ASTM D6511-00, 67%
  .3 Density at 25 deg. C (77 deg. F): ASTM D6511-00, 1.0kg/l
  .4 Flash Point: ASTM D93, >60oC

2.13 INSULATION ADHESIVE

.1 Single compound, solvent-free, moisture curing, low VOC, asphaltic urethane cold fluid applied bituminous-urethane adhesive formulated to adhere roof insulation to substrate, with the following physical properties:
  .1 Asbestos Content: EPA 600/R13/116: None.
  .2 Volatile Organic Compounds (VOC): maximum, ASTM D 3960: 20 g/L.
  .3 Viscosity: ASTM D2556-69, at 25 deg. C (77 deg. F): 70.0 Pa/s
  .4 Non-Volatile Content: minimum, ASTM D 1644: 99 percent.
  .5 Density at 25 deg. C (77 deg. F): minimum: ASTM D 1875: 1.01 kg/L (8.5 lb./gal).
  .6 Tensile Strength at 25 deg. C (77 deg. F): ASTM D412-87 1.4MPa
  .7 Elongation at 25 deg. C (77 deg. F): minimum, ASTM D 412: 1200 percent.
  .8 T-Peel Strength at 25 deg. C (77 deg. F): minimum: ASTM D 1876: 66 N (15 lab).
  .9 Adhesion Strength in Shear at 25 deg. C (77 deg. F): minimum, ASTM D 816: 552 kPa. (80 psi).
  .10 Low-Temperature Flexibility: maximum, ASTM D 816: -51 deg. C (-60 deg. F), pass.

.2 Acceptable product: Tremco, Fas-n-Free Adhesive.

2.14 SEALERS

.1 Sealants: asbestos-free sealant, compatible with systems materials, recommended by system manufacturer. In accordance with Section 07 92 00 - Joint Sealants.

2.15 WALKWAYS

.1 Walkways and Splash Pads at Ballasted Membranes:
  .1 Precast Concrete Pavers: 45 mm / 1 3/4" thick, 55 MPa / 8,000 psi, water absorptionless than 5%, “Standard Diamond Texture Roof Ballasts” by Brooklyn Concrete or approved alternate, colour and texture as later selected by [Departmental Representative] [DCC Representative] [Consultant]] [from manufacturer’s standard products, size as follows:
    .1 At walkways, access ladders and doors: 610 mm x 610 mm / 24” x 24”.
    .2 At Splash Pads at Downspout locations: 610 mm x 610 mm x 610 mm / 24” x 24”.
    .3 Acceptable Product: “Roof Ballast Slabs” by Brooklyn Concrete or approved alternate.

  Set pavers on prefabricated, adjustable plastic pavers pads, approximately 100mm x 100mm size rigid extruded polystyrene pads, 25 mm thick; having a minimum compressive strength of 210 kPa.

2.16 CARPENTRY

.1 Refer to Section 06 10 00 - Rough Carpentry.

2.17 CANT AND TAPERED EDGE STRIPS

.1 Cant to be 38 mm / 1 1/2" thick factory formed, asphalt impregnated wood fibreboard preformed to 45 deg angle, to measure 110 mm on slope.

.2 Tapered edge strips to be preformed asphalt impregnated wood fibreboard, sizes as indicated.

2.18 BALLAST

.1 Stone: gravel ballast to ASTM D 448, Gradation 57 opaque, non-porous, washed, free from fines, long splinters, moisture, ice and snow.
  .1 Acceptable product: white dolomite gravel, 600# per square.

.2 Set in BURmastic adhesive by Tremco

2.19 ACCESSORIES

.1 Aluminum Sleeves and Collars:
  .1 16 ga. / 0.051” pre-spun aluminum as required.
  .2 Sized to suite application.
  .3 Acceptable manufacturers:
    .1 National Roofing Supply.
    .2 Lexcor Canada.
    .3 Thaler Metal Industries.
    .4 Altra Metal Specialties Inc.

.2 B-Vent Flashing:
  .1 Prefabricated from heavy gauge aluminum or stainless steel, complete with wide base flange. Accepted products:
    .1 “MEF-4A” by Thaler Metal Industries Ltd.
    .2 “Flash-Tite” by Lexcor.
    .3 “ME-TC” by National Roofing Supply.
    .4 “BVF” by Altra Metal Specialties Inc.

.3 Soil Pipe Flashings:
  .1 Prefabricated from heavy gauge spun aluminum, complete with wide base flange, telescoping cap and pre-insulated. Minimum 305 mm (12”) above roof surface. Accepted products:
    .1 “PVP-1 series” by National Roofing Supply; complete with cap.
    .2 “SJ-26 series” by Thaler Metal Industries
    .3 “Flash-Tite SC-S Series” by Lexcor
    .4 “AVS-1” by Altra Metal Specialties.

.4 Gooseneck Type Conduit Flashing:
  .1 Prefabricated from heavy gauge aluminum or stainless steel, complete with wide base flange. Accepted products:
    .1 MEF-2A series by Thaler Metal Industries Ltd.,
    .2 Flash-Tite series by Lexcor,
    .3 ME-GN series by National Roofing Supply.
    .4 “MEFA” by Altra Metal Specialties Inc.

.5 Stripping Membrane: Vinyl-coated fibreglass mesh.

.6 Stripping Adhesive: One-part solvent free rubberized elastomer or Single-component bitumen modified polyurethane, vertical grade as specified by Manufacturer.

.7 Pitch Pan: premanufactured type; 0.61 mm thick galvanized steel sheet, height to suite application, minimum 100 mm high.

.8 Termination Bar: 3 mm thick aluminum bar, 25 mm wide profile, pre-drilled for mechanical attachment.

.9 Prefabricated Control or Expansion Joint Flashing: Sheet butyl reinforced with closed cell urethane foam backing, seamed into metal flashing flanges, including sheet butyl counter flashing each side.

.10 Roof Drains:
  .1 Refer to Division 23.

.11 Scuppers:
  .1 0.80 mm / 22 ga. pre-finished metal with 127 mm / 5” flanges and soldered seams.

.12 Deck Closures:
  .1 3 mm / 1/8” galvanized metal plate, size to suit opening and as detailed.

.13 Pipe Supports for roof mounted gas pipes, pipes, electrical conduit, ducts and other mechanical piping:
  .1 Refer to Division 23.

.14 Expansion Joints:
  .1 Exterior cover: of 1.5 mm thick neoprene with joint width to suit application for roof to roof and roof to wall construction, preformed end caps and chance in direction components.
  .2 Flanges, Edge frame, and flashing: galvanized steel to suit application.
  .3 Acceptable product: Soprajoint by Soprema or approved equivalent.

PART 3- EXECUTION

3.1 QUALITY OF WORK

.1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual, CRCA Roofing Specification Manual, and Ontario Roofing Association Manual.

.2 Do priming in accordance with manufacturers written recommendations.

.3 Provide interface between walls and roof assemblies with durable rigid sheet metal as required to provide connection point for continuity of air barrier.

.4 Provide assembly, component and material connections in consideration of appropriate design loads.

.5 Maintain equipment in good working order to ensure control of roofing operations and protection of work.

3.2 GENERAL

.1 Apply roofing in accordance with drawings, specifications and requirements of authorities having jurisdiction and the Canadian Roofing Contractors' Association Roofing Manual.

.2 Use manufacturer's printed recommendations and specifications as minimum requirements for materials, methods and quality of work not otherwise specified herein.

.3 Make adjustments to specified roofing procedures caused by weather and site conditions to Consultant approval.

.4 Ensure watertight junctions of roof drains, vents and other items passing through the roof.

.5 Install plywood and lumber nailer plates to deck, walls and parapets where required and as indicated.

.6 Install vapour retarder and all field membrane beginning at low point and at right angles to the slope or from roof drain.

.7 At manufacturer's recommended rate, prime all existing surfaces that are to receive roof membrane.

.8 Install tapered insulation in accordance with manufactured instructions and reviewed shop drawings.

.9 Soften and shim edges of tapered insulation as required to provide smooth transition from one level to the next.

.10 Ensure all edges of insulation and cover boards, are structurally supported. Stagger joints of insulation boards both horizontally and vertically. Stagger end joints. Butt joints with no gaps or broken boards. Cut and fit neatly at all projections.

.11 Apply adhesives in accordance with manufacturer's instructions and recommendations.

.12 Use only manufacturer approved torches a per manufacturer's recommendations.

3.3 EXAMINATION OF ROOF DECKS

.1 Verification of Conditions: inspect deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.

.2 Surface examination and preparation must be completed in conformance with recommendations in accordance with the material manufactures specifications, particularly for fire safety precautions.

.3 Evaluation and Assessment: Prior to fastening deck sheathing and/or other roof system components, inspect underside of the deck for conduit locations, fire-proofing material and other potential hazards.

.4 If fastening is specified, assume full responsibility to avoid damaging existing conduits within the interior space. Utilize all available means to ensure the continued uninterrupted function of electrical/electronic items, including visual reviews and available electronic detection devices.

.5 Ensure decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.

.6 Ensure curbs have been built.

.7 Ensure roof drains have been installed at proper elevations relative to finished roof surface.

.8 Assume full responsibility for damages occurring as a result of fastening through the deck and make good all such damages at no additional cost to the Owner.

.9 Do not install roofing materials during rain or snowfall.

.10 Remove all existing roof membrane components down to the deck and remove from the roof surface.

3.4 PROTECTION OF IN-PLACE CONDITIONS

.1 Cover walls, walks, 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 roof and away from face of building until roof drains or hoppers installed and connected.

.5 Protect roof from traffic and damage.

.6 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.

.7 Seal and ballast exposed edges.

3.5 PREPARATION OF STEEL DECK

.1 Install sound absorbing insulation in flutes of acoustical steel roof deck in accordance with deck manufacturer's instructions and Section 05 31 00 - Steel Decking.

.2 When installing vapour retardant directly on the steel deck, place a thin sheet of metal under the end lap of the vapour barrier.

3.6 PRIMING DECK AND OTHER SURFACES

.1 Apply deck primer to deck roofing substrate at the rate recommended by manufacturer.

.2 Prime metal and concrete surfaces designated to be covered with asphaltic products.

.3 Allow to cure.

.4 Ensure primer does not enter building through cracks and other openings.

3.7 VAPOUR RETARDER

.1 Prime surfaces to receive vapour retarder membrane. Apply membrane only once primer coat is dry.

.2 Install applicable roof vapour retarder to the approved assembly in accordance with Manufactures specification.

.3 Over exposed substrate and without adhering, unroll modified bitumen membrane to relax and for alignment.

.4 Once relaxed and aligned, reroll membrane from both ends. Peel back one end of the silicone release sheet and adhere this part of the membrane to the substrate. Peel back the remaining release sheet at a 45º angle to avoid wrinkles in the membrane.

.5 If the membrane is not properly aligned, do not try to adjust. Instead, cut the roll and start again, making sure that it is properly aligned and that it overlaps the end of the misaligned piece by 150 mm / 6”.

.6 Overlap each preceding sheet by 100mm / 4” lengthwise following the reference line and by 150mm / 6” at each end. Stagger end laps by at least 300mm / 12”.

.7 Extend vapour retarder under cant strips and blocking. Extend to perimeter and deck protrusions.

.8 Seal roof vapour retarder to wall air/vapour barrier system with flexible flashing membranes to ensure continuity of building air/vapour barrier envelope.

.9 Use a 34 kg roller to press down along each membrane strip, including the laps. Finish by aligning the edge of the roller with the lower end of the side laps and rolling up the membrane. Do not cut the membrane to remove air bubbles trapped below the laps, but rather push the roller to the edge of the joint to squeeze them out.

3.8 INSULATION INSTALLATION

.1 Insulation Application - General:
- .1 Install roof insulation boards, cut and trimmed to provide plain butt joints at perimeters, parapets, curbs, etc.
- .2 Lay insulation boards in parallel courses, butted together tightly in firm contact with one another, without gaps, complete with staggered end joints.
- .3 Place boards in parallel rows with ends staggered, and in firm contact with one another.
- .4 Cut end pieces to suit.
- .5 Install second layer with joints placed offset and perpendicular from underlying layer.
- .6 Install insulation boards to maintain continuity of thermal envelope. Minimize joints.
- .7 Fit insulation tight to roof penetrations.
- .8 Firmly butt insulation boards. Do not jam or deform boards.
- .9 Minimize lipping between adjacent boards.
- .10 Stagger joints minimum 300mm.

.2 Insulation – Cold Adhesive Application:
- .1 Mop first layer of insulation to vapour retarder and upper layers of insulation to bottom layer with cold applied adhesive as specified and as per adhesive manufacturer’s instructions.
- .2 Install additional layers of insulation and tapered insualtion to vapour retarder with adhesive in conformance with manufacturer's written recommendations.

.3 Install insulation panels by butting edges snugly and without warping. Stagger all joints between layers

.4 Install only as much insulation as can be covered in the same day.

.5 Around the drains lower insulation by 25 mm / 1” to create a sump 1200 mm x 1200 mm / 4’ X 4’ in area. Bevel edge of 75 mm / 3” insulation on a 45° angle.

3.9 OVERLAY BOARD

.1 General Application Method:

.1 Stagger all vertical joints between boards and insulation.

.2 Connect panels in perfect connection, without any differences in level and completely adhered all surfaces.

.3 Apply only as many boards as can be covered in the same day.

.2 Cold Applied Adhesive Application: Over completed layer(s) of insulation, and with board joints offset from insulation joints, install overlay board in cold applied adhesive as specified and as per adhesive manufacturer’s instructions. Walk-in to ensure 100% of surface is adhered.

.3 Adhere single layer of overlay board over roof insulation with approved adhesive at manufacturer’s recommended rate.

.4 Stagger overlay board seams with insulation board seams.

3.10 CANT STRIPS

.1 Install cant strips at intersections of roofing and vertical surfaces.

.2 Embed in a continuous bed of approved adhesive applied to overlay boards.

.3 Lay true to line, level and with flush, butt joints and accurately mitred corners.

3.11 BASE SHEET

.1 Installation of Cold Applied Adhesive Base Sheet:

.1 Beginning at the drain and perpendicular to the slope, install the membrane base sheet in a full bed of adhesive applied at the rate of 6 to 8 litres per 10 square metres of roofing area using a notched 5 mm / 3/16”. neoprene squeegee.

.2 Apply base sheet in parallel strips. Lap side joints 100 mm / 4” and end joints 150 mm / 6”. Stagger end joints a minimum of 300 mm / 12”.

.3 After placement in the adhesive, roll the surface of the installed membrane with a 27 kg. steel roller to smooth the membrane to ensure complete and uniform embedment.

.4 Always seal the lap joints of the base sheet at the end of the workday. Perform the work without interruption to avoid tears and the formation of fishmouths, air pockets, and wrinkles.

.5 Cut off corners at end laps to be covered by the next roll.

.6 Provide a smooth application free of wrinkles, fishmouths, air pockets or tears.

.7 Terminate the base sheet 40 mm / 1 1/2" above top of the cant or at the perimeter.

3.12 ROOF MEMBRANE

.1 Install three plies of roof membrane in shingle fashion, starting at roof low point. Apply membrane perpendicular to overlay board joints. Conform to manufacturer's recommended method.

.2 Overlap starter strips 660 mm with first ply, then overlap each succeeding ply 625 mm.

.3 Place ply sheets to ensure water will flow over or parallel to, but not against, exposed edges.

.4 Shingle in direction to shed water. Extend ply membranes over and terminate beyond cants and cut evenly.

.5 Embed plies in approved adhesive, at a minimum rate of 1.2 L/m2, and solidly coating each ply for full width.

.6 Ensure complete and continuous seal and contact between adhesive and ply membranes, including ends, edges and laps without wrinkles, fish mouths or blisters.

.7 Do not step or walk on felts during or immediately after application until adhesive has set.

.8 Install each ply so that it shall be firmly and uniformly set, without voids, into adhesive. Thoroughly and effectively broom or roll each membrane application to ensure full adhesion.

.9 Lap ply membrane ends 150 mm. Stagger end laps 1.0 metres minimum.

.10 Overlap previous day's work 600 mm, as required.

.11 Terminate all ply layers to outer edge of roof perimeter.

3.13 FLASHINGS

.1 Complete installation of flashing base sheet stripping prior to installing membrane cap sheet.

.2 Install flashings to ensure the roof is watertight at the end of each Working Day.

.3 Apply base and cap sheet onto substrate in 1 metre / 3’-3” x 3’-3” wide strips using same method as base and cap sheet applications.

.4 Lap flashing base sheet to membrane base sheet minimum 150 mm / 6” and seal by using same method as base and cap sheet applications.

.5 Lap flashing cap sheet to membrane cap sheet 250 mm / 10” minimum using same method as base and cap sheet applications.

.6 Provide 75 mm / 3” minimum side lap and seal.

.7 Extend flashing membranes minimum 200 mm up vertical surfaces.

.8 Secure flashings at 200 mm OC. Secure vertical flashings through termination bar.

.9 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.

.10 Overcoat lap edges with end lap stripping adhesive and membrane.

.11 Do work in accordance with manufacturer's recommendations and Section 07 62 00 - Sheet Metal Flashing and Trim.

.12 Tie-in leading edge of elastomeric sheet flashing with stripping ply membrane embedded between alternate courses of stripping ply adhesive.

.13 Low Parapet Wall Flashing
- .1 Seal exposed joint between the wall and roof deck for airtight seal.
- .2 Adhere elastomeric sheeting completely to flashing surface, cant, and roofing with flashing adhesive.
- .3 Ensure complete bond and continuity without wrinkles or voids. Lap sheeting ends 100 mm and adhere with flashing adhesive.
- .4 Extend elastomeric sheeting up and over parapet at least 38 mm and face nail with 38 mm common roofing nails, 200 mm OC.

.14 Gravel Stop
- .1 Prior to setting and nailing horizontal flanges of edge flashings, uniformly trowel a 1.5 mm thick layer of cold flashing adhesive to roofing surface designated to receive metal flange.
- .2 Install metal gravel stop with formed drip edge, incorporating lock-type joints to allow expansion and contraction. Set flange in cold flashing adhesive.
- .3 Nail interior portion of flange to wood blocking 75 mm OC, staggered.
- .4 Prime metal flange with asphaltic primer.
- .5 Fully adhere a sufficiently wide strip of elastomeric sheeting to flashing with flashing adhesive. Ensure complete bond and continuity without wrinkles or voids lap sheeting ends 100 mm and adhere with flashing adhesive. Elastomeric sheeting to cover gravel stop completely and overlapping onto adjacent roof minimum 150 mm.
- .6 Seal edge of flashing membrane at metal upturn as specified in Section 07 92 00.

.15 Flashing At Edges and Gutters
- .1 Fabricate and install new one-piece edge and/or gutter with downspouts. Slope gutter to downspouts.
- .2 Prior to setting and nailing horizontal flanges of gutter, uniformly trowel a 1.5 mm thick layer of cold flashing adhesive to roofing surface designated to receive metal flange.
- .3 Nail flange to wood blocking 75 mm OC, staggered.
- .4 Prime metal flange with asphaltic primer.
- .5 Adhere sufficiently wide strip of elastomeric sheeting completely to flashing surface with flashing adhesive. Ensure complete bond and continuity without wrinkles or voids lap sheeting ends 100 mm and adhere with flashing adhesive. Elastomeric sheeting to cover gravel stop completely and overlap onto adjacent roof a minimum of 150 mm.
- .6 Seal edge of flashing membrane at metal upturn as specified in Section 07 92 00.

.16 Wall Flashing
- .1 Seal exposed joint between the wall and roof deck for airtight seal.
- .2 .Adhere elastomeric sheeting completely to flashing surface, cant and roofing with flashing adhesive.
- .3 .Ensure complete bond and continuity without wrinkles or voids. Lap sheeting ends 100 mm and adhere with flashing adhesive.
- .4 .Elastomeric sheeting width: sufficient to extend at least 150 mm beyond toe of cant onto roof surface and 200 mm above the roof surface.
- .5 Secure top of elastomeric sheeting to vertical plane with termination bar. Mechanically fasten 300 mm OC. Overcoat bar with end lap stripping adhesive and membrane.

.17 Building Expansion Joints
- .1 Fill joint with loose insulation.
- .2 Provide plywood to top of wood blocking, secured one side only; as indicated in drawings.
- .3 Apply foam rubber or 25 mm thick mineral fibre insulation to top of plywood.
- .4 Install elastomeric sheeting centered over expansion joint.
- .5 Fully adhere sheeting to horizontal and vertical blocking surfaces with flashing adhesive. Press sheeting into adhesive. Ensure complete bond and continuity without wrinkles or voids.
- .6 Elastomeric Sheeting Width: Sufficient to extend onto adjacent roofing minimum 150 mm.
- .7 Lap sheeting ends 100 mm and adhere with flashing adhesive.

.18 Expansion Joint at Wall
- .1 Extend vapour retarder from deck level up wall sufficiently and secure to wall.
- .2 Fill joint with loose insulation.
- .3 Install blocking, sheathing and compressible insulation as detailed on drawings.
- .4 Adhere elastomeric sheeting completely to flashing surface, cant and roofing with flashing adhesive.
- .5 Ensure complete bond and continuity without wrinkles or voids. Lap sheeting ends 100 mm and adhere with flashing adhesive.
- .6 Elastomeric Sheeting Width: sufficient to extend at least 150 mm beyond toe of cant onto roof surface and 200 mm above the roof surface.
- .7 Secure top of elastomeric sheeting to vertical plane with a termination bar. Mechanically fasten 300 mm OC. Overcoat bar with end lap stripping adhesive and membrane.

.19 Control Joint
- .1 Install elastomeric sheeting centred over joint.
- .2 Fully adhere sheeting to horizontal and vertical blocking surfaces with flashing adhesive. Press sheeting into adhesive. Ensure complete bond and continuity without wrinkles or voids.
- .3 Flashing Width: Sufficient to extend onto adjacent roofing minimum 150 mm.
- .4 Lap sheeting ends 100 mm and adhere with flashing adhesive.

.20 Curb Flashing
- .1 Fully adhere sheeting to horizontal and vertical blocking surfaces with flashing adhesive. Press sheeting into adhesive. Ensure complete bond and continuity without wrinkles or voids.
- .2 Elastomeric Sheeting Width: Sufficient to extend from top of curb down onto adjacent roofing minimum 150 mm. Mechanically fasten sheeting on top face of curb.
- .3 Lap sheeting ends 100 mm and adhere with flashing adhesive.
- .4 If membrane does not completely cover sleeper, secure top edge with a termination bar. Mechanically fasten 300 mm OC. Overcoat bar with end lap stripping adhesive and membrane.

.21 Projection Flashing
- .1 Apply flashing adhesive to prepared area and Provide aluminium base over pipe and set into the flashing adhesive.
- .2 Select proper step of rubber cap and cut off above index ring.
- .3 Install cap onto base collar and press edge to ensure proper seal.
- .4 Provide clamp around pipe and rubber cap. Prime flange.
- .5 Install elastomeric sheeting with stripping ply adhesive and membrane.
- .6 Cover flange completely. Extend flashing minimum 100 mm onto adjacent roofing. Remove wrinkles and voids. Lap flashing ply ends 100 mm.

.22 Lead Plumbing Vents
- .1 Provide lead plumbing vent flashing.
- .2 Flange: minimum 100 mm wide; extend completely around periphery of vent flashing. Set flange into flashing adhesive. Neatly dress flange with wood blocking.
- .3 Prime lead flange with asphaltic primer.
- .4 Pipe Greater Than 50 Mm OD: Bend lead inside pipe minimum 25 mm; replace cracked lead.
- .5 Pipe 50 mm OD or Less: Cut lead at vent top. Provide integral lead cap.

.23 Cartwheel and Collar: Provide cartwheel and collar flashing around projection using elastomeric sheeting and flashing adhesive.

.24 Coping
- .1 Test mortar bond of coping units. Remove loose mortar from bell joint and clean surfaces.
- .2 Pack flashing adhesive into bell joint and extend up onto bell approximately 75 mm and down onto shank of adjoining unit a similar distance.
- .3 Cut proper lengths of 150 mm wide reinforcement membrane and dry trowel membrane into flashing adhesive; tight and wrinkle-free.
- .4 Overcoat reinforcing membrane with flashing adhesive.

.25 Pitch Pans
- .1 Uniformly apply a 3 mm thick layer of flashing adhesive to surfaces designated to receive metal flange.
- .2 Install pre-manufactured pitch pan into adhesive. Prime flange prior to installation.
- .3 Ensure minimum 50 mm clearance between projection and side wall.
- .4 Fully adhere elastomeric sheeting to flashing surface with flashing adhesive. Cover flange completely. Extend flashing at least 100 mm onto adjacent roofing. Ensure complete bond and continuity without wrinkles and voids. Lap sheeting ends minimum 100 mm.
- .5 Fill pitch pan 25 mm from top with pitch pan base filler.
- .6 Fill remainder with rubberized elastomer mastic. Crown top of mastic to ensure water run-off.

.26 Equipment Stands (Pipe)
- .1 Provide 200 mm high sleeve flashing with 100 mm wide flange. Flange to extend completely around flashing periphery. Solder joints. Double solder vertical joints.
- .2 Nail flange to wood blocking minimum 75 mm OC; staggered.
- .3 Prime flange with asphaltic primer.
- .4 Install elastomeric sheeting to stand and roofing with continuous 1.5 mm thick application of flashing adhesive.
- .5 Sandwich top edge of sheeting between two layers flashing tape.
- .6 Secure top of sheeting with stainless steel drawband. Seal top of drawband and sheeting-to-pipe interface. Provide watershed and tool neatly.
- .7 Fabricate umbrella and install drawband; cover sleeve flashing minimum 75 mm. Install immediately above sleeve flashing. Tighten drawband.
- .8 Wipe clean top of umbrella and projection with metal cleaner. Prime surface with metal primer.
- .9 Seal projection-to-sheet metal interface. Provide watershed and tool neatly.

.27 Piping through Roof Boxes
- .1 Install wood blocking as specified in Section 06 10 00 and indicated on drawings.
- .2 Provide two-piece pipe box. Fabricate bottom portion with 100 mm flange. Notch top section to fit over piping. Provide openings 200 mm above the roof surface.
- .3 Set flange in mastic, nail flange to wood blocking at 75 mm OC. Prime flange.

.4 Fill box interior with mineral fibre insulation.
.5 Fasten top and closure detail to bottom.
.6 Clean surfaces of box and piping with metal cleaner and then prime. Seal joint between box and piping.
.7 Install elastomeric sheeting with flashing adhesive and membrane.

3.14 ROOF PENETRATIONS

.1 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with manufacturer's recommendations and details.

.2 Ensure substrate is clear of loose granules and all foreign substances that can impair adhesion.

.3 Place prefabricated curbs in the desired location and mark outside edge for reference. Place curbs at least 25 mm / 1” away from the penetration.

.4 Wire brush area around penetration to remove loose materials and contaminants

.5 Seal base of penetration with specified sealant to prevent the mastic from flowing through openings.

.6 Apply a bead of sealant to the substrate where curbs will be placed.

.7 Apply a bead of sealant to locking joint of the curb.

.8 Set the curbs in place and apply equal pressure to assure positive contact with roof membrane. Strike away excess sealant.

.9 Dispense a small amount of mastic to ensure proper mix, and fill inside prefabricated curb until full.

3.15 WALKWAYS

.1 Install walkway membrane in accordance with manufacturer's instructions and as indicated.
.1 Apply an additional layer of cap sheet membrane fully adhered in the areas in location to receive walkway mat.
.2 Apply primer to cap sheet membrane and cold apply walkway membrane ensuring selvage edge is not removed.
.3 Install walkway with gaps of at least 13 mm / 1/2” between panels to allow for expansion.

3.16 DRAINS

.1 Prior to proceeding with drain installation, ensure all rain water leaders are properly secured. Inspect underside of deck as required.

.2 Neatly cut down top of existing drain bowl to below top of new insulation as required to ensure new drain insert sits at the lowest point possible.

.3 Plug and seal drain to prevent water entry until service connection is completed.

.4 Make opening water and vapour tight at vapour retarder. Apply spray foam insulation to fill voids between existing drain bowl and new insulation. Fill voids within existing drain bowl with mineral wool batt insulation.

.5 Install drains and seals in accordance with the manufacturer's printed instructions.

.6 Provide 600 x 600 mm size elastomeric sheeting reinforcement, centered over drain; and fully adhered with flashing adhesive. Remove wrinkles and entrapped air.

.7 Apply mastic to exposed edge of membrane inside the drain opening.

.8 Re-clamp flashing collar to drain in bed of flashing adhesive.

.9 Trim excess sheeting within drain.

.10 Stop membrane flashing 25mm / 1” from strainer ensuring drainage openings at base of strainer are kept clear.

.11 Ensure strainer dome is in place and secure.

.12 Install drain assembly in accordance with manufacturer's written installation guidelines.

3.17 PIPE SUPPORTS

.1 Install pipe supports where indicated.

.2 Place one additional cold applied cap sheet membrane below pipe supports supporting heavy loads, colour different from field membrane as later selected by Consultant from manufacturer’s standard colour range.

.3 Centre support below conduits pipes and ducts squarely over pipe stand.

.4 Adjust supports level and plumb as required to ensure uniform load with other supports.

.5 Place pipe and ducts on support without dropping or causing undue impact.

3.18 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:
- .1 Obtain written reports 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.

3.19 CLEANING

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.2 Remove bituminous markings from finished surfaces.

.3 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.

.4 Repair or replace defaced or disfigured finishes caused by work of this section.

.5 Perform daily clean up to collect all wrappings, empty containers, and other debris from the project site.

.6 Upon completion, all debris must be disposed of in a legally acceptable manner.

.7 Prior to the final inspection, perform pre-inspection to review all work and to verify completion of all flashings and sealant applications.

.8 Leave roof clean of debris, spills, etc.

3.20 MAINTENANCE MATERIAL

.1 Granules:
  .1 As supplied by membrane manufacturer, colour to match membrane granule, provide to Owner one full pail of granules at end of project.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 The Aluminum Association Inc. (AAI)
- .1 AAI-Aluminum Sheet Metal Work in Building Construction-2002.
- .2 AAI DAF45-03, Designation System for Aluminum Finishes.

.2 American Society for Testing and Materials International (ASTM)
- .1 ASTM A 167-15, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM A 240/A 240M-15a, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- .3 ASTM A 606/A606M-09a, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
- .4 ASTM A 653/A 653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .5 ASTM A 792/A 792M-10, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .6 ASTM B 32-08(2014), Standard Specification for Solder Metal.
- .7 ASTM B 370-14, Standard Specification for Copper Sheet and Strip for Building Construction.
- .8 ASTM D 523-14, Standard Test Method for Specular Gloss.
- .9 ASTM D 822/D822M-13, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.3 Canadian Roofing Contractors Association (CRCA)
- .1 Roofing Specifications Manual 1997.

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
- .2 CAN/CGSB-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.

.5 Canadian Standards Association (CSA International)
- .1 CSA A123.3-05(R2015), Asphalt Saturated Organic Roofing Felt.
- .2 CSA A440-11, Standard/Specification for Windows, Doors, and Skylights.
- .3 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

.6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29 – Health and Safety Requirements 01 35 43 – Environmental Procedures.

.3 Shop Drawings:
.1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

.4 Samples:
.1 Submit duplicate50 x 50mm / 2" x 2" samples of each type of sheet metal material, finishes and colours.

.5 Quality assurance submittals: submit following in accordance with Section 01 45 00 – Quality Control.
.1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

PART 2 - PRODUCTS

2.1 PREFINISHED METAL FLASHINGS, SILLS AND DRIP PLATES

.1 Prefinished Metal Flashing and Drip Plates (Flat Stock):
.1 Prefinished Metal Flashing: galvanized steel, minimum temper rolled accordance with ASTM A446, to profiles indicated, type, colour and thickness to match metal cladding. Factory applied silicone modified polyester finish shall be Series 5000 precoating by Dominion Foundaries and Steel Limited or the Steel Company of Canada Limited.
.2 Prefinished Metal Drip Plates: 4", of size and profile indicated, 26 gauge metal c/w drip and anchoring devices.
.3 Class F1S.
.4 Prefinished 'Standard' and 'Extended' Colour Ranges series:
.1 Colour to later select by consultant, up to three (3) colours.
.2 Acceptable product: 'Colorite' by Vicwest, or equivalent by Agway, or Ideal Roofing.

2.2 ALUMINUM SILLS

.1 Aluminum sills, extruded aluminum, full length, of type and size and profile indicated, 0.125" thick anodized aluminum c/w drip, chairs, anchoring devices and cast end damns.

2.3 PREFINISHED METAL EAVESTROUGHS COMPLETE WITH INTEGRAL SCUPPER DOWNPIPE

.1 Form eaves troughs c/w integral scuppers and downpipes, 0.91 mm / 20 gauge, prefinished sheet metal.

.2 Form 'U' bracket from 1.9 mm / 14 gauge, prefinished sheet metal.

.3 Sizes and profiles as indicated.

.4 Fabricate eaves troughs complete with integral scupper, downpipes and necessary fastenings as indicated.

2.4 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Plastic cement: to CAN/CGSB 37.5.

.3 Underlay for metal flashing and Drip Plates: No. 15 perforated asphalt felt to CSA A123.3.

.4 Sealants: Refer to Section 07 92 00 – Sealants.

.5 Cleats: of same material, and temper as sheet metal, minimum 2” wide. Thickness same as sheet metal being secured.

.6 Fasteners: of same material as sheet metal, to CSA B111, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.

.7 Washers: of same material as sheet metal, 0.039” thick with rubber packings.

.8 Touch-up paint: as recommended by prefinished material manufacturer.

2.5 FABRICATION

.1 Form flashings, copings and fascias to sizes and profiles indicated.

.2 Fabricate metal flashings, drip plates, sills and other sheet metal work as indicated.

.3 Fabricate aluminum flashings, sills and other sheet aluminum work in accordance with AAI-Aluminum Sheet Metal Work in Building Construction.

.4 Form pieces in 8’-0” minimum lengths.
- .1 Make allowance for expansion at joints.

.5 Form sills in full window width pieces, in profiles as indicated, c/w end caps and end damns. Round off all sharp edges within 6’-6” off ground level.

.6 Hem exposed edges on underside 1/2".
- .1 Mitre and seal corners with sealant.

.7 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.8 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.6 REGLETS AND CAP FLASHINGS

.1 Form surface mounted reglets and metal cap flashing as detailed.
- .1 Provide slotted fixing holes and steel/plastic washer fasteners.
- .2 Return open ends of metal flashings to cover voids. Ensure all sharp edges are rounded and made safe.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install sheet metal work in accordance with CRCA FL series details and as detailed.

.2 Use concealed fastenings except where approved before installation.

.3 Provide underlay under sheet metal.
- .1 Secure in place and lap joints 4”.

.4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.
- .1 Flash joints using S-lock standing seams forming tight fit over hook strips, as detailed.

.5 Lock end joints and caulk with sealant.

.6 Install through wall flashings true and level to top of foundation walls with mechanical fasteners at 16” o/c maximum.
- .1 Return and close exposed ends of through wall flashings and make watertight complete with drip. Angle and chamfer edges and corners as required to eliminate all sharp edges.

.7 Install surface mounted reglets true and level, and caulk top of reglet with sealant.

.8 Insert metal flashing into reglets and under cap flashing to form weathertight junction.

.9 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm / 1”. Lead wedge flashing securely into joint.

.10 Caulk flashing at cap flashings with sealant. Do not seal where water is intended to drain from the building system / components.

.11 Install pans, where shown around items projecting through roof membrane.

3.3 SILL INSTALLATION

.1 Provide mock-up of window sill conditions where directed by Consultant. Do not proceed with installation of window sills until approved in writing by the Consultant.

.2 Fabricate sills to suit individual window openings and to accommodate concealed end damns where possible to Consultant approval. Set sills with uniform design drainage slope to exterior, level in length. Where possible extend sills past jambs as required to conceal end damns behind adjacent exterior wall finish and provide watertight joint with sealant concealed from the elements.
- .1 At masonry locations fit sills to provide snug fit. Set end damns and against masonry in bed of sealant in accordance with Section 07 92 00 – Joint Sealants and provide watertight joint concealed from the elements.

.3 Set sills with uniform design drainage slope to exterior, level in length. Extend sills past jambs and provide watertight joint concealed from the elements.

.4 Secure sills in place with anchoring devices located at ends and joints and evenly spaced at maximum 610 mm / 2'-0" maximum between.

.5 Provide one-piece sill flashing where practicable.

.1 Where joints are required, keep joints to a minimum and locate to provide equal sill lengths. Provide a 200 mm / 8" long sill piece below windowsill on solid backing and embed exposed sill fully into bed of sealant over sill piece for a watertight connection. Do not surface caulk joints.

.6 Provide adequate space between butt ends of sill lengths to allow for thermal expansion. For sills over 1220 mm / 4'-0" in length, maintain 3 to 5 mm / 1/8" to 3/16" expansion space at each end. Provide securely fastened concealed flashing below exposed sill and make watertight with sealant concealed from the elements for longevity.

.7 Return and close exposed ends of sill flashings watertight complete with drip, angled and chamfered as required to eliminate all sharp edges.

3.4 PREFINISHED METAL EAVESTROUGHS COMPLETE WITH INTEGRAL SCUPPER DOWNPIPE

.1 Install eaves troughs complete with integral scupper and secure to building at 400 mm / 16" on centre maximum with concealed anchoring.

.1 Slope eaves troughs to downpipes as indicated.

.2 Seal joints watertight.

.2 Install scuppers as indicated.

.3 Install downpipes and provide goosenecks back to wall.

.1 Secure downpipes to wall with straps at 1830 mm / 6'-0" on centre; minimum two straps per downpipe.

.2 Connect downpipes to drainage system and seal joint with plastic cement.

.4 Install downpipe extension a minimum 610 mm beyond face of adjacent wall.

.5 Install splash pans at termination of all downpipes and extensions.

3.5 FIELD QUALITY CONTROL

.1 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.

3.6 CLEANING

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).

.2 Underwriter's Laboratories of Canada (ULC)
  .2 ULC-S115-11, Fire Tests of Fire stop Systems.

1.2 DEFINITIONS

.1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.

.2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.

.3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.

.4 Tightly Fitted; (ref: NBC Part 3.1.9.1.1 and 9.10.9.6.1): penetrating items that are cast in place in buildings of non-combustible construction or have "0" annular space in buildings of combustible construction.
  .1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
  .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29– Health and Safety Requirements and manufacturer’s instructions.

.3 Shop Drawings:
  .1 Submit shop drawings to show proposed material, reinforcement, anchorage, fastenings and method of installation.
  .2 Construction details should accurately reflect actual job conditions.
  .3 Submit manufacturer's product data to show proposed material, rating and application of material for use in rated separation, reinforcement, anchorage, fastenings and method of installation, compliance with listed standards. Construction details should accurately reflect actual job conditions.
  .4 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation.

.5 Prior to submitting data, review with Authority having Jurisdiction to confirm acceptability of proposed materials and assemblies.

.4 Samples:
.1 Submit duplicate 300 x 300 mm / 12’ x 12’ samples showing actual fire stop material proposed for project.

.5 Quality assurance submittals: submit following as per Section 01 45 00 – Quality Control.
.1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
.1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.
.4 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.2 Installer: company and person specializing in fire stopping installations with 5 years documented experience approved by Manufacturer’s Field Services: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits with manufacturer’s representative, to review Work, at stages listed.
.1 After delivery and storage of products, and when preparatory Work and mock-up is complete, but before installation begins.
.2 Twice during progress of Work at 25% and 60% complete.
.3 Upon completion of Work, after cleaning is carried out.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:
.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.
.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
.3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.

.2 Storage and Protection:
.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
- .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN- ULC-S115 and not to exceed opening sizes for which they are intended and conforming to specified special requirements described in PART 3.
- .2 Fire stops system rating: to correspond with tested assemblies, or acceptable calculation procedures to provide fire resistance ratings as indicated.
- .3 Fire stop system rating for sealing junction of rated walls to rated floors and ceilings: to suit Ontario Building Code.

.2 Service penetration assemblies: systems tested to CAN-ULC-S115.

.3 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115 and listed in ULC Guide No. 40 U19.13 and ULC Guide No. 40 U19.15 under the Label Service of ULC.

.4 Fire-resistance rating of installed fire stopping assembly in accordance with OBC.

.5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.10 Sealants for vertical joints: non-sagging.

.11 Sealants:
- .1 Sealants / Silicone: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction, colour as later selected by Consultant from manufacturer’s complete colour range.
- .2 Sealants / Water-based Acrylic Dispersion (Paintable):to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction, colour as later selected by Consultant from manufacturer’s complete colour range.

.12 Fire Stop Insulation: Mineral wool insulation as per sealant manufacturer written recommendations for intended use.

.13 Fire Stop Mortar: Non-combustible, fibre reinforced, foamed cement mortar, ULC labelled.
- .1 Acceptable material: ‘A/D Fire barrier Mortar’, by A/D Fire Protection Systems Inc, or equivalent by Hilti or approved alternate.

.14 Sheet Metal Fire stopping in accordance with OBC 3.1.11.7(2).
.1 Sheet Metal Fire stopping: min 0.38 mm / 28 gauge sheet metal size and shape to suit opening. Provide continuous supports to all joints.

.15 Gypsum Board: Refer to Section 09 21 16 – Gypsum Board Assemblies.

.16 Identification Labels: Purpose made by manufacturer for permanent attachment to fire stop substrate area. Clearly identify manufacturer, product name, maximum hour rating, ULC rating number, installation date, approved installer name and company c/w phone and fax number, and location number.

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 datasheets.

3.2 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
.1 Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.

.2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.4 Fire Stop Sealant:
.1 Provide silicone fire stop sealant in concealed locations as determined in writing by Consultant.
.2 Provide water-based paintable acrylic fire stop sealant at all exposed to view locations.
.3 Provide fire stop sealant over fire stop insulation.
.4 Tool or trowel exposed sealant surfaces to a smooth, neat finish.

.5 Remove excess compound promptly as work progresses and upon completion.

.6 As the Work progresses, permanently mark all penetration seals with identification plate in visible locations next to seal. Review all exposed to view locations with Consultant prior to installing identification plates.

3.4 SEQUENCES OF OPERATION

.1 Proceed with installation only when submittals have been reviewed by Consultant.

.2 Install floor fire stopping before interior partition erections.

.3 Metal deck bonding: fire stopping to precede spray applied fireproofing to ensure required bonding.

.4 Mechanical pipe insulation: certified fire stop system component.
- .1 Ensure pipe insulation installation precedes fire stopping.

3.5 FIELD QUALITY CONTROL

.1 Inspections: notify Consultant when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

.2 Manufacturer's Field Services:
- .1 Obtain written reports 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.

3.6 CLEANING

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.7 SCHEDULE

.1 Fire stop and smoke seal including but not limited to:
- .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
- .2 Edge of floor slabs at curtain wall and precast concrete panels.
- .3 Top of fire-resistance rated masonry and gypsum board partitions.
- .4 Intersection of fire-resistance rated masonry and gypsum board partitions.
- .5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
- .6 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.

.7 Openings and sleeves installed for future use through fire separations.

.8 Around mechanical and electrical assemblies penetrating fire separations.

.9 Rigid ducts greater than 129 cm²/20in²: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

.10 At other locations as indicated on drawings.

3.8 INDEPENDENT TESTING AND INSPECTION

.1 Arrange independent inspection and testing of work of this Section. Pay costs from cash allowance established in Section 01 21 01 – Allowances for this purpose.

.2 Independent inspection agency shall:

.1 Inspect representative examples of each type of fire stops and smoke seals prior to being enclosed or covered.

.2 Make representative tests and investigations of completed work of this Section to ascertain conformance with manufacturer's requirements and performance criteria. Contractor shall make and repair test openings. Cost of making and repairing test openings shall be in Contract Price and not in Cash Allowance.

.3 Contractor shall schedule and arrange inspections, providing sufficient advance notice to independent inspection and testing agency. Uncover any work of this Section that has not been subject to independent inspection and testing.

.4 Independent inspection and testing agency shall issue written reports, copied to Owner, Building Dept., Contractor and Consultant.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International:
- .1 ASTM C834-14, Standard Specification for Latex Sealants.
- .2 ASTM C 919-12, Standard Practice for Use of Sealants in Acoustical Applications.

.2 Canadian General Standards Board (CGSB):
- .1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
- .2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
- .3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
- .4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
- .5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

.3 General Services Administration (GSA) - Federal Specifications (FS):
- .1 FS-SS-S-200-E (2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland cement Concrete Pavement.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
- .1 Material Safety Data Sheets (MSDS).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Manufacturer's product to describe:
  - .1 Caulking compound.
  - .2 Primers.
  - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
- .3 Submit two (2) copies of WHMIS MSDS in accordance with Section 01 35 29 – Health and Safety Requirements 01 35 43 – Environmental Procedures.

.3 Samples:
- .1 Submit two (2) samples of each type of material and colour.
- .2 Cured samples of exposed sealants for each colour where required to match adjacent material.

.4 Manufacturer's Instructions:
- .1 Submit instructions to include installation instructions for each product used.

1.3 QUALITY ASSURANCE

.1 Qualifications:

.1 Subcontractor: Possess a copy of and be familiar with all standards specified. A person specializing in work specified with minimum five (5) years documented experience approved by Manufacturer.

.2 Installer: A person specializing in installing sealants in exposed joints with minimum one (1) year documented experience approved by Manufacturer.

.2 Mock-ups:

.1 Construct mock-up in accordance with Section 01 45 00 – Quality Control.

.2 Construct mock-up to show location, size, shape and depth of joint(s) complete with back up material, primer, caulking and sealant.

.3 Mock-up will be used to judge workmanship, substrate preparation, operation of equipment and material application.

.4 Locate where directed by Consultant.

.5 Allow forty eight (48) hours for inspection of mock-up by Consultant before proceeding with sealant work.

.6 When accepted, mock-up will demonstrate minimum standard of quality required for this Work. Approved mock-up may remain as part of finished Work if deemed acceptable by Consultant.

.3 Acoustic Testing:

.1 Refer to Section 09 21 16 Gypsum Board Assemblies.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 – Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect joint sealants from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS

.1 Ambient Conditions:
  .1 Proceed with installation of joint sealants only when:
    .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
    .2 Joint substrates are dry.
    .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.2 Joint-Width Conditions:
  .1 Proceed with installation of joint sealants only where joint widths do not exceed those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:
  .1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.

1.8 WARRANTY

.1 Provide a written warrantee signed and issued in the name of the Owner, stating that caulking work of this section is guaranteed against leakage, cracking, crumbling, melting, shrinkage, running, loss of adhesion and staining adjacent surfaces, for a period of two (2) years from date of Consultant's Certificate of Substantial Performance.

PART 2 - PRODUCTS

2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.

.3 Where sealants are qualified with primers use only primers as recommended by sealant manufacturer for type of surface and conditions being primed.

.4 Joint Filler and Back-Up: Circular cross section unless shown as slab or sheet, minimum 25% wider than joint, semi-rigid: closed cell polyethylene or polyurethane product, rubber tubing or non-migrating plasticized vinyl having a shore "A" hardness of 20 and tensile strength of 130-200 kPa, compatible with sealant and as recommended by sealant manufacturer.
  .1 Acceptable material: ‘Ethafoam’, by Dow Chemical of Canada Ltd, or product of Hercules Inc., Delaware USA.

.5 Bond Breaker: As recommended for use by sealant manufacturer.

.6 Vent Tubes: Rigid clear extruded plastic, min. 6 mm ID and 9 mm OD.

.7 Preformed compressible and non-compressible back-up materials:
- .1 Polyethylene, urethane, neoprene or vinyl foam:
  - .1 Extruded closed cell foam backer rod.
  - .2 Size: oversize 30 to 50 %.
- .2 Neoprene or butyl rubber:
  - .1 Round solid rod, Shore A hardness 70.
- .3 High density foam:
  - .1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m³ density, or neoprene foam backer, size as recommended by manufacturer.
- .4 Bond breaker tape:
  - .1 Polyethylene bond breaker tape which will not bond to sealant.

.8 Sealant Colours: Colours of exposed sealants as later selected by Consultant from manufacturer's standard colour range.

2.2 SEALANT MATERIAL/DESIGNATIONS

.1 Exterior Use:
- .1 All areas unless specified otherwise: One Part moisture curing polyurethane, Self-Leveling to CAN/CGSB-19.13, class MC-2-25-B-N:
  - .1 Acceptable Product: "Dymonic' by Tremco Ltd, or approved alternate.
- .2 Prefinished Metal to Prefinished Metal: one part blend of synthetic rubber and resin, self leveling to CAN/CGSB 7.1:
  - .1 Acceptable Product: "Gutter Seal" by Tremco or approved alternate.
- .3 Glass to glass, glass to metal and metal to metal curtain wall joints: Medium modulus, moisture curing, one part silicone sealant. Meeting the specified requirements of specification CAN/CGSB-19.13-M87, Classification MCG-2-25-A-L:
  - .1 Acceptable Product: 'Spectrem 2' by Tremco Ltd. or approved alternate.
- .4 Sealants in contact with air/ vapour barrier membranes: a moisture cure, medium modulus polymer modified sealing compound to ASTM C920 Type S, Grade NS, Class 25.
  - .1 Acceptable Products: 'HE925 BES Sealant' manufactured by Henry Bakor, or 'Sopramastic ALU' by Soprema, or approved alternate.

.2 Interior Use:
- .1 Lap Joints in Plastic Sheet Vapour Barrier and around mechanical piping and conduit in concealed to view spaces in partitions identified with an STC rating: Non-skinning, non-hardening, non-oxidizing, non-bleeding synthetic rubber sealant sealing and bedding compound for acoustical purposes and concealed joints conforming to CAN/CGSB 19-GP-21M87:
  - .1 Acceptable Product: "Acoustical Sealant", by Tremco or approved alternate.
- .2 Joints around holes or voids made by through penetrations including but limited to mechanical piping and conduit in exposed to view spaces in partitions identified with an STC rating: easy gunning, non-staining, paintable acrylic polymer conforming to ASTM C834:
  - .1 Acceptable Product: "Tremflex 834", by Tremco, or approved alternate.
- .3 Interior General Application (all areas unless specified otherwise): to CAN/CGSB-19.14M:
  - .1 Acceptable Product: "Tremflex 834" by Tremco or approved alternate.

.4 Wet Areas and Washroom Fixtures: Mildew resistant, one component neutral cure silicone sealant to CGSB-19GP22M:
  .1 Acceptable Product: “Tremsil 200” by Tremco or approved alternate.
.5 Interior non-moving joint applications to be painted: One component, paintable acrylic latex sealant to CGSB-19-GP-17M:
  .1 “Tremflex 834" by Tremco or approved alternate.
.6 Interior Fire Stop application:
  .1 All locations unless otherwise noted:
    .1 Acceptable Product: to CAN4-S115M "Tremstop Acrylic (GG)" by Tremco or approved alternate.
    .2 For ULC rated systems: Refer to Section 07840 – Fire Stopping and Smoke Seals.

2.3 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.

.2 Primer: in accordance with sealant manufacturer's written recommendations.

PART 3 – EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for joint sealants installation in accordance with manufacturer's written instructions.
  .1 Visually inspect substrate.
  .2 Inform Consultant of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of back-up materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACK-UP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 APPLICATION

.1 Sealant:
- .1 Apply sealant in accordance with manufacturer's written instructions.
- .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
- .3 Apply sealant in continuous beads.
- .4 Apply sealant using gun with proper size nozzle.
- .5 Use sufficient pressure to fill voids and joints solid.
- .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
- .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
- .8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing:
- .1 Cure sealants in accordance with sealant manufacturer's instructions.
- .2 Do not cover up sealants until proper curing has taken place.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Clean adjacent surfaces immediately.
- .3 Remove excess and droppings, using recommended cleaners as work progresses.
- .4 Remove masking tape after initial set of sealant.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.8 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by joint sealants installation.

3.9 SCHEDULE

.1 Apply sealant at the following exterior locations:
- .1 Between dissimilar materials in locations except where specifically indicated otherwise.
- .2 Control joints in masonry elements.
- .3 Joints between precast elements and between precast concrete elements and adjacent Work.
- .4 Below thresholds (double bead).
- .5 At perimeter of door, screen and louver frames.
- .6 At penetrations through exterior building elements.
- .7 Where indicated.

.2 Apply sealant at the following interior locations:
- .1 Between dissimilar materials in exposed locations except where specifically indicated otherwise.
- .2 Perimeter of exterior door, louver and screen frames.
- .3 Between interior door frames and wall.
- .4 Control joints in masonry elements, and joints between bearing and non-bearing masonry walls.
- .5 Building expansion joints, except where expansion joint covers are required.
- .6 At ceramic tile control joints.
- .7 Perimeter of firehose cabinets, access panels, and control panels.
- .8 Between vanities / countertops / underside of window stools and walls.
- .9 Between interior door frame and flooring.
- .10 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of sound ratings are maintained in partitions identified with STC ratings.
- .11 Where shown.

.3 At interior locations use acrylic emulsion sealant except:
- .1 At floor control joints use self leveling polyurethane.
- .2 At vanities / countertops and at ceramic wall tile control joints use silicone sealant.
- .3 Where expected joint movement exceeds movement capacity of acrylic emulsion sealant, use sealant specified for exterior use, as directed by Consultant

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM A 653/A 653M-15, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM B 29-14, Standard Specification for Refined Lead.
- .3 ASTM B 749-14, Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .2 CGSB 41-GP-19Ma-84, Rigid Vinyl Extrusions for Windows and Doors.

.3 Canadian Standards Association (CSA International)
- .1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA W59-13, Welded Steel Construction (Metal Arc Welding).
- .3 CSA A440-11, AAMA/WDMA/CSA 101/I.S.2/A440-11, North American Fenestration Standards/Specification for Windows, Doors and Skylights.
- .4 CSA A440S1-09, Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440,NAFS # North American Fenestration Standard/Specification for windows, doors, and skylights, Includes Update No. 1 (2013).

.4 Canadian Steel Door Manufacturers' Association (CSDMA)
- .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2000.
- .2 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 1990.

.5 National Fire Protection Association (NFPA)
- .1 NFPA 80-2016 Edition, Standard for Fire Doors and Other Opening Protectives.
- .2 NFPA 252-(2012), Standard Methods of Fire Tests of Door Assemblies.

.6 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .2 CAN/ULC-S702-14, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
- .3 CAN/ULC-S704-11, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
- .4 CAN/ULC4-S104-10, Standard Method for Fire Tests of Door Assemblies.
- .5 CAN4-S105-09, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.2 SYSTEM DESCRIPTION

.1 Design Requirements:
- .1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35 degrees C to 35 degrees C.
- .2 Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.

.3 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104 NFPA 252 for ratings specified or indicated.

.4 Provide fire labelled frames for openings requiring fire protection ratings. Test products in conformance with CAN4-S104, ASTM E 152 or NFPA 252 and listed by nationally recognized agency having factory inspection services.

.5 Fenestration performance grades for doors:

.1 In accordance with the CSA A440SI Canadian Supplement, Clause (1)(b) appropriate for the conditions and geographic location in which the doors will be installed.

.2 Conform to performance grades selected under CSA A440SI Canadian Supplement, Sentence (2) when tested in accordance with the standard referenced in Clause (1)(a).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Provide product data: in accordance with Section 01 33 00 – Submittal Procedures.

.3 Provide shop drawings: in accordance with Section 01 33 00 – Submittal Procedures.

.1 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed, louvred, arrangement of hardware and fire rating and finishes.

.2 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and reinforcing fire rating finishes.

.3 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

.4 Submit test and engineering data, and installation instructions.

.5 Verify actual opening sizes and field conditions by field measurement before fabrication. Shop drawings to reflect measurements and conditions provided, and product shall be manufactured accordingly. Coordinate field measurements with fabrication and construction schedules to avoid delays.

.4 Provide samples in accordance with Section 01 33 00 – Submittal Procedures.

.5 Submit one 305 x 305 mm / 12” x 12” corner sample of each type of frame.

.1 Show butt cutout glazing stops 12” long removable mullion connection snap-on trim with clips.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Storage and Handling Requirements:

.1 Store materials off floor, in well ventilated room, indoors in dry location and in accordance with manufacturer's recommendations in clean, dry area.

.2 Store and protect metal doors and frames from dents, nicks, scratches, and blemishes, well-ventilated area.

.3 Replace defective or damaged materials with new.

1.5 QUALITY ASSURANCE

.1 Acoustic Testing:
  .1 Refer to Section 09 21 16 Gypsum Board Assemblies.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Standard hollow metal doors, frames and screes shall be as manufactured by Barron Steel Doors and Frames or approved alternate.

.2 Acoustic doors, frames and screens shall be as manufactured by Fleming Steel Doors and Frames, or approved alternate.
  .1 Provide whisper core acoustic doors and frames with applicable sound transmission control rating (STC) as indicated on the door and frame schedule.
  .2 Acoustic door and frame construction to correspond to scheduled STC rating.

.3 Hot dipped galvanized steel sheet: to ASTM A 653M, ZF75, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.

.4 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A 653M, ZF75.

.5 Cast or rolled pure sheet lead: to ASTM B 29 ASTM B 749, weight: 19.5 kg/m², thickness 1.6 mm.

.6 Composites: balance of core materials used in conjunction with lead: in accordance with manufacturers' proprietary design.

2.2 DOOR CORE MATERIALS

.1 Honeycomb Construction:
  .1 Structural full, 1 1/4", cell size resin impregnated fibrous 'honeycomb'.

.2 Stiffened: face sheets , insulated core.
  .1 Insulation: polyurethane, rigid extruded, closed cell board and heat resistant. Density; 16 to 32 kg/m3, thermal values; RSI 1.0 (R 6.0) minimum, Type 1, in accordance with ASTM C578 Fibreglass: to CAN/ULC-S702, semi-rigid, density 24 kg/m^2.

2.3 ADHESIVES

.1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.

.2 Polystyrene and Polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.

.3 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, sealant/adhesive.

2.4 PRIMER

.1 Touch-up prime CAN/CGSB-1.181.

2.5 PAINT

.1 Field paint steel doors and frames in accordance with Section 09 91 99 - Painting. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.

2.6 ACCESSORIES

.1 Door silencers: single stud rubber/neoprene type.

.2 Exterior and interior top and bottom caps: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.

.3 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.

.4 Door bottom seal: Refer to Section 08 71 00 Door Hardware and door hardware schedule.

.5 Metallic paste filler: to manufacturer's standard.

.6 Fire labels: metal, riveted and clearly visible.

.7 Sealant: Refer to Section 07 92 00 – Joint Sealing.

.8 Glazing: Refer to Section 08 80 50 – Glazing.

.1 Make provisions for glazing as indicated and provide necessary glazing stops.

.1 Provide removable stainless steel glazing beads for use with glazing tapes and compounds and secured with countersunk stainless steel screws.

.2 Design exterior glazing stops to be tamperproof.

2.7 FRAMES FABRICATION GENERAL

.1 Fabricate frames in accordance with CSDMA specifications.

.2 Fabricate frames to profiles and maximum face sizes as indicated.

.3 Exterior frames: 16 ga. welded thermally broken type construction.

.4 Interior frames:

.1 16 ga. welded type construction, unless otherwise indicated.

.5 Blank, reinforce, drill and tap frames for mortised, templated hardware, and electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.

.6 Prepare frame for door silencers, three (3) for single door, two (2) at head for double door.

.7 Weld in place all frame back boxes, provided by hardware schedule for electrical hardware. Boxes shall be centred on the electrical hardware preparation.

.8 Provide ½" conduit to all electrical hardware locations in frame and screen mullions and mid-rails. Coordinate exact locations with hardware schedule.

.9 Manufacturer's nameplates on frames and screens are not permitted.

.10 Conceal fastenings except where exposed fastenings are indicated.

.11 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

.12 Insulate entire interior of interior frame components with mineral wool acoustic insulation.

.13 Wrap around frames to be used at gypsum wallboard interior partitions.

.14 Insulate entire interior of exterior frame components with polyurethane foam insulation.

2.8 FRAME ANCHORAGE

.1 Provide appropriate anchorage to floor and wall construction.

.2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.

.3 Provide a minimum of three anchors for doors. Provide two (2) anchors for rebate opening heights up to 1520 mm / 5'-0" and one (1) additional anchor for each additional760 mm / 2'-6" of height or fraction thereof.

.4 Locate anchors for frames in existing openings not more than 150 mm / 6" from top and bottom of each jamb and intermediate at 660 mm / 26" on centre maximum.

2.9 FRAMES: WELDED TYPE

.1 Welding in accordance with CSA W59.

.2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.

.3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.

.4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.

.5 Securely attach floor anchors to inside of each jamb profile.

.6 Weld in two (2) temporary jamb spreaders per frame to maintain proper alignment during shipment.

2.10 DOOR FABRICATION GENERAL

.1 Doors: swing type, flush, with provision for glass and/or louvre openings as indicated.

.2 Exterior doors: insulated construction, size as indicated x 45 mm / 1 3/4" thick, unless otherwise indicated.

.3 Exterior doors shall have extended P.V.C flush cap closing off head rail conforming to CGSB 41-GP-19Ma and will be insulated.

.4 Interior doors: insulated steel construction, size as indicated x 45 mm / 1 3/4" thick, unless otherwise indicated.

.5 Fabricate doors with longitudinal edges welded. Grind welded seam joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.

.6 Doors: manufacturers' proprietary construction, tested and/or engineered as part of a fully operable assembly, including door, frame, gasketting and hardware in accordance with ASTM E 330.

.7 Size doors to provide even margins between doors and jambs and doors and finished floor and thresholds as follows:

.1 Hinge side: 1.0 mm / 3/64”.

.2 Latchside and head: 1/16”.

.3 Underside of door to finished floor, top of carpet, noncombustible sill, and thresholds: 13 mm / 1/2”.

.8 Blank, reinforce, drill doors and tap for mortised, templated hardware and electronic hardware.

.9 Factory prepare holes12.7 mm / 1/2" diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.

.10 Factory all doors to receive hardware, including preparation for specialized integral door power requirements, to be coordinated with the hardware supplier.

.1 Refer to Section 08 71 00 – Door hardware.

.11 Provide 3/8” wire raceway and pull string from current transfer location to all electric hardware locations. Raceways must be clear of all other door cut outs. Electric mortise lock preps must be a minimum 124 mm deep to accommodate future wiring and connectors.

.12 Reinforce doors where required, for surface mounted hardware. Provide inverted, recessed, spot welded channels to top and bottom of interior and exterior doors and finish with flush PVC top and bottom caps.

.13 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

.14 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in conformance with CAN4-S104, NFPA 252 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

.15 Manufacturer's nameplates on doors are not permitted.

2.11 HOLLOW STEEL CONSTRUCTION

.1 Form face sheets for exterior doors from 16 ga. sheet steel.

.2 Form face sheets for interior doors from 18 ga. sheet steel.

.3 Reinforce doors with vertical stiffeners, securely welded to face sheets at 6” on centre maximum.

.4 Fill voids between stiffeners of exterior doors with polyurethane core.

.5 Fill voids between stiffeners of interior doors with acoustic insulation core to achieve required STC rating.

.6 Provide temperature rise rated core where indicated.

2.12 THERMALLY BROKEN DOORS AND FRAMES

.1 Fabricate thermally broken doors by using insulated core and separating exterior parts from interior parts with continuous interlocking thermal break.

.2 Thermal break: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.

.3 Fabricate thermally broken frames separating exterior parts from interior parts with continuous interlocking thermal break.

.4 Apply insulation to entire frame interior.

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 datasheets.

3.2 INSTALLATION GENERAL

.1 Install labelled steel fire rated doors and frames to NFPA 80 except where specified otherwise.

.2 Install doors and frames to CSDMA Installation Guide.

3.3 FRAME INSTALLATION

.1 Set frames plumb, square, level and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 4’-0” wide. Remove temporary spreaders after frames are built-in.

.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.5 Caulk perimeter of frames between frame and adjacent material in accordance with Section 07 92 00 – Joint Sealants.

.6 Maintain continuity of air barrier and vapour retarder. Provide continuous air / vapour barrier seal between thermal break of thermally broken frame and air / vapour barrier of exterior wall system with air / vapour barrier transition membrane. Refer to Section 07 28 00 Air / Vapour Barriers.

3.4 DOOR INSTALLATION

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 – Door Hardware.

.2 Adjust operable parts for correct function.

.3 Install louvres.

3.5 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation.

.2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.6 GLAZING

.1 Install glazing for doors and frames in accordance with Section 08 80 50 – Glazing.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American Architectural Manufacturers Association (AAMA)
- .1 AAMA 609/610-09, Cleaning and Maintenance Guide for Architecturally Finished Aluminum.

.2 ASTM International
- .1 ASTM E 330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.3 Canadian General Standards Board (CGSB)
- .1 CGSB 1.40-97, Anticorrosive Structural Steel Alkyd Primer.
- .2 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
- .3 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.

.4 CSA International
- .1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CSA A440-11, AAMA/WDMA/CSA 101/I.S.2/A440-11, North American Fenestration Standards/Specification for Windows, Doors and Skylights.
- .4 CSA A440S1-09, Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440,NAFS # North American Fenestration Standard/Specification for windows, doors, and skylights, Includes Update No. 1 (2013).

.5 Environmental Choice Program (ECP)
- .1 CCD-045-95, Sealants and Caulking Compounds.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for doors and frames and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Indicate materials and profiles and provide full-size, scaled details of components for each type of door and frame. Indicate:
  - .1 Interior trim and exterior junctions with adjacent construction.
  - .2 Junctions between combination units.
  - .3 Elevations of units.
  - .4 Core thicknesses of components.
  - .5 Type and location of exposed finishes, method of anchorage, number of anchors, supports, reinforcement, and accessories.
  - .6 Location of caulking.
  - .7 Each type of door system including location.
  - .8 Arrangement of reinforcing for hardware and joints.
  - .9 Arrangement of hardware and required clearances.

.4 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Samples may be returned for inclusion into work.
- .3 Submit one 12” x 12” corner sample of each type door and frame.
- .4 Submit sample showing glazing detail, reinforcement, finish and location of manufacturer's nameplates.
- .5 Frame sample to show glazing stop, door stop, jointing detail, finish, and wall trim where indicated.

.5 Manufacturers Reports:
- .1 Manufacturer's Field Reports: submit manufacturer's written reports within three 3 days of review, verifying compliance of Work, as described in Part 3 - FIELD QUALITY CONTROL.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 – Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for cleaning and maintenance of aluminum finishes for incorporation into manual.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certifications: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Pre-installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

.4 Manufacturer’s Field Services: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits with manufacturer’s representative, to review Work, at stages listed.
- .1 After delivery and storage of products, and when preparatory Work and mock-up is complete, but before installation begins.
- .2 Twice during progress of Work at 25% and 60% complete.
- .3 Upon completion of Work, after cleaning is carried out.

.5 Acoustic Testing:
- .1 Refer to Section 09 21 16 Gypsum Board Assemblies.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.1 Apply temporary protective coating to finished surfaces. Remove coating after erection. Use coatings that are easy to remove and residue free.

.2 Leave protective covering in place until final cleaning of building.

.3 Storage and Handling Requirements:

.1 Store materials off ground, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect aluminum doors and frames from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.6 GUARANTEES

.1 Door Manufacturer shall guarantee the frames and doors against defective material and workmanship which shall appear within a period of seven (7) years from the date of the architects' certificate of substantial completion.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

.1 Design frames and doors in exterior walls to:

.1 Accommodate expansion and contraction within service temperature range of -35 to 35 degrees C.

.2 Limit deflection of mullions to maximum 1/175th of clear span when tested to ASTM E 330 under wind load of 1.2 kPa submit certificate of tests performed.

.3 Movement within system.

.4 Movement between system and perimeter framing components or substrate.

.5 Fenestration performance grades:

.1 In accordance with the CSA A440SI Canadian Supplement, Clause (1)(b) appropriate for the conditions and geographic location in which the doors will be installed.

.2 Conform to performance grades selected under CSA A440SI Canadian Supplement, Sentence (2) when tested in accordance with the standard referenced in Clause (1)(a).

.2 Include continuous air / vapour barrier and vapour retarder through door system. Primarily in line with inside pane of glass and heel bead of glazing compound.

2.2 MATERIALS

.1 Aluminum extrusions: to Aluminum Association alloy AA 6063-T5 or T6 anodizing quality.

.2 Sheet aluminum: 1.5 mm/ 1/16" minimum thick to Aluminum Association alloy AA 1100 - H14 or AA 5005 - H32 or H34 anodizing quality.

.3 Steel reinforcement: to CSA G40.20/G40.21, grade 300 W.

.4 Fasteners: stainless steel, finished to match adjacent material.

.5 Weatherstrip: replaceable, mohair and metal backed wool pile.

.6 Door bumpers: black neoprene.

.7 Door bottom seal: operable and automatic door seal of anodized extruded aluminum frame and vinyl weather seal, recessed in door bottom, closed ends, automatic retract mechanism when door is open.

.8 Isolation coating: alkali resistant.

.9 Glazing materials: Refer to Section 08 80 50 – Glazing.

.10 Sealants: colour as later selected by Consultant in accordance with Section 07 92 00 - Joint Sealants.

2.3 ALUMINUM DOORS

.1 Exterior Thermally Broken Aluminum Entrance Doors:
- .1 Construct doors of porthole extrusions with minimum wall thickness of 0.125”.
- .2 Door depth: 2 1/4".
- .3 Door stiles nominal 4 1/4” wide plus or minus 1/4".
- .4 Top rail nominal 4 1/4” wide plus or minus 1/4".
- .5 Bottom rail nominal 6 1/2" wide plus or minus 1/4".
- .6 Mid rail nominal 3 1/2" wide plus or minus 1/4".
- .7 Reinforce mechanically-joined corners of doors to produce sturdy door unit.
- .8 Acceptable product: ‘AA 425 wide stile’, by Kawneer, or approved alternate.

.2 Glazing stops: interlocking snap-in type for dry glazing. Exterior stops: tamperproof type. Hardware: Refer to Section 08 71 00 – Door Hardware.

.3 Interior Aluminum Entrance Door:
- .1 Construct doors of porthole extrusions with minimum wall thickness of 0.090” minimum.
- .2 Door depth: 1 3/4".
- .3 Door stiles nominal 89 mm / 3 1/2"" wide plus or minus 1/4".
- .4 Top rail nominal 89 mm / 3 1/2" wide plus or minus 1/4".
- .5 Bottom rail nominal 165 mm / 6 1/2"wide plus or minus 1/4".
- .6 Reinforce mechanically-joined corners of doors to produce sturdy door unit.
- .7 Glazing stops: interlocking snap-in type for dry glazing. Exterior stops: tamperproof type.
- .8 Hardware: Refer to Section 08 71 00 – Door Hardware.
- .9 Acceptable product: ‘350 Medium Stile’by Kawneer, or approved alternate.

2.4 ALUMINUM FRAMES

.1 Construct thermally broken and insulated frames of aluminum extrusions with minimum wall thickness of 13/64” at all hardware attachment points.

.2 Frame members:
- .1 Exterior: thermally broken, 50 mm x 115 mm / 2” x 4 1/2" nominal size, for flush glazing.
- .2 Interior:45 mm x 115 mm / 1 3/4" x 4 1/2" nominal size, for flush glazing.

.3 Sidelite Base: width to match frame, height to match bottom rail of adjacent door.

.4 Acceptable product:
.1 Interior and Exterior Frame: 'AA 6500', by Kawneer, or approved alternate.

2.5 ALUMINUM FINISHES

.1 All door and frame finish unless otherwise noted:
.1 Exterior Doors and Frames#17 clear, designation AA M12C22A31anodized anodic finish, designation by Kawneer, or approved alternate.
.2 Interior Doors and Frames: #17 clear, designation AA M12C22A31anodized anodic finish, designation AA M12C22A44 by Kawneer, or approved alternate.

.2 Appearance and properties of anodized finishes designated by Aluminum Association as Architectural Class 1, Architectural Class 2, and Protective and Decorative.

2.6 STEEL FINISHES

.1 Finish steel clips and reinforcing steel with steel primer to CGSB 1.40.

2.7 FABRICATION

.1 Doors and framing to be by same manufacturer.

.2 Fabricate doors and frames to profiles and maximum face sizes as indicated. 7/8" bite for insulating glazed units.

.3 Provide structural steel reinforcement as required.

.4 Fit joints tightly and secure mechanically.

.5 Conceal fastenings.

.6 Mortise, reinforce, drill and tap doors, frames and reinforcements to receive hardware using templates provided under Section 08 71 00 - Door Hardware.

.7 Isolate aluminum from direct contact with dissimilar metals, concrete and masonry.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for aluminum doors and frames installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate. Examine work of other trades over which aluminum framing will be applied, for conformity to drawings. Report all discrepancies to Consultant prior to commencing with work for aluminum doors and framing systems.
.2 Deliver all Aluminum door frames and glazing material and related components in the manufacturers provided protective packaging. Do not deliver until ready for installation.

.3 Inspect all components for damage upon delivery

.4 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.5 Store all materials indoors, in dry locations. Ensure that materials do not come into direct contact with ground or damp substrates.

.6 Inform Consultant of unacceptable conditions immediately upon discovery.

.7 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Set frames plumb, square, level at correct elevation in alignment with adjacent work.

.3 Anchor securely.

.4 Install doors and hardware in accordance with hardware templates and manufacturer's instructions.

.5 Adjust door components to ensure smooth operation.

.6 Make allowances for deflection of structure to ensure that structural loads are not transmitted to frames.

.7 Once door is hung and glazed contractor shall check and re-adjust, as required, all aspects including but not limited to; operating hardware installed under this section.

.8 Strictly adhere to manufacturer's shop drawings specified widths and heights to ensure excellent fit and finish.

.9 Once installation or door and hardware is complete, inspect door, frame and hardware to ensure proper function as intended.

.10 Glaze aluminum doors and frames in accordance with Section 08 80 50 - Glazing.

.11 Seal joints to provide weathertight seal at outside and air, vapour seal at inside.

.12 Apply sealant in accordance with Section 07 92 00 - Joint Sealants. Conceal sealant within the aluminum work except where exposed use is permitted by Consultant.

3.3 FIELD QUALITY CONTROL

.1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.

.2 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 Manufacturer's Field Services:

.1 Obtain written reports 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 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Perform cleaning of aluminum components in accordance with AAMA 609.1 - Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.

.3 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.4 Clean aluminum with damp rag and approved non-abrasive cleaner.

.5 Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames.

.6 Clean glass and glazing materials with approved non-abrasive cleaner.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by aluminum door and frame installation.

END OF SECTION

PART 1 - GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Verification:

.1 Obtain specific locations and sizes for required access doors and frames from trades, including mechanical and electrical, requiring access to concealed equipment and indicate on submittal schedule.

.3 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for access door components and include product characteristics, performance criteria, physical size, finish, limitations, fire-resistive characteristics and details of anchorage devices.

.4 Shop Drawings:

.1 Submit catalogue details for each type of door illustrating profiles, dimensions and methods of assembly.

.2 Door and panel units: Show types, elevations, thickness of metals, full size profiles of door members.

.3 Hardware: Show materials, finishes, locations of fasteners, types of fasteners, locations and types of operating hardware, and details of installation.

.4 General: Show connections of units and hardware to other Work. Include schedules showing location of each type and size of door and panel units.

1.2 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 – Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect access doors from nicks, scratches, and blemishes.

.3 Apply temporary protective coating to finished surfaces. Remove coating after installation.
  .1 Use coatings in accordance with manufacturer's written instructions that are easily removable.
  .2 Leave protective coating in place until final cleaning of building.
.4 Replace defective or damaged materials with new.

1.4 QUALITY ASSURANCE

.1 Single Source Responsibility: Obtain access door and panel units, and frames for entire Project from 1 source and 1 single manufacturer.

.2 Coordination: Provide inserts and anchoring devices that will be built into other Work for installation of access door assemblies. Coordinate delivery with other Work to avoid delay.

PART 2 - PRODUCTS

2.1 NON-RATED ACCESS DOORS FOR WALLS AND CEILINGS

.1 Source Limitations: Obtain each type of access door and frame for the entire project from a single source and from a single manufacturer.

.2 Size: to suit access requirements.
  .1 For body entry: 600 x 600 mm minimum.
  .2 For hand entry: 300 x 300 mm minimum.

.3 Construction: rounded safety corners, concealed hinges, screwdriver latch, anchor straps, able to open 180 degrees.

.4 Gasketing: Fabricate access doors with neoprene gasket around perimeter of door frame.

.5 Anchors: concealed, to suit application.

.6 Finish: as follows:
  .1 All areas unless otherwise indicated: Galvanized, bonderized steel with white powder coat primer.
  .2 To all washrooms, kitchens, custodial wet areas and other wet areas as indicated: No. 304 stainless steel with No. 4 satin brushed polished finish.

.7 Flush Access Doors with Exposed Flanges:
  .1 Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
  .2 Door: 1.6 mm / 16 gauge cold rolled steel with edge support for structural rigidity.
  .3 Frame: Standard, 16 gauge cold rolled sheet steel with concealed fasteners.
  .4 Hinge: Concealed continuous rod opening to 100 degrees.
  .5 Latching : Factory installed 6 mm / 1/4" allen key, self-latching.

.8 Flush Access Doors with Concealed Flanges / Frame:

.1 Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board beads for concealed flange installation.

.2 Door: 1.6 mm / 16 gauge cold rolled steel beveled on all 4 sides.

.3 Frame: 1.6 mm / 16 gauge cold rolled steel with 13 mm / 1/2" flange at perimeter.

.4 Hinge: Hinges: Flush continuous piano hinge.

.5 Latching: Factory installed 6 mm / 1/4" Allen key, self-latching.

2.2 FIRE-RATED ACCESS DOORS FOR WALLS AND CEILINGS

.1 Fire-Rated Access Doors and Frames: Provide access door and frame assemblies tested for fire-test-response characteristics in accordance with NFPA 80 to the following test methods and that are listed and labeled by UL or Interek - Warnock Hersey and to the authorities having jurisdiction:

.1 NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.

.2 NFPA 288 for fire-rated access door assemblies installed horizontally.

.2 Fire-Resistance Ratings: Wherever a fire-resistance classification is indicated, provide fire rated access door and panel assemblies with panel door, frame, hinge, and latch from manufacturer listed in Underwriter's Laboratories (UL), "Building Materials Directory" or Interek - Warnock Hersey for rating shown.

.1 Provide 90 minute UL label at 2-hour rated partitions.

.2 Provide 3 hour Warnock Hersey label at horizontal applications, up to 24 inches wide x 36 inches high.

.3 Provide 2 hour Warnock Hersey label at horizontal applications greater than 24 inches wide x 36 inches high.

.3 Size: to suit access requirements.

.1 For body entry: 610 x 610 mm / 24" x 24" minimum.

.2 For hand entry: 305 x 305 mm / 12" x 12" minimum.

.4 Construction: rounded safety corners, concealed hinges, screwdriver latch, anchor straps, able to open 180 degrees.

.5 Anchors: concealed, to suit application.

.6 Finish:

.1 All areas unless otherwise indicated: Galvanized, bonderized steel with white powder coat primer.

.2 To all washrooms, kitchens, custodial wet areas and other wet areas as indicated: No. 304 stainless steel with No. 4 satin brushed polished finish.

.7 Maximum Size and Rating for:

.1 Horizontal Application: 610 mm wide x 914 mm high / 24" x 36".

.2 Maximum Size and Rating for Vertical Applications: 1219 mm x 1219 mm / 48" x 48".

.8 Fire-Rated, Insulated Flush Access Doors with Exposed Flanges / Frame:

.1 Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fibre insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide manufacturer's standard-width exposed flange, proportional to door size.

.2 Door: 0.9 mm / 20 gauge galvanized (satin coated) steel door with 2 1/4 inch (57 mm) depth sandwich type assembly.

.3 Frame Material: 1.6 mm / 16 gauge cold rolled steel of 64 mm / 2 1/2" depth with 25.4 mm / 1" flange at perimeter with concealed fasteners.

.4 Hinges: Flush continuous piano hinge.

.5 Latching / Locking Devices: Standard, self-latching tool-key operated slam latch and/or ring operated slam latch key operated cylinder cam latch with 2 keys per lock, keyed alike hex head cam latch, regular 6 mm / 1/4" Allen head.

.6 Automatic Closure Devices: Spring operated automatic closure devices for each door, number of springs to suit door size.

.7 Interior Latch Release all doors over 305 mm x 305 mm / 12" x 12": Mechanisms to allow panels to open from inside.

.8 Insulation: 51 mm / 2" thick fire rated mineral wool.

.9 Flush Access Doors with Concealed Flanges / Frame:

.1 Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fibre insulation enclosed in sheet metal with self-latching door, automatic closer and interior latch release. Provide frame with gypsum board plaster beads for concealed flange installation.

.2 Door: 0.9 mm / 20 gauge galvanized (satin coated) steel door with 2 1/4 inch (57 mm) depth sandwich type assembly.

.3 Frame: 1.6 mm / 16 gauge cold rolled steel of 64 mm / 2 1/2" depth with 25.4 mm / 1" flange at perimeter with concealed fasteners.

.4 Hinge: Hinges: Flush continuous piano hinge.

.5 Latching / Locking: Factory installed 6 mm / 1/4" Allen key, self-latching Key operated cylinder cam lock with 2 keys per lock, keyed alike Pinned Allen head security cam latches.

.6 Automatic Closure Devices: Spring operated automatic closure devices for each door, number of springs to suit door size.

.7 Interior Latch Release all doors over 305 mm x 305 mm / 12" x 12": Mechanisms to allow panels to open from inside.

.8 Insulation: 51 mm / 2" thick fire rated mineral wool.

2.3 EXCLUSIONS

.1 Lay-in tile ceilings: use unobtrusive identification locators.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for access door installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Installation: locate access doors within view of equipment and ensure equipment is accessible for operating, inspecting, adjusting, servicing without using special tools.

.1 Install masonry surfaces in accordance with Section 04 20 00 – Unit Masonry.

.2 Install gypsum board surfaces in accordance with Section 09 21 16 – Gypsum Board Assemblies.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by access door installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Aluminum Association (AA)
- .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 American Architectural Manufacturers Association (AAMA)
- .1 AAMA CW-10-04, Care and Handling of Architectural Aluminum From Shop to Site.
- .2 AAMA CW-11-85, Design Wind Loads and Boundary Layer Wind Tunnel Testing.
- .3 AAMA T1R-A1-04, Sound Control for Fenestration Products.
- .4 AAMA 501-05, Methods of Test for Exterior Walls.
- .5 AAMA 501.2, Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems
- .6 AAMA 502, Voluntary Specification for Field Testing of Newly Installed Fenstration
- .7 AAMA 503, Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing.
- .8 AAMA 611-98, Voluntary Specifications for Anodized Finishes Architectural Aluminum.
- .9 AAMA 612-02, Voluntary Specifications, Performance Requirements, and Test Procedures for Combined Coatings of Anode Oxide and Transparent Organic Coatings on Architectural Aluminum.
- .10 AAMA 2603-02, Voluntary Specification Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
- .11 AAMA 2604-05, Voluntary Specification Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.

.3 ASTM International
- .1 ASTM A 36/A 36M-14, Specification for Carbon Structural Steel.
- .2 ASTM A 123/A 123M-13, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .3 ASTM A 167-15, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .4 ASTM A653/A653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .5 ASTM B 209-14, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .6 ASTM B 221-14, Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- .7 ASTM E 283-04(2012), Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- .8 ASTM E 330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls, by Uniform Static Air Pressure Difference.
- .9 ASTM E 331-00(2009), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference.
- .10 ASTM E 413-10, Classification for Rating Sound Insulation.
- .11 ASTM E 1105-15, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB 1.108-M89, Bituminous Solvent Type Paint.
- .2 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.

.5 CSA International

.1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CSA S136-12, North American Specification for the Design of Cold Formed Steel Structural Members.

.3 CSA S157-05/S157.1-05(R2015), Strength Design in Aluminum/Commentary on CSA-S157-05, Strength Design in Aluminum.

.4 CSA W59.2-M1991(R2013), Welded Aluminum Construction.

.5 CSA A440-11, North American Fenestration Standards/Specification for Windows, Doors and Skylights.

.6 CSA A440S1-09, Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440,NAFS # North American Fenestration Standard/Specification for windows, doors, and skylights, Includes Update No. 1 (2013).

.6 Society for Protective Coatings (SSPC)

.1 SSPC - Paint 20-02(R2014), Zinc Rich Coating, Type I - Inorganic and Type II - Organic.

.2 SSPC - Paint 25-11, BCS, Zinc Oxide, Alkyd, Linseed Oil and Primer for Use Over Hand Cleaned Steel Type 1 and Type 2.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: coordinate work of this Section with installation of air / vapour barrier placement, vapour retarder placement, flashing placement, and components or materials.

.2 Pre-Installation Meetings:

.1 Convene pre-installation meeting 1 week prior to beginning work of this Section, with Contractor's Representative and Consultant in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Coordination with other building subtrades.

.4 Review manufacturer's written installation instructions and warranty requirements.

.5 Arrange for site visit with Consultant prior to start of Work to examine existing site conditions adjacent to demolition Work

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for curtain wall components, anchorage and fasteners, glass and infill, and internal drainage details and include product characteristics, performance criteria, physical size, finish and limitations and water flow diagrams.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

.2 Indicate system dimensions, framed opening requirements and tolerances, adjacent construction, anchor details anticipated deflection under load, affected related Work, weep drainage network, expansion and contraction joint location and details, and field welding required.

.4 Samples:

.1 Submit for review and acceptance of each unit.

.2 Samples will be returned for inclusion into work if requested.

.3 Submit 2 samples 24” x 24” in size illustrating prefinished aluminum surface, finish, colour, texture, specified glass units, insulated infill panels, glazing materials illustrating edge and corner.

.5 Test Reports:

.1 Submit substantiating engineering data, test results of previous tests by independent laboratory which purport to meet performance criteria, and supportive data.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazed aluminum curtain wall for incorporation into manual.

1.5 QUALITY ASSURANCE

.1 Regulatory Requirements:

.1 Conform to applicable code for acoustic attenuation, sound transmission, requirements.

.2 Mock-ups:

.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.

.2 Supply 3 m x full height mock-up including intermediate mullion, corner mullion, vision glass light, and insulated infill panel.

.1 Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.

.3 Locate mock-up where directed by Consultant. Allow 48 hours for inspection of mock-up by Consultant before proceeding with work. When accepted, mock-up will demonstrate minimum standard of quality and materials for work of this Section.

.4 Mock-up may remain as part of finished work to Consultant approval.

.3 Manufacturer’s Field Services: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits with manufacturer’s representative, to review Work, at stages listed.

.1 After delivery and storage of products, and when preparatory Work and mock-up is complete, but before installation begins.

.2 Twice during progress of Work at 25% and 60% complete.

.3 Upon completion of Work, after cleaning is carried out.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Handle work of this Section in accordance with AAMA CW-10.

.2 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.3 Store and protect aluminum glazed curtain wall components from nicks, scratches, and blemishes.

.4 Protect prefinished aluminum surfaces with wrapping or strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

.5 Replace defective or damaged materials with new.

1.7 AMBIENT CONDITIONS

.1 Install sealants when ambient and surface temperature is above 5°C minimum.

.2 Maintain this minimum temperature during and for forty-eight (48) hours minimum after installation of sealants.

1.8 MANUFACTURER'S FIELD SERVICES

.1 Arrange for initial job start-up site attendance, periodic site attendance of membrane manufacturer's technical representative during installation work, together with written report.

.2 The Contractor must at all times enable and facilitate access to the work site by said representative.

.3 Notify Consultant of date and time of inspection, a minimum of 48 hours prior to inspection. Provide one copy of manufacturer's report to the Consultant within 48 hours of inspection being carried out.

1.9 WARRANTY

.1 Contractor hereby warrants that glazed aluminum curtain wall will function as specified in accordance with CCDC 24, but for sixty (60) months.

PART 2 - PRODUCTS

2.1 SYSTEMS

.1 Description:

.1 Vertical glazed aluminum curtain wall system includes thermally broken tubular aluminum sections with self-supporting framing supplementary support, shop fabricated, factory prefinished, vision glass, insulated metal panel spandrel infill, related flashings, anchorage and attachment devices.

.2 Assembled system to permit re-glazing of individual glass (and infill panel) units from exterior without requiring removal of structural mullion sections.

.2 Performance Requirements:

.1 Design and size components to withstand dead and live loads caused by pressure and suction of wind, snow and hail for sloped glazing, acting normal to plane of system as calculated in accordance with OBC as measured to AAMA CW 11 and ASTM E 330.

.2 Design and size components to withstand seismic loads and sway displacement as calculated in accordance with applicable codes.

.3 Fenestration performance grades for curtain wall system:
- .1 In accordance with the CSA A440SI Canadian Supplement, Clause (1)(b) appropriate for the conditions and geographic location in which the doors will be installed.
- .2 Conform to performance grades selected under CSA A440SI Canadian Supplement, Sentence (2) when tested in accordance with the standard referenced in Clause (1)(a).

.4 Deflection of Framing Members: At design wind pressure, as follows:
- .1 Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding L/175 of the glass edge length for each individual glazing lite, or an amount that restricts edge deflection of individual glazing lites to 3/4", whichever is less. Limit deflection of clear span of framing members to L/175 for spans less than or equal 16’-6” and L/240 for spans greater than 16’-6”.
- .2 Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8”, whichever is smaller.
- .3 Operable Units: Provide a minimum 1/16” clearance between framing members and operable units.
- .4 Cantilever Deflection: Where framing members overhang an anchor point, limit deflection to two times the length of cantilevered member, divided by 175.

.5 Ensure system allows for expansion and contraction within system components when temperature range is 95 degrees C over 12 hour period without causing detrimental effect to system components.

.6 Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior by weep drainage network.

.7 Maintain continuous air/vapour barrier and vapour retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.
- .1 Position thermal insulation on exterior surface of air/vapour barrier and vapour retarder.

.8 Ensure no vibration harmonics, wind whistles, noises caused by thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system occur.

.9 Reinforce curtain wall system to accommodate window washing guide rails.
- .1 Supply sufficiently rigid anchors to resist loads caused by equipment platform, without damage to wall system.

2.2 MATERIALS

.1 Aluminum Extrusions: Alloy and temper recommended by glazed aluminum curtain wall manufacturer for strength, corrosion resistance, and application of required finish and not less than 5/64” wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.

.2 Aluminum sheet alloy: to requirements of ASTM B209.

.3 Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.

.4 Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

.5 Pressure Plate: Aluminum fastened to the mullion with stainless steel screws.

.6 Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

.7 Sealant: Refer to Section 07 92 00 – Sealants.

.8 Thermal Barrier: Thermal barrier consists of25 mm / 1” separation between the interior and exterior metal members in a typical condition, while maintaining a continuous watertight seal. Thermal barrier assembly tested in accordance with thermal cycling requirements of ASTM E2692 and show no sign of degradation following the test.

.9 Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of glazed curtain wall members are nominal and in compliance with AA Aluminum Standards and Data.

.10 Bituminous Paint: CAN/CGSB 1.108, Type 1 or 2, without thinner as recommended by manufacturer.

.11 Glazing: Refer to Section 08 80 50 – Glazing.

2.3 COMPONENTS

.1 Description: Thermally broken with interior tubular section insulated from exterior pressure plate; matching stops and pressure plate of sufficient size and strength to provide adequate bite on glass and infill panels; drainage holes, deflector plates and internal flashings to accommodate internal weep drainage system; internal mullion baffles to eliminate "stack effect" air movement within internal spaces.

.2 Exterior Curtain Wall, Horizontal and Vertical members: overall size including cap, 2 1/2" x 7 1/2” nominal dimension.

.1 Acceptable product: 1600UT Wall System 1 by Kawneer, equivalent from Alumicor or approved alternate.

.3 Fasteners: 300 Series stainless steel or 400 series stainless steel cadmium plated of sufficient size and quantity to perform work.

.4 Weathering and Glazing Gaskets: extruded, black, closed cell or dense elastomer of durometer appropriate to function.

.5 Thermally Broken Door Adaptors: provide thermal pressure plate door adaptors to accommodate insulated aluminum doors.

.6 Gasket and Glazing Tape: EPDM gasket with integral glazing tape, ‘Vision Strip’ by Tremco, or approved alternate.

.7 Cap Profile:

.1 Horizontal mullions: 2 1/2" x 3/4" deep nominal dimension unless otherwise indicated.

.2 Vertical mullion: 2 1/2" x 3/4" deep nominal dimension.

.3 Decorative cap and plate: Horizontal pressure plate and cap to extend across the full glass. Finish back of the pressure plate with anodized aluminum to match curtain wall framing.

.8 Infill panels:

.1 Interior spandrel panel: 1.5 mm / /16” thick, aluminum panel laminated to 19 mm / 3/4" thick plywood, finish to match framing system.

.2 Internal back pan: galvanized metal, 22 gauge, x full depth, sealed air / vapour tight corners, and flanges designed to fit into glazing pocket to form an integral part of the curtain wall air / vapour barrier system.

.3 Insulation: Semi-rigid stone wool insulation board. Fill pan with mineral wool insulation. Allow for 7/8” space between back pan and inside mullion face in locations to receive anodized aluminum panel.

.1 Acceptable Product: CurtainRock 40 by Roxul Inc., or approved alternate.

.4 Exterior Spandrel Panel: Refer to Section 08 80 00 Glazing.

.5 Adjacent Wall Covers: 1/64” thick aluminum, full contact pressure bonded to wall surfaces, ensuring flat surface, finish to match curtain wall mullion sections.

.6 Flashings: 1/64” thick aluminum, to match curtain wall mullion sections where exposed, secured with concealed fastening method.

.9 Sills: Refer to Section 07 62 00 Sheet Metal Flashing and Trim and 06 40 00 Architectural Woodwork.

.10 Louvres: Refer to Section 08 90 00 - Louvers and Vents.

.11 Condensation Gutters

.1 Aluminum condensation gutters, braked formed aluminum sheet, full length, of type and size and profile indicated, 3/64” thick anodized aluminum c/w watertight formed 1/2" high upstand, chairs and anchoring devices.

.12 Air / Vapour Barrier: Refer to Section 07 28 00 - Air Barrier 07 27 00– Air / Vapour Barriers.

.13 Vapour Retarder: specified in Section 07 26 00 - Vapour Retarders.

.14 Air Barrier: specified in Section 07 27 00.01 - Air Barriers.

2.4 FABRICATION

.1 Fabricate system components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

.2 Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof

.3 Prepare components to receive anchor devices. Install anchors.

.4 Arrange fasteners and attachments to ensure concealment from view.

.5 Prepare system components to receive exterior doors and hardware specified in Section 08 11 16 - Aluminum Doors and Frames. Reinforce interior horizontal head rail to receive track brackets and attachments. Reinforce framing members for external imposed loads.

.6 Visible manufacturer's identification labels not permitted.

.7 Fabricate curtain wall system complete with glazing to withstand the lateral design loads as per OBC requirements.

.8 Infill Panels:

.1 Fabricate infill panels with metal covered edge seals around perimeter of panel assembly, enabling installation and minor movement of perimeter seal.

.2 Reinforce interior surface of exterior panel sheet from deflection caused by wind and suction loads.

.3 Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

.4 Place insulation within panel, adhered to exterior face of interior panel sheet over entire area of sheet with impale fasteners.

.5 Ventilate and pressure-equalize the air space outside the exterior surface of the insulation, to the exterior.

.6 Arrange fasteners and attachments to ensure concealment from view.

.9 Finishes:

.1 Finish coatings: unless otherwise indicated finish all exposed surfaces of interior and exterior aluminum sections with anodic oxide treatment in accordance with Aluminum Association specification #14 clear, designation AA M12C22A41" by Kawneer, or approved alternate.

.2 Shop and touch-up primer for steel components: SSPC 25 Paint red oxide.

.3 Touch-up primer for galvanized steel surfaces: SSPC 20 Paint zinc rich.

.4 Concealed steel items: galvanized in accordance with CSA G164M to m2. Primed with iron oxide paint.

.5 Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

2.5 SOURCE QUALITY CONTROL

.1 Perform work in accordance with AAMA GSM-1 AAMA CW-I-9. Maintain one 1 copy on site.

.2 Manufacturer qualifications: company specializing in manufacturing the products specified in this section with minimum five (5) years documented experience.

.3 Installer qualifications: company specializing in performing the work of this section with minimum five (5) years documented experience approved by manufacturer.

.4 Design structural support framing components to CAN/CSA-S157 under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at the place where the Project is located in the Province of Ontario, Canada.

.5 Perform welding Work in accordance with CSA W59.2.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for aluminum curtain wall installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Verify dimensions, tolerances, and method of attachment with other work.

.3 Verify wall openings and adjoining air / vapour barrier and vapour retarder materials are ready to receive work of this Section.

.4 Inform Consultant of unacceptable conditions immediately upon discovery.

.5 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install curtain wall system in accordance with manufacturer's instructions.

.2 Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

.3 Use alignment attachments and shims to permanently fasten system to building structure. Clean weld surfaces; apply protective primer to field welds and adjacent surfaces.

.4 Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.

.5 Use thermal isolation where components penetrate or disrupt building insulation.

.6 Install sill flashings.

.7 Install eave edge flashings at sloped glazing system.

.8 Coordinate attachment and seal of perimeter air / vapour barrier and vapour retarder materials.

.9 Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier in accordance with curtain wall and insulation manufacturer’s written instructions.

.10 Install thermally broken pressure plate door adaptors to accommodate insulated aluminum doors.

.11 Install louvres, associated flashings, blank-off plates and screening. Fit blank-off plates tight to ductwork. Install glass and infill panels in accordance with Section 08 80 50 – Glazing.

.12 Place sealant on the up-slope side of the pressure plate cover caps; finish the surface with a slope to encourage drainage over the cap Cover caps to conceal screws and ensure continuous sightline.

.13 Install perimeter sealant to method required to achieve performance criteria and installation criteria in accordance with Section 07 92 00 – Joint Sealants.

3.3 SITE TOLERANCES

.1 Maximum variation from plumb: 1/16” non-cumulative or 1/2":100’, whichever is less.

.2 Maximum misalignment of two adjoining members abutting in plane: 1/32”.

.3 Maximum sealant space between curtain wall and adjacent construction: 1/2".

3.4 FIELD QUALITY CONTROL

.1 Inspection by independent testing agency will monitor quality of installation and glazing.
  .1 Test system to: ASTM E 1105, AAMA 501, AAMA 501.2, AAMA 502 and AAMA 503..
  .2 Evaluate installed system by thermo-photographic scan.
  .3 Provide test report within one (1) week of testing.

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer of curtain wall and or glass verifying compliance of Work, in handling, installing, applying, protecting and cleaning of products, and submit written reports in acceptable format to verify compliance of Work with Contract within 3 days of review.

.2 Submit 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 Ensure manufacturer's representative of curtain wall and of glass is present before and during critical periods of installation construction of field joints and testing.

.4 Schedule site visits to review Work at stages listed:

.1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.

.2 Twice during progress of Work at 25% and 60% complete.

.3 Upon completion of Work, after cleaning is carried out.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Remove protective material from prefinished aluminum surfaces.

.3 Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

.4 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

.5 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by glazed aluminum curtain wall installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Aluminum Association (AA)
- .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 American Architectural Manufacturers Association (AAMA)
- .1 AAMA CW-10-04, Care and Handling of Architectural Aluminum From Shop to Site.
- .2 AAMA CW-11-85, Design Wind Loads and Boundary Layer Wind Tunnel Testing.
- .3 AAMA T1R-A1-04, Sound Control for Fenestration Products.
- .4 AAMA 501-05, Methods of Test for Exterior Walls.
- .5 AAMA 611-98, Voluntary Specifications for Anodized Finishes Architectural Aluminum.
- .6 AAMA 612-02, Voluntary Specifications, Performance Requirements, and Test Procedures for Combined Coatings of Anode Oxide and Transparent Organic Coatings on Architectural Aluminum.
- .7 AAMA 2603-02, Voluntary Specification Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
- .8 AAMA 2604-05, Voluntary Specification Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.

.3 ASTM International
- .1 ASTM A 123/A 123M-13, Standard Specification for Zinc (Hot-Dip galvanized) Coatings on Iron and Steel Products.
- .2 ASTM E 1748-95(2009), Standard Test Method for Evaluating the Engagement Between Windows and Insect Screens as an Integral System.

.4 CSA Group
- .1 AAMA/WDMA/CSA 101/I.S.2/A440-11, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
- .2 CSA A440S1-09, Canadian Supplement to AAMA/WDMA/CSA 101/1.S.2/A440, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
- .3 CAN/CSA-A440.4-07(R2012), Window, Door, and Skylight Installation.
- .4 CAN/CSA-A440.2/A440.3-14, Fenestration energy performance/User guide to CSA A440.2, Fenestration energy performance.
- .5 CAN/CSA-Z91-02(R2013), Health and Safety Code for Suspended Equipment Operations.
- .6 CAN/CSA-Z809-08(R2013), Sustainable Forest Management.

.5 Forest Stewardship Council (FSC)
- .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.

.6 Green Seal Environmental Standards (GS)

.7 Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - current edition.
  - .1 MPI #79, Primer, Alkyd, Anti-Corrosive for Metal.

.8 Screen Manufacturers Association (SMA)
- .1 SMA 1201R-2002 Specification for Insect Screens for Windows, Sliding Doors and Swinging Doors.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for windows and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
- .2 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim junction between combination units elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes fasteners, and caulking. Indicate location of manufacturer's nameplates.

.4 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Samples may be returned for inclusion into work if requested.
- .3 Submit one representative model complete full size window sample of each type window.
- .4 Include frame, sash, sill, glazing and weatherproofing method, insect screens, surface finish and hardware. Show location of manufacturer's nameplates.
- .5 Include 6” long samples of head, jamb, sill, and mullions to indicate profile.

.5 Test Reports:
- .1 Submit substantiating engineering data, and test results performed by independent testing agency, which purport to meeting performance criteria and supportive data.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 – Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for windows for incorporation into manual.

1.4 QUALITY ASSURANCE

.1 Certifications: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.2 Acoustic Testing:
- .1 Refer to Section 09 21 16 Gypsum Board Assemblies.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect windows from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

.1 Fenestration performance grades for windows:
- .1 In accordance with the CSA A440SI Canadian Supplement, Clause (1)(b) appropriate for the conditions and geographic location in which the doors will be installed.
- .2 Conform to performance grades selected under CSA A440SI Canadian Supplement, Sentence (2) when tested in accordance with the standard referenced in Clause (1)(a).

2.2 MATERIALS

.1 Materials: to CSA-A440/A440.1 supplemented as follows:

.2 All windows by same manufacturer.

.3 Sash: aluminum thermally broken.

.4 Main frame: aluminum thermally broken.

.5 Aluminum Support Angles: Design and fabricate aluminum support angles at sill jambs and head in accordance with OBC and manufacturers requirements.

.6 Glass: in accordance with Section 08 80 50 - Glazing.

.7 Flashings: Refer to Section 07 62 00 Sheet Metal Flashing and Trim.

.8 Sills: Refer to Section 07 62 00 Sheet Metal Flashing and Trim.

.9 Exterior aluminum facings: brake formed, 1/16” thick, clear anodized aluminum panel laminated to 3/4" thick plywood.

.10 Isolation coating: alkali resistant bituminous paint.

.11 Sealants: Refer to Section 07 92 00 Joint Sealants.

2.3 WINDOW TYPE AND CLASSIFICATION

.1 Types:
- .1 Fixed Window Unit: fixed window unit designed and fabricated to ‘rainscreen principals’, 6” wide, c/w thermal break.
  - .1 Acceptable product: ‘Kawneer AA 6600’ fixed framing, or approved equivalent by Alumicor.

2.4 FABRICATION

.1 Fabricate in accordance with CSA-A440/A440.1 supplemented as follows:

.2 Fabricate units square and true with maximum tolerance of plus or minus 1/16” for units with a diagonal measurement of 6’0” or less and plus or minus 1/8” for units with a diagonal measurement over 6”-0”.

.3 Face dimensions detailed are maximum permissible sizes.

.4 Brace frames to maintain squareness and rigidity during shipment and installation.

.5 Finish steel clips and reinforcement with shop coat primer to MPI #79 CAN/CGSB-1.40 380 g/m² zinc coating to ASTM A 123/A 123M.

2.5 ALUMINUM FINISHES

.1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.

.1 Finish coatings: finish all exposed surfaces of interior and exterior aluminum sections with anodic oxide treatment in accordance with Aluminum Association specification AA-M12c22A31, "No. 17 Clear"" by Kawneer, approved equivalent by Alumicor. or approved alternate.

2.6 ISOLATION COATING

.1 Primers, Paints, and Coatings: in accordance with manufacturer's recommendations for surface conditions.

.2 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.

2.7 GLAZING

.1 Glaze windows: Refer to Section 08 80 50 – Glazing.

2.8 AIR BARRIER /VAPOUR BARRIER SEAL

.1 Provide positive air / vapour / watertight seal between window frames and exterior wall system using air / vapour barrier transition strip as per Section 07 28 00 Air / Vapour Barriers 07 26 00 – Vapour Retarders / 07 27 00 – Air Barriers.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate to verify dimensions, tolerances, and method of attachment with other work.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 AIR/VAPOUR BARRIER CONNECTIONS

.1 Prior to installing windows, prepare window system to provide a continuous air / vapour seal from the window system to the wall air / vapour barrier system.

.2 Apply a continuous strip of 305 mm / 12” wide ‘Self-Adhered Sheet Membrane’ as described in Section 07 28 00.01 – Air / Vapour Barriers around on all sides of window opening. Apply sheet membrane lapped in a ‘shingle like manner’ to shed water. Ensure a positive continuous seal is provided to wall framing.

.3 Provide a 2nd overlapping lapping layer of ‘Self-Adhered Sheet Membrane’ at each corner as required to seal all air leaks at corner conditions.

3.3 INSTALLATION

.1 Window installation:
- .1 Install in accordance with CSA-A440/A440.1.
- .2 Arrange components to prevent abrupt variation in colour.
- .3 Do not exceed 3 mm / 1/8” in 3.0 m / 10’ variation from plumb and level.

.2 Aluminum Support Angles:
- .1 Design and fabricate aluminum angles in accordance with OBC and manufacturers requirements. Provide slotted clip angle connection where deflection is anticipated.

.3 Sill installation: Refer to Section 07 62 00 – Sheet Metal Flashing and Trim.

.4 Aluminum Closure Panel and Column Cover Installation:
- .1 Install aluminum closure panel and column covers, level in length, straight in alignment with plumb upstands and faces. Use one (1) piece lengths where practicable.
- .2 Where joints in closure panels and column covers are necessary, provide hairline joints with concealed watertight anchors.
- .3 Secure closure panels and column covers in place with anchoring devices located spaced 24” o/c maximum between.

.5 Caulking:
- .1 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.
- .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.

.6 Field Quality Control

.1 Testing, inspection and reporting in accordance with 3.4 Field Quality Control in Section 08 44 13 – Glazed Aluminum Curtainwall.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 –Cleaning.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by window installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
- .1 ANSI/BHMA A156.9-2010, Cabinet Hardware.
- .2 ANSI/BHMA A156.11-2014, Cabinet Locks.
- .3 ANSI/BHMA A156.16-2013, Auxiliary Hardware.
- .4 ANSI/BHMA A156.18-2012, Materials and Finishes.
- .5 ANSI/BHMA A156.20-2012, Strap and Tee Hinges and Hasps.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for cabinet hardware and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
- .1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
- .3 After approval samples may be returned if requested for incorporation in the Work.

.4 Hardware List:
- .1 Submit contract hardware list.
- .2 Indicate specified hardware, including make, model, material, function, finish and other pertinent information.

.5 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.6 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 – Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for cabinet hardware for incorporation into manual.

1.4 QUALITY ASSURANCE

.1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.4 Storage and Handling Requirements:
- .1 Store cabinet hardware in locked, clean, dry area, off ground, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect cabinet hardware from nicks, scratches, and blemishes.
- .3 Protect prefinished surfaces with wrapping strippable coating.
- .4 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 HARDWARE ITEMS

.1 Cabinet hardware listed within provides a ‘standard of acceptance’ for the specified item. Equivalent products by Richelieu, Häfele, Hettich, or approved alternate are acceptable for use on this project.
- .1 Use one manufacturer's product for all similar items.

2.2 CABINET AND MISCELLANEOUS HARDWARE

.1 Cabinet hardware: to CAN/CGSB-69.25, as listed below:
- .1 Hinges: soft close hinge:
  - .1 Type 1 - 110º swing:
    - .1 Application: where door opens adjacent to a wall
    - .2 Acceptable product: ‘71T Series’ hinge with ‘Blumotion 973A, by Richelieu, model type to suit cabinet.
  - .2 Type 2 - 170º swing:
    - .1 Application: where door has no adjacent wall
    - .2 Acceptable product: ‘71T Series’ hinge with ‘Blumotion 973A, by Richelieu, model type to suit cabinet.
  - .3 Type 3 - 180º swing piano hinge:
    - .1 Application: viewing room 127A
    - .2 Side: to suit application
    - .3 Acceptable product: 2” wide x 0.037” pre-drilled stainless steel by Richelieu or approved alternate.
- .2 Drawer and Door Pulls:
  - .1 Straight Handle: metal, stainless steel, 192mm long, vertical installation on doors and horizontal on drawers.
    - .1 Acceptable product: ‘Contemporary Stainless Steel Handle Pull – 1310, by Richelieu.
- .3 Drawer Slides:
  - .1 ‘Type 1’: For all drawers unless otherwise noted, easy close, medium duty, 100 lb. capacity, zinc finish, length to suit drawer for full extension.
    - .1 Acceptable product: ‘Accuride 3832EC2G Full Extension Slide’, by Richelieu.

.2 Door and Drawer Bumpers:

.1 Acceptable product: 'No. MP30311', by Richelieu, clear nylon, 1/8" height x 3/8" diameter, peel and stick bumpers.

.3 Cabinet and Drawer Unit, Locks: to CAN/CGSB-69.27, as listed below:

.1 Door or drawer locks – Type 1 (typical):

.1 Acceptable product:

.1 Universal Cam Lock Body: Adjustable from 7/8" to 1 3/8". '235.09.000', by Häfele Canada Inc.

.2 Material: steel.

.3 Cylinder Rosette: '210.04.062', by Häfele Canada Inc. Material: nickel-polished finish.

.4 Lock Core: '210.04.606', by Häfele Canada Inc., Snap-in lock core, material zinc die cast, Lock face, nickel polished finish.

.2 Door locks – Type 2 (closed storage):

.1 Acceptable product:

.1 '322CR Locking Hasp', complete with like keyed cylinder and locking cores, by Richelieu or approved alternate.

.2 Material: steel.

.3 Cylinders: key into keying system. Master key each department complete with grand master key, as later selected by Consultant.

.4 Shelf labels:

.1 25mm H x 64m D x 125mm Wclip-on plastic shelf label holders.

.2 Acceptable product:

.1 '48-610A' by Carr McLean or approved equal.

.5 Shelf Supports:

.1 Acceptable product:

.1 Metal Pilaster: 'No. 2552G', by Richelieu, 5/8" wide x total length. zinc finish.

.2 Pilaster Shelf Clip: 'No. CP2392G', by Richelieu, heavy-duty, zinc finish.

.6 Sliding Glass Reception Window: Aluminum extrusion kit for glass sliding door: satin anodized aluminum, finish satin aluminum.

.1 Acceptable product: 'D1042A Jamb less Daisy Pass-Thru Window', by C.R. Laurence Company. Provide custom double loaded, double width overhead track, size as indicated.

.7 Glass Handrail Mount:

.1 Acceptable product: 'HR2JGBS Series' by C.R. Laurence Aluminum.

.2 Refer also to Section 08 80 50 – Glazing.

.8 Glass Clamps

.1 Acceptable product: 'GE90SBN Geneva Series' by C.R. Laurence Aluminum.

.2 Refer also to Section 08 80 50 – Glazing.

.9 Cable Entry Plug (Grommets):

.1 Refer to Divisions 26, 27 and 28.

.10 Garbage Grommet: Stainless steel trash grommet

.1 Size: 150 dia x 50mm deep

.2 Acceptable Product: '61432171' by Richelieu, polished finish.

2.3 FASTENINGS

.1 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.2 Exposed fastening devices to match finish of hardware.

.3 Use fasteners compatible with material through which they pass.

2.4 KEYING

.1 Cabinet locks to be keyed as directed by Owner. Submit keying schedule for approval.

.2 Supply keys in duplicate for every lock in this Contract.

.3 Supply three (3) master keys for each master key or grand master key group.

.4 Stamp keying code numbers on keys and cylinders.

PART 3 – EXECUTION

3.1 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Install hardware to standard hardware location dimensions in accordance with manufacturer's recommendations and to project design requirements.

.3 Make all shelves in cabinets adjustable, unless otherwise indicated.

.4 Install locks on all cabinet doors and drawers where indicated.

.5 Install drawer slides to all drawers, number as required to suit application.

.6 Install drawer & drawer bumpers to all doors and drawers.

3.2 ADJUSTING

.1 Adjust cabinet hardware for optimum, smooth operating condition.

.2 Lubricate hardware and other moving parts.

.3 Adjust cabinet door hardware to ensure tight fit at contact points with frames.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
- .3 Remove protective material from hardware items where present.
- .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.4 DEMONSTRATION

.1 Keying System Setup and Cabinet:
- .1 Set up key control system with file, duplicate key tags, alphabetical index.

.2 Maintenance Staff Briefing:
- .1 Brief maintenance staff regarding:
  - .1 Proper care, cleaning, and general maintenance of projects complete hardware.
  - .2 Description, use, handling, and storage of keys.

.3 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by cabinet and miscellaneous hardware installation.

3.6 SCHEDULE

.1 All cabinet drawers, unless otherwise noted:
- .1 1 set full extension drawer slides: ‘Type 1’.
- .2 Lock, all cabinets.
- .3 1 pull per drawer.
- .4 Drawer bumpers.

.2 Cabinet swing doors:
- .1 1 pull per door
- .2 Lock, all cabinets.
- .3 1 set of hinges, number as recommended by manufacturer to suit condition.
- .4 Door bumpers.

.3 Shelf supports:
- .1 4 recessed metal standards per unit.
- .2 4 pilaster shelf clips per shelf.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
- .1 ANSI/BHMA A156.1-2013, American National Standard for Butts and Hinges.
- .2 ANSI/BHMA A156.2-2011, Bored and Preassembled Locks and Latches.
- .3 ANSI/BHMA A156.3-2014, Exit Devices.
- .4 ANSI/BHMA A156.4-2013, Door Controls - Closers.
- .5 ANSI/BHMA A156.5-2014, Auxiliary Locks and Associated Products.
- .6 ANSI/BHMA A156.6-2010, Architectural Door Trim.
- .7 ANSI/BHMA A156.8-2010, Door Controls - Overhead Stops and Holders.
- .8 ANSI/BHMA A156.10-2011, Power Operated Pedestrian Doors.
- .9 ANSI/BHMA A156.12-2013, Interconnected Locks and Latches.
- .10 ANSI/BHMA A156.13-2013, Mortise Locks and Latches Series 1000.
- .11 ANSI/BHMA A156.14-2013, Sliding and Folding Door Hardware.
- .12 ANSI/BHMA A156.15-2011, Release Devices - Closer Holder, Electromagnetic and Electromechanical.
- .13 ANSI/BHMA A156.16-2013, Auxiliary Hardware.
- .14 ANSI/BHMA A156.17-2014, Self-closing Hinges and Pivots.
- .15 ANSI/BHMA A156.18-2012, Materials and Finishes.
- .16 ANSI/BHMA A156.19-2013, Power Assist and Low Energy Power - Operated Doors.
- .17 ANSI/BHMA A156.20-2012, Strap and Tee Hinges and Hasps.
- .18 ANSI/BHMA A156.26 – Continuous Hinges
- .19 ANSI/BHMA A250.4 – Steel Doors and Frames Physical Endurance

.2 Underwriters Laboratories' (UL):
- .1 UL10C – Positive Pressure Fire Tests of Door Assemblies

.3 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)
- .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

1.2 GENERAL

1. The work in this section includes furnishing and installation of all items of finish hardware as hereinafter specified or obviously necessary for all swinging, sliding, folding and other doors. Except items, which are specifically excluded from this section of the specification or of unique hardware, specified in the same sections as the doors and frames on which they are installed.

2. The following list of bidders have been pre-qualified to bid on this work:

Pinders Security Products	Knell’s Door & Hardware	jpw systems inc.
25 Nihan Drive	2090 Shirley Drive	30 Doan Drive
St. Catharines Ontario	Kitchener, Ontario	Komoka, Ontario
905-934-6333	519-578-1000	519-474-9797
Attn: Greg Pinder	Attn: Mark Bauman	Attn: Andy Pope

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for door hardware and include product characteristics, performance criteria, physical size, finish and limitations. Submit catalog cuts and/or product data sheets for all scheduled finish hardware.

.3 Samples:

.1 Submit for review and acceptance of each unit.

.2 Samples may be returned for inclusion into work.

.3 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.

.4 After approval samples will be returned for incorporation in Work.

.4 Hardware List:

.1 Submit contract hardware list.

.2 Prior to hardware schedule submittal, the successful bidder shall review all drawings and related documents to ensure compatibility and completeness. Schedules to be in vertical format, listing each door opening, and organized into “hardware sets” indicating complete designations of every item required for each door opening to function as intended. Hardware schedule shall be submitted within two (2) weeks from date the purchase order is received by the finish hardware supplier. Furnish four (4) copies of revised schedules after approval for field and file use. Note any special mounting instructions or requirements with the hardware schedule. Schedules to include the following information:

.1 Location of each hardware set cross-referenced to indications on drawings, both on floor plans and in door and frame schedule.

.2 Handing and degree of swing of each door.

.3 Door and frame sizes and materials.

.4 Keying information.

.5 Type, style, function, size, and finish of each hardware item.

.6 Provide complete methods of operation for all openings containing electronic components. Operational descriptions to detail how each electrical component functions within the opening incorporating all conditions of ingress and egress.

.7 Provide elevation drawings of electronic hardware and systems identifying locations of the system components with respect to their placement in the door opening

.8 Name and manufacturer of each hardware item.

.9 Fastenings and other pertinent information.

.10 Explanation of all abbreviations, symbols and codes contained in schedule

.11 Mounting locations for hardware when varies from standard.

.5 Submit separate detailed keying schedule without keysets assigned to the University of Guelph’s Lock Shop for coordination of keying layout and the number of keys required. Locks and cylinders are not to be ordered until the finalized keying schedule has been approved and the schedule returned to the Hardware Supplier.

.6 Templates:

.1 Furnish a complete list and suitable templates, together with finish hardware schedule to contractor, for distribution to necessary trades supplying materials to be prepped for finish hardware.

.7 It is the responsibility of the hardware supplier to update and keep current the hardware schedule. All approved hardware changes shall be noted in the hardware schedule and kept current throughout the duration of the project. Update pages as necessary to the contractor for furtherance to the Consultant

.8 . Provide the end user with the original tendered hardware schedule and a copy of the updated hardware schedule incorporating all changes upon completion of the project. Where changes occur to electrical products and functions the hardware supplier shall be responsible to produce new elevations and methods of operation both for submittal with changes and update the hardware schedule.

.9 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.10 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.4 ELECTRONIC HARDWARE SYSTEMS

.1 Wiring Diagrams: Prepared and submitted within 2 weeks of receipt of purchase order by or under the supervision of supplier and coordinated with all drawings and related documents to ensure accurate function and coordination.

.1 Elevations: Provide diagrams for each unique opening with electronic hardware components identifying individual item locations, conduits, back boxes, junction boxes and miscellaneous system requirements and devices.

.2 Risers: Provide diagrams detailing locations and infrastructure between door openings, power supplies, access control panels and system components.

.3 Point to Points: Provide diagrams detailing wiring terminations at all electrified devices as applicable to function of all openings. (inclusion depending on installation)

.4 Responsibility matrix: Provide documentation for approval detailing basic responsibilities inclusive of all related sections involved in the preparation for, installation and commissioning of electrified systems.

.2 Proof of Certification: Provide copy of manufacturer(s) official certification or accreditation document indicating proof of status as a qualified and authorized provider and/or installer of specified integrated locking products.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 – Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for door hardware for incorporation into manual.

1.6 MAINTENANCE MATERIALS SUBMITTALS

.1 Extra Stock Materials:

.1 Supply maintenance materials in accordance with Section 01 78 00 – Closeout Submittals.

.2 Tools:

.1 Supply 2 sets of wrenches for door closers, locksets, and fire exit hardware.

.2 Upon completion of construction and building turnover, furnish two (2) complete maintenance manuals to the owner. Manuals to include the following items:

.1 Approved hardware schedule, catalog cuts and keying schedule.

.2 Hardware installation and adjustment instructions.

.3 Hardware installation and adjustment instructions in searchable format on CD.

.4 Copy of product templates.

.5 Manufacturer's maintenance information, including any required lubrication schedules.

.6 Parts lists and diagrams for high frequency of use products.

.7 Manufacturer's written warranty information.

.8 Wiring diagrams, elevation drawings and operational descriptions for all electronic openings.

1.7 QUALITY ASSURANCE

.1 Substitutions

.1 All requests for approved alternates must be submitted in writing 10 working days prior to closing date. Any products suggested for substitution must be submitted with the following information:

.2 Manufacturer's name and address.

.3 Written confirmation that the alternate product shall not exceed the space requirements allocated in the drawings.

.4 Detailed catalogue cuts illustrating function and documentation of ANSI testing.

.5 Cost savings from accepting the alternate product.

.6 Letter acknowledging that this Section is responsible for any additional installation costs resulting from the acceptance of a substituted product.

.7 Alternate acceptance shall be subject to the approval at the discretion of the Consultant, the hardware consultant and the University Electronic Access Team and Lock Shop

.2 Supplier Qualifications

.1 A recognized architectural door hardware supplier who has maintained an office and has been furnishing hardware in the project's vicinity for a period of at least two (2) years. Hardware Supplier shall be available for site visits when requested by the University.

.2 Hardware supplier shall have office and warehouse facilities to accommodate this project.

.3 Hardware supplier must be an authorized factory distributor of all products specified herein.

.4 Hardware supplier shall have in his employment at least one (1) Architectural Hardware Consultant (AHC) accredited in the Continuing Education Program (CEP) administered by The Door and Hardware Institute, Chantilly, VA.

.5 It shall be clearly understood that within the terms of this Subcontract, the Hardware Supplier is bound not just as a supplier but also is responsible for the supply of hardware services relative to the project co-ordination, supervision and inspection.

.6 Hardware Subcontractor shall meet with the Owner, Consultant, Electrical Subcontractor, Security Consultant, and Access Control Subcontractor to review, coordinate and implement all details relating to the proper operation of all electronic hardware including locations of power supplies, back boxes, junction boxes and conduit details prior to start of construction.

.7 Hardware supplier shall provide all-inclusive consultation and solutions to the Consultant and related trades and shall be fully responsible for coordinating, managing, and assisting in the design of full system integration of security access control (i.e. proximity card reader, CCTV, and other electrified security hardware components not specified in the hardware schedule) and electronic hardware.

.3 Regulatory Requirements:

.1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

.2 Provide door hardware for fire-rated openings that comply with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed by Underwriter's Laboratories (UL) or Warnock Hersey (WH) for use on types and sizes of doors indicated

.4 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.5 Acoustic Testing:

.1 Refer to Section 09 21 16 Gypsum Board Assemblies.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Properly package and mark items according to the approved hardware schedule, complete with necessary screws and accessories, instructions and installation templates for spotting mortising tools. Contractor shall check deliveries against accepted list and provide receipt for them, after which he is responsible for storage and care. Any shortage or damaged good shall be made without cost to the owner.

.4 Packaging of door hardware is the responsibility of the supplier. As hardware supplier receives material from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set and door numbers to match the approved hardware schedule. Two or more identical sets may be packed in same container.

.5 Storage and Handling Requirements:

.1 Store materials locked in clean and dry area off ground, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 The Contractor shall set up a clean, dry & secure hardware storage room with adequate shelving to layout each item of hardware by door number and hardware schedule item number. It is the responsibility of the hardware supplier/installer to coordinate the room size with the Contractor to ensure proper layout of products. Hardware is to be shipped to site floor specific, if required.

.3 Store and protect door hardware from nicks, scratches, and blemishes.

.4 Protect prefinished surfaces with wrapping strippable coating.

.5 Replace defective or damaged materials with new.

1.9 WARRANTY

.1 All items, are to carry a warranty to meet the conditions listed in Division 1. Products listed below shall carry an extended warranty to meet the time span detailed. Products warranty shall commence of the date of substantial completion. Warranty is to cover complete replacement, including adjacent Work.

.1 Mortise locksets – Ten (10) years

.2 Electrified Locksets – Two (2) years

.3 Exit Devices - Five (5) years

.4 Electrical Exit Devices - Five (5) years

.5 Door closers - Ten (10) years

.6 Door closers with electrical hold open – Two (2) years

.7 Electric Strikes – Five (5) years

.8 Securitron electrified hardware - Unlimited Lifetime

PART 2 - PRODUCTS

2.1 HARDWARE ITEMS

.1 Use one manufacturer's products only for similar items.

2.2 DOOR HARDWARE

.1 Unless otherwise indicated, refer to Hardware Schedule as prepared by Pat Ryan, Assa Abloy, attached following this section for finishing hardware.

.2 Manufacturers as listed below have been determined as the acceptable standard. Obtain each type of finish hardware (hinges, latch and locksets, exit devices, door closers, etc.) from a single manufacturer.

2.3 MISCELLANEOUS HARDWARE

.1 Key Control Cabinet: refer to hardware schedule.

2.4 FASTENINGS

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

.2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware. All required screws shall be supplied as necessary for securing finish hardware in the appropriate manner. Thru-bolts shall be supplied for exit devices and door closers where required by code and the appropriate blocking or reinforcing is not present in the door to preclude their use.

.3 Exposed fastening devices to match finish of hardware.

.4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.

.5 Use fasteners compatible with material through which they pass.

2.5 HANGING DEVICES

.1 HINGES

.1 Hinges shall conform to ANSI A156.1 and have the number of knuckles as specified, oil-impregnated bearings as specified with NRP (non-removable pin) feature, at all exterior and interior locked reverse bevel doors. Unless otherwise scheduled, supply 2 hinges for doors up to 60"(1520mm) in height and supply one (1) additional hinge for every 30" (760mm) of door height or part thereof. Hinges shall be sized per the manufacturer's recommendations. Hinges shall be a minimum of 4 1/2" high and 4" wide; heavy weight hinges (.180+) shall be supplied at all doors where specified.

Provide hinge size to comply with the following:

Door Width	Hinge Height	Hinge Width
Up to 36"	4-1/2"	4"
Over 36"	5"	4-1/2"
Up to 48"	5"	5"
Over 48"	6"	6"

.2 Specified Manufacturer: McKinney TA/T4A Series

.2 CONTINUOUS GEARED HINGES

.1 All hinges to be non-handed and completely reversible. Hinge line to be available in concealed flush mount with or without inset, full surface and half surface types as specified in the hardware sets. All hinges to be made of extruded 6060 T6 aluminum alloy with polyacetal thrust bearings, anodized after cutouts are made for bearings. All concealed hinges to be fire-rated for 20, 45 and 90 minutes when incorporated into proper door and frame labeled installations, without necessitating the use of fusible-link pins. All concealed hinges to be available in standard, heavy, and extra heavy duty weights; all full surface and half surface hinges in standard and heavy duty weights as specified in the hardware sets. All hinges to be factory cut for door size.

.2 Where specified electric continuous geared hinges shall be provided with a removable access panel to allow connection/testing without requiring the removal of the door. Provide with Molex standardized plug connectors to accommodate up to twelve (12) wires. Plug connectors shall plug directly into Molex through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Provide a mortar guard for each electric hinge specified.

.1 Specified Manufacturers: McKinney - MCK12HD (MCK12HDK for Kawneer doors)

2.6 FLUSH BOLTS AND ACCESSORIES

.1 All automatic flush bolts to be furnished as specified.

.2 Manual flush bolts are to be supplied with a dust proof strike and threaded rod to suit door height.

.1 Specified Manufacturer: Rockwood

2.7 CYLINDERS AND KEYING FOR NEW CONSTRUCTION

.1 CYLINDERS

.1 Furnished cylinders must provide the capability of a high security, patented, pick- and attack-resistant design with angled key cuts, rotating tumblers, a keyway side bitting, and a slider mechanism. Cylinders shall provide the option of certified listing to Underwriters Laboratories Listed Standard--UL437--for key locks. Cylinders shall provide the option of certification under American National Standards Institute (ANSI)/Builder's Hardware Manufacturer's Association (BHMA) certification A156.30 2007 (High Security Cylinders) "Levels M1AAAM," and ANSI/BHMA A156.5 2010 "Grade 1."

.2 All cylinders with the high security option shall incorporate three locking elements, consisting of a slider mechanism, a sidebar mechanism with tumbler rotation, and pin tumbler elevation. The critical parts of the locking mechanism such as pins, shear line, sidebar, and slider mechanism shall be afforded extra protection from drilling and other forceful attack by the strategic placement of hardened steel inserts in a minimum of 7 possible locations within the cylinder. The lock tumblers shall combine a dual-axis action, with one axis utilized for pin tumbler rotation and the other axis utilized for positioning key cuts. Randomly selected tumbler pins shall incorporate a hardened steel insert for additional drill resistance.

.3 The locking system is to be furnished in a restricted key section for which key blanks are not made available from the manufacturer's factory or any other source by uncontrolled distribution methods. The key and cylinder must have utility patent protection so as to hinder unlawful or unauthorized key duplication. Such patent protection shall be afforded in the United States of America, Canada, Mexico, and a plurality of other countries. The keys and key blanks must be capable of being furnished to allow an upgrade to a dual mechanical and electronic credential by the single exchange of a field removable key bow. The key blank thickness should be no less than .125" (one hundred twenty-five thousandths).The manufacturer shall have the capability of establishing a key system with a minimum of six angled cuts in six possible pin positions with the capability of two distinct positions of cut per pin chamber, if required by the parameters of the system.

The manufacturer shall have the capability of producing a patent-protected keying system in either of two distinct and different keying specifications and pinning specifications. The system shall be capable of incorporating a key which is capable of more than one bitting per position to expand master keying and key changes. The key shall also incorporate the capacity to include twelve possible side bittings along the key blade located on two different planes or surfaces of the key. The system shall also have the capability to provide a single master key with over 1,000,000 (1 million) usable, non-interchangeable change keys in a single profile

.4 The cylinders shall be immediately rekeyable to new combinations or a new system at any time desired and shall be serviceable on location in the field. Installation of cylinders shall require no modification to U.S. manufactured commercial-grade locksets. All master keys and bitting lists for this project shall be sent using appropriate shipping carriers from the factory directly to the owner. Prior to shipment of keys, the owner shall verify, in writing, preference for shipping carrier and destination.

.5 Specified Manufacturer: MEDECO M3 – No alternate.

.2 KEYING

.1 Keying: All locks and permanent cylinders to be master-keyed or grandmaster-keyed as directed by the owner (or sub-assembled if requested by owner). The factory shall key all locks and cylinders and maintain keying records.

.2 Prepare detailed keying schedule in conjunction with University of Guelph Representative and Consultant.

.3 Factory key cylinders to Owner requirements.

.4 The contractor shall be responsible to remove construction cylinders and install all permanent cylinders

.5 All locksets to be supplied with keyed alike cylinders to act as construction cylinders until end of construction.

.6 Pack all permanent cylinders and keys separately from locksets. Identify door number and keyset symbol on each envelope and ship directly to owner.

.7 Construction keys are to be issued by the Owner. Do not ship construction keys with locksets.

.8 Ship the control keys directly to the owner unless directed otherwise.

.9 Furnish the following:

.1 Two (2) change keys per lock. Determine final quantities during keying meeting.

.2 Allow for 100 key blanks. Determine quantity per key set during keying meeting.

.3 All cylinders and keys are to be provided with visual, keyset symbol, key control.

.4 Fifteen (15) construction keys.

.5 Master keys and all high-security or patented keyway blanks shall be sealed in tamper-proof packaged boxes when shipped from the factory. The boxes shall be shrink wrapped and imprinted to ensure the integrity of the packaging. Deliver all keys and key blanks directly to owner's representative as directed.

.6 The construction keys are to be shipped separate from the locksets, directly to the University of Guelph.

2.8 LOCKING DEVICES

.1 MORTISE LOCKSETS

.1 All locksets shall be ANSI 156.13 Series 1000, Grade 1 Certified. All functions shall be manufactured in a single sized case formed from 12 gauge steel minimum. The lockset shall have a field-adjustable, beveled armored front, with a .125" minimum thickness and shall be reversible without opening the lock body. The lockset shall be 2 3/4" backset with a one-piece 3/4" anti-friction stainless steel latch bolt. The deadbolt shall be a full 1" throw made of stainless steel and have 2 hardened steel roller inserts. All strikes shall be non-handed with a curved lip. To insure proper alignment, all trim, shall be thru-bolted and fully interchangeable between rose and escutcheon designs and shall be the product of one manufacturer. Locks shall have all functions available in one size case, manufactured from heavy gauge steel, minimum thickness 3/32"(2mm). The handing of all locks shall be reversible without the disassembly of the lock case. Cases are to be closed on all sides to protect internal parts. Locks are to have adjustable, beveled and armored fronts, standard 2-3/4" (70mm) backset, a full 3/4" (19mm) throw two-piece mechanical anti-friction latch bolt, and a one-piece stainless steel 1" (25mm) throw deadbolt, and shall be available for a minimum door thickness of 1-3/8" (35mm). Internal parts shall be heavy gauge steel, zinc dichromate plated for corrosion resistance.

.2 All locksets with latch bolts, regardless of trim, shall be listed by Underwriters Laboratories for A label and lesser class doors, 4' x 10' single or 8' x 10' pair.

.3 Lock trim (knob, lever, sectional or escutcheon) shall be through bolted through the lock case to ensure correct alignment and proper operation.

.4 Certification:

.1 UBC - 7 - 2 and UL10C – Positive Pressure

.2 ANSI/BHMA A156.13 Series 1000, Grade 1

.3 ANSI/BHMA A117.1, Accessibility Code

.5 Specified Manufacturer: Corbin Russwin ML2000 NSA Series – No alternate.

.2 ELECTRIFIED LOCKSETS

.1 Mechanical features of locksets shall conform to standards as specified above. Locksets shall be fail-secure unless otherwise specified. Where specified electrified locksets shall be provided with a switch to monitor inside or outside lever handle and a switch to monitor the latch bolt/deadbolt position. Locksets shall be operationally insensitive from 12 VDC to 24 VDC. Locksets shall include Molex connectors for simplified installation.

.1 Specified Manufacturers: Corbin Russwin ML20906 NSA Series – No alternate.

.3 LOCKSET STRIKES

.1 Strikes shall be available with curved lip as required. Provide strikes with lip-length required to accommodate jamb and/or trim detail and projection.

2.9 ELECTRIC STRIKES

.1 STANDARD STRIKES

.1 All standard electric strikes shall meet BHMA standard 501, grade 1 and be UL Listed for Burglary Resistance, category 1034. Strikes shall be all stainless steel construction for corrosion resistance, strength and durability. Strikes shall have been tested to withstand a static strength of a minimum 2500 lbs, a dynamic strength of 350 lbs before releasing and perform with a minimum of one million cycles of operation. Strikes shall be 24VDC fail-safe unless otherwise specified.

.1 Specified Manufacturers: RCI (dormakaba) F Series - F2364

2.10 EXIT DEVICES

.1 CONVENTIONAL DEVICES – PUSH RAIL

.1 All exit devices shall be ANSI A156.3, Grade 1 Certified and shall be listed by Underwriters Laboratories and bear the UL label for life safety in full compliance with NFPA 80 and NFPA 101. Mounting rails shall be formed from a solid single piece of stainless steel, brass or bronze no less than 0.072” thick. Push rails shall be constructed of 0.062” thick material. Painted or anodized aluminum shall not be considered heavy duty and is not acceptable. Lever trim shall be available in finishes and designs to match that of the specified locksets.

.1 Specified Manufacturer: Sargent 80 Series

.2 ELECTRIFIED DEVICES

.1 Electrified exit devices shall conform to all traditional exit device standards as specified above. All power requirements for exit devices used must utilize a telescopic jamb mounted power transfer for ease of maintenance and testing. Exit devices shall include a factory wired Molex connector.

.2 Provide exterior doors wit, request to exit switch and latch retraction as specified.

.3 Exit devices with electrified trim shall be fail-secure unless otherwise specified.

.4 At controlled openings, exit devices shall be provided with a switch to monitor push rail to provide request-to-exit signaling.

.1 Specified Manufacturers: Sargent 80 Series

.3 MULLIONS

.1 Mullions are to be fabricated from steel or aluminum and be removable only through the use of a cylinder keyed into the building’s master key system.

.1 Specified Manufacturer: Sargent 12-L980 – no alternate
L980A – no alternate

2.11 DOOR CLOSERS

.1 SURFACE MOUNTED CLOSERS – HEAVY DUTY

.1 All exterior door closers shall be ANSI 156.4, Grade 1 Certified. All closers shall have cast aluminum bodies at interior doors and cast iron bodies at exterior doors. All closers shall be furnished forged steel arms, and separate valves for adjusting back check, closing and latching cycles and adjustable spring to provide up to 50% increase in spring power. Closers shall be furnished with parallel arms mounting on all doors opening into corridors or other public spaces and shall be mounted to permit 180 degrees door swing wherever wall conditions permit. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

.1 Specified Manufacturer: LCN 4041XP – exterior doors only – no alternate

Norton 7500 series – interior doors – no alternate

8500 series – interior doors – no alternate

.2 POWERED DOOR OPERATORS – HEAVY DUTY

.1 Door operators shall be in accordance with ANSI 156.19 and work in conjunction with the fire rated hardware. Operators shall be powered by 24V, 1/8 hp motor. Non handed operator with adjustable spring to compensate for different manual push forces required on varying door widths. Microprocessor controlled unit shall control the operation and switching of the swing power operator. Operator to include power open, power close, power assist, electronic dampening, stack pressure consumption and lock retry circuit features. Provide 4.5” square actuators with concealed fasteners with International Symbol Accessibility and “PUSH TO OPEN”.

.1 Specified Manufacturer: Besam SW200i

2.12 DOOR TRIM AND PROTECTIVE PLATES

.1 Door Pulls/Push/Kick/Armor Plates: to be 0.050 inches thick and 1.5 inches less full width of door, or as specified. Furnish all push/kick and armor plates with ‘B4E’ beveled edges with self-adhesive tape fastening for new doors and stainless steel mechanical fasteners for existing doors. Follow specific mounting instructions where push plate, door pull and deadlock applications occur. Fasteners for push plates, pull plates, door pulls and miscellaneous door trim shall be as shown in the hardware schedule. Where full height door pulls are specified supply units less 150mm from the top of door and 300mm from bottom of door. Submit shop drawing of pulls for review.

.1 Specified Manufacturer: Rockwood

2.13 DOOR STOPS AND HOLDERS

.1 WALL MOUNTED DOOR STOPS

.1 Where a door is indicated on the plans to strike flush against a wall, wall bumpers shall be provided. Provide convex or concave design as indicated.

.1 Specified Manufacturers: Rockwood

.2 OVERHEAD STOPS/HOLDERS

.1 Where specified, overhead stops/holders as shown in the hardware sets are to be provided. Track, slide, arm and jamb bracket shall be constructed of extruded bronze and shock absorber spring shall be of heavy tempered steel. Overhead stops shall be of non-handed design.

.1 Specified Manufacturer: Rixson 1, 2, 6 and 10 Series.

2.14 GASKETING AND THRESHOLDS

.1 On exterior doors and smoke, light, or sound seals on interior doors where indicated or scheduled. Provide seals as required to meet UL10C. Provide only those units where silicon seal strip is easily replaceable and readily available from stocks maintained by manufacturer. Provide head seal as solid aluminum extrusion suitable for stop applied hardware ie P/A closers or surface overhead door stops.

.2 Door Sweeps: House nylon brush seal in extruded aluminum case. Surface applied and adjusted to suit gap at bottom of door, complete with snap cover.

.3 Auto Door Bottoms: Surface or semi mortise automatic door bottoms housed in aluminum case and equipped with nylon brush or silicone inserts. Each unit sized to suit the door width and meets the requirements of ANSI/BHMA 156.22-2003 for latching force and air infiltration.

.4 Astragal Seal: Overlapping stainless steel astragal. Surface applied, meeting stile astragal consisting of one piece attached to active leaf, pull side face of door.

.5 Provide threshold units not less than 5” wide at hollow metal frames and not less than 4” at aluminum frames, formed to accommodate change in floor elevation where indicated, fabricated to accommodate door hardware and to fit door frames. Provide 3” wide thresholds with a flat contact surface at locations with automatic door bottoms.

.1 Specified Manufacturers: Pemko

2.15 SILENCERS

.1 Furnish rubber door silencers all hollow metal frames; two (2) per pair and three (3) per single door frame.

2.16 ELECTRONIC PRODUCTS AND ACCESSORIES

.1 POWER SUPPLIES

.1 Power supplies shall furnish regulated 24VDC and shall be UL class 2 listed. LED’s shall monitor zone status (voltage/no voltage) and slide switches shall be provided to connect or disconnect the load from power; 1, 4 or 8 separate output circuit breakers shall be provided to divide the load. Power supplies shall have the internal capability of charging optional 24VDC sealed lead acid batteries in addition to operating the DC load. Power supplies shall be supplied complete requiring only 120VAC to the fused input and shall be supplied in an enclosure. Power supplies shall be provided with emergency release terminals that allow the release of all devices upon activation of the fire alarm system. Power supplies to be provided for local installation at required electrified openings.

.1 Specified Manufacturer: Securitron BPS

.2 ELYNX CABLES

.1 All power transfer hinges, electrified locksets, electric exit device trim and electric exit devices are to be equipped with Molex plug connectors. Door and Frame Elynx cables have been specified at a provisional length at each of these locations. It is the responsibility of the finishing hardware supplier to supply these cables, prior to door/frame manufacture, in appropriate lengths required by the various manufacturers. The hardware supplier is responsible to contact the door manufacturers to determine the cabling route and supply the correct length. Where the door manufacturer requires flying ends on Elynx cables the hardware installer will be responsible to map and pin Molex connectors.

.1 Specified Manufacturer: McKinney

.3 CURRENT TRANSFER DEVICES

.1 Provide current transfers concealed in both door and frame. Provide current transfers with molex connectors and suitable gauge wire with a minimum of ten (10) conductors to properly connect schedule electrified hardware.

.1 Specified Manufacturer: Securitron CEPT-10-EL

2.17 FINISHES

.1 The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 or traditional U.S. finishes shown by certain manufacturers for their products.

.2 Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Contractor shall ensure that the building is secured and free from weather elements prior to installing interior door hardware. Examine hardware before installation to ensure it is free of defects.

.2 It is the responsibility of the Hardware Supplier’s AHC to provide a written inspection report to the Contractor, Consultant and Hardware Consultant after door hardware installation has been completed. The report is to certify that the finishing hardware has been supplied as specified and has been installed and is functioning according to the manufacturer’s instructions. Subsequently the deficiencies will be corrected by the Contractor and reported in writing to the Consultant and Hardware Consultant.

.3 After the deficiencies have been corrected, the Hardware Consultant will provide the final inspection. Any deficiencies found during this final inspection will be reported, in writing, to the Consultant.

.4 Existing Openings: Hardware supplier is responsible for surveying all existing doors and frames to verify existing site conditions, preparations and opening details to ensure compatibility with specified hardware prior to submittal of schedules and shop drawings. Provide a letter confirming that the survey was completed accompanied with a list by door number of evident discrepancies or conflicts. Discrepancies and conflicts to be resolved in writing prior to order of hardware.

3.2 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Supply metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

.3 Supply manufacturers' instructions for proper installation of each hardware component.

.4 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).

.5 Where door stop contacts door pulls, mount stop to strike bottom of pull.

.6 Install key control cabinet where directed by Consultant.

.7 Use only manufacturer's supplied fasteners.

.1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

.8 Remove construction cores when directed by Consultant.

.1 Install permanent cores and ensure locks operate correctly.

.9 Install each item of mechanical and electromechanical hardware and access control equipment to comply with the manufacturer’s written instructions and according to specifications. All items to be installed with fasteners identified by manufacturer’s installation instructions unless otherwise noted.

.10 All high voltage and low voltage wire, junction boxes and conduit shall be installed by Division 26.

.11 All Access Control System components not listing in the Hardware Schedule shall be installed by Division 28.

.12 Mounting Heights: Install door hardware at heights indicated in the following applicable publications unless; specifically indicated or required by local governing regulations, requirements to match existing conditions, special templates, necessary coordination with door elevations, and or to ensure consistency with pairs of doors.

.1 DHI’s “Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames”

.2 DHI’s “Recommended Locations for Architectural Hardware for Wood Flush Doors”

.3 ANSI A117.1 “Accessibility Guidelines for Buildings and Facilities”

.4 NWWDA

.13 Power door operator products and accessories are required to be installed by an AAADM certified technician as approved by the manufacturer. The 110 VAC connection shall be made by Division 26. All low voltage connections to all operator peripherals shall be made by this section. Adjust for proper opening and closing operation per operational requirements. Ensure proper operation is maintained after final balancing of HVAC system.

.14 Wall stops: Locate wall stops to contact door pulls/levers at mounting post connecting to door. Ensure existence of necessary wall reinforcing where specified for installation on drywall, plaster or clad wall conditions prior to installation.

.15 Vertical rods: Adjust rod lengths to ensure positive latching of devices. Install bottom strikes as required by finished flooring conditions and in coordination with flooring subcontractor.

.16 Closers: Size closers as per manufacturer’s installation instructions. Adjust all closers after final balancing of HVAC system to ensure; proper latching of doors, proper closing/latch speed, adequate back check and opening force in accordance with referenced accessibility requirements.

.17 Protection plates – Install on clean surface, and in temperature range of 5-25 degrees Celsius where tape applied. Pre-drill pilot holes doors when using mechanical fasteners.

.18 Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 7, Section 07 92 00, and Joint Sealants.

.19 Architectural Seals – Install prior to other soffit mounted door hardware as indicated in hardware schedule. Ensure continuous seal of gasketing to door without impeding latching.

.20 Door Bottoms – Ensure continuous seal to threshold or finished floor.

.21 Electronic hardware systems: Install all electronic hardware as per electrical elevations and point-to-point drawings furnished under Submittals.

.22 Retrofitting: Install door hardware to comply with manufacturers published templates and written instructions. Coordinate; cutting and fitting of doors and frames, installation of door hardware items, and removal of protective coverings with related sections.

3.3 FIELD QUALITY CONTROL

.1 The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures for coordinating all portions of the work under the Contract, unless the contract Documents give other specific instructions concerning these matters.

.2 The hardware supplier shall attend site meetings to make certain of proper execution of the guidelines set in this document. The Contractor will do periodic inspection of door frames, prior to door and hardware installation to ensure frames have been installed plumb and true.

.3 The installer will verify all frames to be plumb and true, prior to hardware installation.

3.4 ADJUSTING

.1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.

.2 Lubricate hardware, operating equipment and other moving parts.

.3 Adjust door hardware to ensure tight fit at contact points with frames.

.4 Prior to acceptance or occupancy, adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.

.5 Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore to proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

.6 Instruct owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes and usage of any electronic devices.

.7 This Section shall Commission and train the Owners in the use of all the Kaba-Ilco stand-alone locks supplied where specified.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
  .1 Leave Work area clean at end of each day.
  .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
  .3 Remove protective material from hardware items where present.
  .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.6 DEMONSTRATION

.1 Keying System Setup and Cabinet:
  .1 Set up key control system with file key tags and numerical index,
  .2 Place file keys and duplicate keys in key cabinet on their respective hooks.

.2 Lock key cabinet and turn over key to University of Guelph representative Maintenance Staff Briefing:
  .1 Brief maintenance staff regarding:
    .1 Proper care, cleaning, and general maintenance of projects complete hardware.
    .2 Description, use, handling, and storage of keys.
    .3 Use, application and storage of wrenches for door closers locksets and fire exit hardware.

.3 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by door hardware installation.

3.8 HARDWARE SCHEDULE

.1 The following schedule is furnished for whatever assistance it may afford the Contractor; do not consider it as entirely inclusive. Prior to tender closing, it is the responsibility of the hardware supplier, to bring to the attention of the Contractor any errors or omissions. Cross-reference hardware schedule with architectural drawings and door schedule. Should any particular door or item be omitted in any scheduled hardware heading, provide door or item with hardware same as required for similar purposes. Hardware supplier is responsible for handing and sizing all products as listed in the hardware heading. Quantities listed are for each pair of doors, or for each single door.

.2 Refer to the following Hardware Schedule, prepared by Pat Ryan of Assa Abloy, attached as Appendix A.

END OF SECTION

APPENDIX "A"

FINISH HARDWARE SCHEDULE

APPENDIX A – FINISH HARDWARE SCHEDULE

Set: 1.0

Pair D103, corridor C103 from corridor C102, 1930 x 2135 x 45, Hollow Metal x , LHR/LHR,
Pair D104, corridor C102 from corridor C104, 1930 x 2135 x 45, Hollow Metal x , LHR/LHR,
Pair D106, corridor C104 from corridor C106, 1930 x 2135 x 45, Hollow Metal x , LHR/LHR,
Pair D108, corridor C108 from corridor C106, 1930 x 2135 x 45, Hollow Metal x , LHR/LHR,

6	Hinges	T4A3786 Size to Suit (NRP at Outswing Doors)	652	MK
1	Magnetic Lock	M62		SU
1	Exit Device	8893 J	US32D	SA
1	Rim Exit Device	55 56 8810	US32D	SA
2	Concealed Overhead Stop	6-X36	630	RF
2	Auto Door Operator	SW200i-IS-99-CL	628	BM
2	Wall Switch	CM-45/4	630	OT
2	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
2	Door Position Switch	1076-D		OT
2	ElectroLynx Harness (In Frame)	QC-C1500P		MK
2	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
2	Mortar Box	TA-6410 (to suit door contact location)		OT
2	Mortar Box	TA-6410 (to suit mag lock locations)		OT
2	Mortar Box	TA-6413 (to suit auto operator location)		OT
1	Bracket	ASB-62CL	628	SU
1	Signage	TA-EXS-1		OT

Notes: 120vac to door operator by division 26 00 00
Conduit, back boxes, and pull strings to door operator header and wall switches by division 26 00 00
Mortar boxes welded in place by HM frame supplier

Mode of Operation
One leaf normally closed and locked by mag lock. Presentation of valid card to card reader will release power to mag lock and enable wall switch to activate door operator. Entry by pushing door open or by pushing door operator wall switch. Free egress at all times by pushing exit device rail which will release mag lock and enable operator button.
Upon activation of fire alarm mag locks are to lose power allowing free egress. Mag locks to be locally released by fire alarm pull stations located on either side of opening. Mag locks to be overridden and reset by key switch located at main fire alarm annunciator panel.

Door# D103 - East leaf of double egress pair to receive 55-56-8810 and CEPT-10
Door# D104, D106, D108 - North leaf of double egress pair to receive 55-56-8810 and CEPT-10

Set: 2.0

Single D116, corridor C102 to custodian C116, 915 x 2135 x 45, Hollow Metal x , RH,
Single D116g, washroom WR116 to chase, ~497 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Storeroom Lock	ML2057 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Conc Overhead Stop	2-X36	619	RF
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Gasketing	S773BL		PE
1	Sweep	18061CNB TKSP8 WIDTH		PE

Notes: Template overhead stop to maximum degree of opening allowable by site conditions

Set: 3.0

Single D116a, corridor C102 to washroom 116a, 915 x 2135 x 45, Hollow Metal x , LH,
Single D116f, corridor c102 to washroom 116f, 915 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Privacy Set	ML2020 NSA M19S	630	RU
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Wall Stop	405	US26D	RO

Set: 4.0

Single D116b, corridor C102 to washroom 116b, 610 x 2135 x 45, Hollow Metal x , LH,
Single D116c, corridor C102 to washroom 116c, 610 x 2135 x 45, Hollow Metal x , LH,
Single D116d, corridor C102 to washroom 116d, 610 x 2135 x 45, Hollow Metal x , RH,
Single D116e, corridor C102 to washroom 116e, 610 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Privacy Set	ML2020 NSA M19S	630	RU
1	Surf Overhead Stop	10-X36	652	RF
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO

Notes: Template overhead stop to maximum degree of opening allowable by site conditions

Set: 5.0

Single D117, corridor C103 from vestibule 117, 915 x 2135 x 45, Hollow Metal x , RHR,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Storeroom Lock	ML2057 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surf Overhead Stop	10-X36	652	RF
1	Surface Closer	CPS7500	689	NO
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Mortar Box	TA-6410 (to suit future door contact location)		OT
1	Mortar Box	TA-6410 (to suite future current transfer location)		OT
1	Filler Plate Set	CEPT-10 (filler frame and door)	600	OT

Notes: Door supplier to provide raceway thru door to future electric lock location
Mortar boxes welded in place by HM frame supplier

Set: 6.0

Single D117a, vestibule 117 from server 117a, 915 x 2135 x 45, Hollow Metal x , LHR,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	CPS7500	689	NO
1	Door Position Switch	1076-D		OT
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier

Mode of Operation
Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 7.0

Single D117b, vestibule 117 to CCS 117b, 915 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Storeroom Lock	ML2057 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	7500 (pull side mount)	689	NO
1	Wall Stop	405	US26D	RO

Set: 8.0

Single D123, corridor C103 to reception 123, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinge (heavy weight)	T4A3786 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Concealed Overhead Stop	1-X36	689	RF
1	Surface Closer	7500 (pull side mount)	689	NO
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier
Template overhead stop to maximum degree allowable by site conditions

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 8.1

Single D123a, corridor C103 to corridor C123, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinge (heavy weight)	T4A3786 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Storeroom Lock	RX 21 8206 LNL	US32D	SA
1	Cylinder	100200AT P GMK GGMK Z20	19	MC
1	Concealed Overhead Stop	1-X36	689	RF
1	Surface Closer	7500 (pull side mount)	689	NO
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to future electric lock location
Mortar boxes welded in place by HM frame supplier
Template overhead stop to maximum degree allowable by site conditions

Mode of Operation

Door normally closed and locked. Free egress at all times by turning lever and pulling / pushing door open. Integral request to exit switch to shunt door contact when interior lever depressed.

Set: 9.0

Single D123b, reception 123 to office 123b, 965 x 2135 x 45, Hollow Metal x , LH,
Single D123c, reception 123 to office 123c, 965 x 2135 x 45, Hollow Metal x , LH,
Single D123d, corridor C123 to office 123d, 965 x 2135 x 45, Hollow Metal x , LH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Office Lock	ML2051 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Floor Stop	441H	US26D	RO
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE

Set: 10.0

Single D123e, corridor C123 to meeting 123e, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Passage Latch	ML2010 NSA	630	RU
1	Floor Stop	441H	US26D	RO
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE

Set: 11.0

Single D124, corridor C104 to closed file storage 124, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	7500 (pull side mount)	689	NO
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Floor Stop	441H	US26D	RO
1	Door Position Switch	1076-D		OT
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 12.0

Single D125, corridor C150e to family therapy room 125, 965 x 2135 x 45, Hollow Metal x , LH,
Single D126a, corridor C104 to couple / individual room 126a, 965 x 2135 x 45, Hollow Metal x , LH,
Single D126b, corridor C104 to couple /individual room 126b, 965 x 2135 x 45, Hollow Metal x , RH,
Single D126c, corridor C104 to couple / individual room 126c, 965 x 2135 x 45, Hollow Metal x , LH,
Single D126d, corridor c104 to couple / individual room 126d, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	7500 (pull side mount)	689	NO
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Floor Stop	441H	US26D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier
Template overhead stop to maximum degree allowable by site conditions

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 13.0

Single D125a, corridor C150e to viewing room D125a, 965 x 2135 x 45, Hollow Metal x , RH,
Single D127a, corridor C150e to viewing / child care 127a, 965 x 2135 x 45, Hollow Metal x , LH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	7500 (pull side mount)	689	NO
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Floor Stop	441H	US26D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier
Template overhead stop to maximum degree allowable by site conditions

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 14.0

Single D127, corridor C150e to family therapy room 127, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	7500 (pull side mount)	689	NO
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Floor Stop	441H	US26D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier
Template overhead stop to maximum degree allowable by site conditions

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 15.0

Single D127b, viewing / child care 127a to family therapy room 127, 762 x 2135 x 45, Hollow Metal x , LH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Classroom Lock	ML2055 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Floor Stop	441H	US26D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE

Set: 16.0

Single D128, corridor C104 to multi-purpose room 128, 965 x 2135 x 45, Hollow Metal x , RH,
Single D129, corridor C104 to large group room 129, 965 x 2135 x 45, Hollow Metal x , LH,
Single D129a, corridor C104 to large group room 129, 965 x 2135 x 45, Hollow Metal x , RH,
Single D130, corridor C104 to sessional office 130, 965 x 2135 x 45, Hollow Metal x , LH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	7500 (pull side mount)	689	NO
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Floor Stop	441H	US26D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier
Template overhead stop to maximum degree allowable by site conditions

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 17.0

Single D131, corridor C137 to storage 131, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Storeroom Lock	ML2057 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Wall Stop	405	US26D	RO

Set: 18.0

Single D132, corridor C106 to research space 132, 965 x 2135 x 45, Hollow Metal x , RH,
Single D133, corridor C107 to office / supervision 133, 965 x 2135 x 45, Hollow Metal x , LH,
Single D135, corridor C107 to office / supervision 135, 965 x 2135 x 45, Hollow Metal x , RH,
Single D137, corridor C107 to office / supervision 137, 965 x 2135 x 45, Hollow Metal x , LH,
Single D139, corridor C107 to office / supervision 139, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	7500 (pull side mount)	689	NO
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Floor Stop	441H	US26D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier
Template overhead stop to maximum degree allowable by site conditions

Mode of Operation
Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 19.0

Single D134, corridor C106 to kitchenette 134, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	7500 (pull side mount)	689	NO
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Floor Stop	441H	US26D	RO
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier
Template overhead stop to maximum degree allowable by site conditions

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 20.0

Single D136, corridor C106 from student work area 136, 965 x 2135 x 45, Hollow Metal x , LHR,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	7500 (pull side mount)	689	NO
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Floor Stop	441H	US26D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier
Template overhead stop to maximum degree allowable by site conditions

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 21.0

Single D136b, student work area 136 to telephone 136b, 965 x 2135 x 45, Hollow Metal x , RH,
Single D136c, student work area 136 to breakout room 136c, 965 x 2135 x 45, Hollow Metal x , LH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Passage Latch	ML2010 NSA	630	RU
1	Floor Stop	441H	US26D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE

Set: 22.0

Single D138, corridor C106 from sprinkler room 138, 762 x 2135 x 45, Hollow Metal x , RHR,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Storeroom Lock	ML2057 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	CPS7500	689	NO

Set: 23.0

Single D138a, corridor C108 to universal washroom WR138, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinges	T4A3786 Size to Suit (NRP at Outswing Doors)	652	MK
1	Storeroom Lock	21 8206 LNL x less strike	US32	SA
1	Cylinder	100200AT GMK GGMK (key switch)	19	MC
1	Cylinder	100200AT P GMK GGMK Z20	19	MC
1	Electric Strike	F2364 (fail safe)	630	RCI
1	Push Plate	70C x 152mm x 762mm x CFC x TAPE x B4E (RH)	630	RO
1	Concealed Overhead Stop	6-X36	630	RF
1	Auto Door Operator	SW200i-IS-99-CL	628	BM
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Universal Washroom Call System	CX-WC13AXFM		OT
1	Key Switch	MKA	628	OT
1	Universal Emergency Call System Kit	CX-WEC10K2	630	OT
1	Relay	RB-4-24		SU
1	Door Position Switch	1076-D		OT
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Emergency Instructional Signage	CM-SE21		00
1	Power Supply	BPS-24-1		SU
1	Mortar Box	TA-6410 (to suit door contact location)		OT
1	Mortar Box	TA-6410 (to suit door operator location)		OT
1	Mortar Box	TA-6410 (to suit electric strike location)		OT

Notes: Mortar boxes welded in place by HM frame supplier
Template overhead stop to maximum degree of opening allowable by site conditions

Mode of Operation

Door normally closed and latched. Outside occupancy indicator GREEN. Door can be opened manually by pushing door open or by pushing operator wall switch. Once inside room and with door closed, pressing Push-To-Lock button locks door and disables corridor side wall switch, and changes LED on occupancy indicator to RED from GREEN.

Egress by pushing / pulling door open or by pushing inside wall switch.

Key switch inside secures bathroom if service work required.
Pressing inside wall mounted mushroom button activates washroom and corridor mounted lights and horn. Free egress at all times.

Set: 24.0

Single D141, corridor C107 to mail 141, 965 x 2135 x 45, Hollow Metal x , LH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	7500H	689	NO
1	Door Position Switch	1076-D		OT
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 25.0

Single D143, corridor C108 to waiting 143, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinge (heavy weight)	T4A3786 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Electric Strike	1006CLB	630	HS
2	Wall Switch	CM-35N/4	630	OT
1	Auto Door Operator	SW200i-IS-99-CL	628	BM
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE
1	Door Position Switch	1076-D		OT
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT
1	Mortar Box	TA-6410 (to suit door operator location)		OT
1	Mortar Box	TA-6410 (to suit electric strike location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier
120vac to door operator by division 26 00 00
Wall switch back boxes and pull strings to operator header by division 26 00 00.

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and enable outside operator wall switch. Ingress by turning lever and push / pull door open, or by, pressing outside push button
which will release the electric strike and door will open automatically.
Free egress at all times from inside by turning inside lever and pulling / pushing door open, or by, pushing inside wall switch which will release the electric strike and door will open automatically.

Set: 26.0

Single D145, waiting 143 to reception 145, 965 x 2135 x 45, Hollow Metal x , LH,
Single D147, reception 145 to admin office D147, 965 x 2135 x 45, Hollow Metal x , RH,
Single D149, reception 145 to office / supervision 149, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surf Overhead Stop	10-X36 (door D145 only)	652	RF
1	Surface Closer	7500 (pull side mount)	689	NO
1	Floor Stop	441H	US26D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier
Template overhead stop to maximum degree allowable by site conditions

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 27.0

Pair DST101, exterior from entrance vestibule ST101a, 1930 x 2135 x 57, Aluminum x , RHRA/LHR,

2	Continuous Hinge	MCK-12HD EPT 83"	CL	MK
1	Removable Mullion	L980A x 980C1 Less Cyl	US28	SA
1	Exit Device (Elect)	21 31 55 56 AD8504 x 649	US32D	SA
1	Exit Device (Elect)	21 31 55 56 AD8510 x 649	US32D	SA
1	Cylinder	100200AT P GMK GGMK Z20	19	MC
1	Cylinder	100403VT P GMK GGMK	19	MC
2	Door Pull	RM3312MP 12XHD x Dr Height (-450mm) x Thickness	US32D	RO
2	Concealed Overhead Stop	6-X36	630	RF
1	Closer	4021 LONG x ST-3212 x mws (concealed in operator header)	689	LC
2	Actuator Inside Non-Lit	CM-45/4		00
1	Auto Door Operator	SW200i-OS-51-CL x full width header x 120vac	628	BM
1	Threshold	255x5AFG		PE
2	Sweep	18061CNB TKSP8 WIDTH		PE
1	Relay	RB-4-24		SU
1	Door Position Switch	1076-D		OT
2	ElectroLynx Harness (In Frame)	QC-C1500P		MK
2	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Interface Module	CX-12		OT
2	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
2	Actuator Back Box	CM-43CBL	BLK	00
1	Video Intercom	Video Intercom supplied and installed by division 26 00 00		OT

Notes: Balance of perimeter weather strip by the aluminum frame supplier
Template overhead stops to maximum degree of opening allowable by site conditions

120vac to door operator by division 26 00 00
Wall switch back boxes and pull strings to operator header by division 26 00 00.

Mode of Operation

Doors normally closed and locked. Entry by presenting valid card to card reader which will electrically retract exit device latches on both leaves and allow door to be pulled open. Valid card will also enable exterior wall switch which when pressed will activate door operator allowing one leaf to open automatically. Secondary entry by remote release located in intercom monitoring station, location of station to be confirmed.

Free egress at all times by pushing doors open or by pushing inside wall switch which will retract exit device latch and automatically open door.

Set: 28.0

Pair DST102, existing stairwell ST102 from corridor C103, 1930 x 2135 x 45, Hollow Metal x , RHRA/LHR, 45 min

6	Hinge (heavy weight)	T4A3786 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Removable Mullion	12-L980	PC	SA
1	Rim Exit Device	12 55 56 8810	US32D	SA
1	Rim Exit Device	12 55 56 8804 Less Pull	US32D	SA
1	Cylinder	100200AT P GMK GGMK Z20	19	MC
1	Cylinder	100403VT P GMK GGMK	19	MC
2	Door Pull	BF158 Mtg-Type 12XHD	US32D	RO
2	Surface Closer	PR7500	689	NO
2	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
2	Wall Stop	405	US26D	RO
1	Gasketing	S773BL		PE
2	Sweep	18061CNB TKSP8 WIDTH		PE
1	Relay	RB-4-24		SU
2	Door Position Switch	1076-D		OT
2	ElectroLynx Harness (In Frame)	QC-C1500P		MK
2	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
2	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
2	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Template overhead stops to maximum degree of opening allowable by site conditions

Mode of Operation

Doors normally closed and locked. Entry by presenting valid card to card reader which will electrically retract exit device latches on both leaves and allow doors to be pulled open. Free egress at all times by pushing doors open. Upon activation of the fire alarm power will be disconnected to the electric exit devices.

Set: 29.0

Pair DST101a, entrance vestibule ST101A from corridor C108, 1930 x 2135 x 45, Hollow Metal x , RHRA/LHR, 45 min
Pair D101, entrance vestibule from corridor C101, 1930 x 2135 x 45, Hollow Metal x , RHRA/LHR, 45 min

6	Hinge (heavy weight)	T4A3786 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Removable Mullion	12-L980	PC	SA
1	Rim Exit Device	12 55 56 8810	US32D	SA
1	Rim Exit Device	12 55 56 8804 Less Pull	US32D	SA
1	Cylinder	100200AT P GMK GGMK Z20	19	MC
1	Cylinder	100403VT P GMK GGMK	19	MC
2	Door Pull	BF158 Mtg-Type 12XHD	US32D	RO
2	Closer	4021 LONG x ST-3212 x mws (concealed in operator header)	689	LC
1	Actuator Inside Non-Lit	CM-45/4		00
1	Auto Door Operator	SW200i-OS-51-CL x full width header x 120vac	628	BM
1	Wall Stop	405	US26D	RO
1	Floor Stop	441H	US26D	RO
1	Gasketing	supplied by acoustic door and frame supplier		PE
2	Sweep	18061CNB TKSP8 WIDTH		PE
1	Relay	RB-4-24		SU
1	Door Position Switch	1076-D		OT
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Interface Module	CX-12		OT
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Actuator Back Box	CM-43CBL	BLK	00
1	Wiring Diagrams	POINT TO POINT		00
2	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT
1	Mortar Box	TA-6413 (to suit auto operator location)		OT

Notes: Mortar boxes welded in place by HM frame supplier.
120vac to door operator by division 26 00 00
Wall switch back boxes and pull strings to operator header by division 26 00 00.

Mode of Operation
Doors normally closed and locked. Entry by presenting valid card to card reader which will electrically retract exit device latches on both leaves and allow door to be pulled open. Valid card will also enable exterior wall

switch which when pressed will activate door operator allowing one leaf to open automatically.
Free egress at all times by pushing doors open or by pushing inside wall switch which will retract exit device latch and automatically open door.

Set: 30.0

Pair DST103, exterior from existing stairwell ST103, 1930 x 2135 x 57, Aluminum x , RHRA/LHR,

2	Continuous Hinge	MCK-12HD EPT 83"	CL	MK
1	Removable Mullion	L980A x 980C1 Less Cyl	US28	SA
1	Exit Device (Elect)	21 31 55 56 AD8504 x 649	US32D	SA
1	Exit Device (Elect)	21 31 55 56 AD8510 x 649	US32D	SA
1	Cylinder	100200AT P GMK GGMK Z20	19	MC
1	Cylinder	100403VT P GMK GGMK	19	MC
2	Door Pull	RM3312MP 12XHD x Dr Height (-450mm) x Thickness	US32D	RO
2	Closer	4041XP SCUSH	689	LC
2	Adapter Plate	4040XP-18PA	689	LC
1	Threshold	255x5AFG		PE
2	Sweep	18061CNB TKSP8 WIDTH		PE
1	Relay	RB-4-24		SU
2	Door Position Switch	1076-D		OT
2	ElectroLynx Harness (In Frame)	QC-C1500P		MK
2	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
2	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID

Notes: Balance of perimeter weather strip by the aluminum frame supplier

Mode of Operation

Doors normally closed and locked. Entry by presenting valid card to card reader which will electrically retract exit device latches on both leaves and allow doors to be pulled open.
Free egress at all times by pushing doors open.

Set: 31.0

Single DST103a, existing stairwell ST103 from corridor C103, 1015 x 2135 x 45, Hollow Metal x , LHR, 45 min

3	Hinge (heavy weight)	T4A3386 Size to Suit (NRP at Outswinging Doors)	US32D	MK
1	Electrified Rim Exit	12 21 55 8876-24v ETL	US32D	SA
1	Cylinder	100403VT P GMK GGMK	19	MC
1	Surface Closer	7500 (pull side mount)	689	NO
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Wall Stop	405	US26D	RO
1	Gasketing	S773BL		PE
1	Sweep	18061CNB TKSP8 WIDTH		PE
1	Door Position Switch	1076-D		OT
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Mortar boxes welded in place by HM frame supplier

Mode of Operation

Door normally closed and locked. Presentation of valid card will unlock exit device trim lever. Entry by turning lever and pulling door open.
Free egress at all times.

Set: 32.0

Single D001, stairwell STB001 from corridor CB001, 965 x 2135 x 45, Hollow Metal x Hollow Metal, RHR, 45 min

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Storeroom Lock	ML2057 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	PR7500	689	NO
1	Wall Stop	405	US26D	RO
1	Gasketing	S773BL		PE
1	Sweep	18061CNB TKSP8 WIDTH		PE

Set: 33.0

Pair D100, exterior from existing vestibule C100, 1930 x 2135 x 57, Aluminum x , RHRA/LHR,
Pair D103a, exterior from existing vestibule C101A, 1930 x 2135 x 45, Aluminum x , RHRA/LHR,

2	Continuous Hinge	MCK-12HD EPT 83"	CL	MK
1	Removable Mullion	L980A x 980C1 Less Cyl	US28	SA
1	Exit Device (Elect)	21 31 55 56 AD8504 x 649	US32D	SA
1	Exit Device (Elect)	21 31 55 56 AD8510 x 649	US32D	SA
1	Cylinder	100200AT P GMK GGMK Z20	19	MC
1	Cylinder	100403VT P GMK GGMK	19	MC
2	Door Pull	RM3312MP 12XHD x Dr Height (-450mm) x Thickness	US32D	RO
2	Concealed Overhead Stop	6-X36	630	RF
2	Closer	4021 LONG x ST-3212 x mws (concealed in operator header)	689	LC
1	Actuator Inside Non-Lit	CM-45/4		00
1	Auto Door Operator	SW200i-OS-51-CL x full width header x 120vac	628	BM
1	Threshold	252x3AFG WIDTH		PE
2	Sweep	18061CNB TKSP8 WIDTH		PE
1	Relay	RB-4-24		SU
2	Door Position Switch	1076-D		OT
2	ElectroLynx Harness (In Frame)	QC-C1500P		MK
2	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Interface Module	CX-12		OT
2	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
2	Actuator Back Box	CM-43CBL	BLK	00

Notes: Balance of perimeter weather strip by the aluminum frame supplier
Template overhead stops to maximum degree of opening allowable by site conditions

120vac to door operator by division 26 00 00
Wall switch back boxes and pull strings to operator header by division 26 00 00.

Mode of Operation

Doors normally closed and locked. Entry by presenting valid card to card reader which will electrically retract exit device latches on both leaves and allow door to be pulled open. Valid card will also enable exterior wall switch which when pressed will activate door operator allowing one leaf to open automatically.

Free egress at all times by pushing doors open or by pushing inside wall switch which will retract exit device latch and automatically open door.

Set: 34.0

Single D104WR, existing corridor C101 to universal washroom 104, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinges	T4A3786 Size to Suit (NRP at Outswing Doors)	652	MK
1	Storeroom Lock	21 8206 LNL x less strike	US32	SA
1	Cylinder	100200AT GMK GGMK (key switch)	19	MC
1	Cylinder	100200AT P GMK GGMK Z20	19	MC
1	Electric Strike	F2364 (fail safe)	630	RCI
1	Push Plate	70C x 152mm x 762mm x CFC x TAPE x B4E (RH)	630	RO
1	Concealed Overhead Stop	6-X36	630	RF
1	Auto Door Operator	SW200i-IS-99-CL	628	BM
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Universal Washroom Call System	CX-WC13AXFM		OT
1	Key Switch	MKA	628	OT
1	Universal Emergency Call System Kit	CX-WEC10K2	630	OT
1	Relay	RB-4-24		SU
1	Door Position Switch	1076-D		OT
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Emergency Instructional Signage	CM-SE21		00
1	Power Supply	BPS-24-1		SU
1	Mortar Box	TA-6410 (to suit door contact location)		OT
1	Mortar Box	TA-6410 (to suit door operator location)		OT
1	Mortar Box	TA-6410 (to suit electric strike location)		OT

Notes: Mortar boxes welded in place by HM frame supplier
Template overhead stop to maximum degree of opening allowable by site conditions

Mode of Operation

Door normally closed and latched. Outside occupancy indicator GREEN. Door can be opened manually by pushing door open or by pushing operator wall switch. Once inside room and with door closed, pressing Push-To-Lock button locks door and disables corridor side wall switch, and changes LED on occupancy indicator to RED from GREEN.

Egress by pushing / pulling door open or by pushing inside wall switch.

Key switch inside secures bathroom if service work required.
Pressing inside wall mounted mushroom button activates washroom and corridor mounted lights and horn. Free egress at all times.

Set: 35.0

Single D104a, existing corridor C101 to washroom 104a, 965 x 2135 x 45, Hollow Metal x , LH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Privacy Set	ML2020 NSA M19S	630	RU
1	Concealed Overhead Stop	6-X36	630	RF
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO

Notes: Template overhead stop to maximum degree allowable by site conditions

Set: 36.0

Pair D110a, existing classroom 110 from closet 110a, 1930 x 2135 x 45, Hollow Metal x , RHRA/LHR,

6	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Flush Bolt	555	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Storeroom Lock	ML2057 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
2	Conc Overhead Stop	2-X36	619	RF

Notes: template overhead stops to maximum degree of opening allowable by site conditions

Set: 37.0

Single D201, corridor C201 to custodian 201, 915 x 2135 x 45, Hollow Metal x , RH,
Single D201g, washroom WR201 to chase, ~555 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Storeroom Lock	ML2057 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Conc Overhead Stop	2-X36	619	RF
1	Surface Closer	7500 (pull side mount)	689	NO
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Gasketing	S773BL		PE
1	Sweep	18061CNB TKSP8 WIDTH		PE

Set: 38.0

Single D201a, corridor C201 to washroom 201a, 915 x 2135 x 45, Hollow Metal x , LH,
Single D201f, corridor C201 to washroom 201f, 915 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Privacy Set	ML2020 NSA M19S	630	RU
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Wall Stop	405	US26D	RO

Set: 39.0

Single D201b, corridor C201 to washroom 201b, 610 x 2135 x 45, Hollow Metal x , LH,
Single D201c, corridor C201 to washroom 201c, 610 x 2135 x 45, Hollow Metal x , LH,
Single D201d, corridor C201 to washroom 201d, 610 x 2135 x 45, Hollow Metal x , RH,
Single D201e, corridor C201 to washroom 201e, 610 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Privacy Set	ML2020 NSA M19S	630	RU
1	Conc Overhead Stop	2-X36	619	RF
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO

Notes: Template overhead stop to maximum degree allowable by site conditions

Set: 40.0

Single D202, corridor C206 to assessment room 202, 965 x 2135 x 45, Hollow Metal x , RH,
Single D203, corridor C206 to couple / individual room 203 , 965 x 2135 x 45, Hollow Metal x , LH,
Single D204, corridor C206 to assessment room 204, 965 x 2135 x 45, Hollow Metal x , LH,
Single D205, corridor C206 to couple / individual room 205, 965 x 2135 x 45, Hollow Metal x , RH,
Single D207, corridor C206 to couple / individual room 207, 965 x 2135 x 45, Hollow Metal x , LH,
Single D208, corridor C206 to assessment room 208, 965 x 2135 x 45, Hollow Metal x , LH,
Single D209, corridor C206 to play room 209, 965 x 2135 x 45, Hollow Metal x , RH,
Single D210, corridor C207 to playroom 210, 965 x 2135 x 45, Hollow Metal x , RH,
Single D211, corridor C207 to family therapy room 211, 965 x 2135 x 45, Hollow Metal x , LH,
Single D213, corridor C208 to family therapy room 213, 965 x 2135 x 45, Hollow Metal x , RH,
Single D214, corridor C208 to viewing room 214, 965 x 2135 x 45, Hollow Metal x , LH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Classroom Lock	ML2055 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Floor Stop	441H	US26D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE

Set: 41.0

Single D206, corridor C206 to viewing room 206, 965 x 2135 x 45, Hollow Metal x , LH,
Single D210a, corridor C207 to viewing room 210a, 965 x 2135 x 45, Hollow Metal x , LH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Classroom Lock	ML2055 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Floor Stop	441H	US26D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE

Set: 42.0

Pair D202a, corridor C202 from corridor C201, 1930 x 2135 x 45, Hollow Metal x , LHR/LHR,
Pair D206a, corridor C206 from corridor C201, 1930 x 2135 x 45, Hollow Metal x , LHR/LHR,

6	Hinges	T4A3786 Size to Suit (NRP at Outswing Doors)	652	MK
1	Magnetic Lock	M62		SU
1	Exit Device	8893 J	US32D	SA
2	Rim Exit Device	55 56 8810	US32D	SA
2	Concealed Overhead Stop	6-X36	630	RF
2	Auto Door Operator	SW200i-IS-99-CL	628	BM
2	Wall Switch	CM-45/4	630	OT
2	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
2	Door Position Switch	1076-D		OT
2	ElectroLynx Harness (In Frame)	QC-C1500P		MK
2	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit door contact location)		OT
1	Mortar Box	TA-6410 (to suit mag lock locations)		OT
2	Mortar Box	TA-6413 (to suit auto operator location)		OT
1	Bracket	ASB-62CL	628	SU

Notes: 120vac to door operator by division 26 00 00
Conduit, back boxes, and pull strings to door operator header and wall switches by division 26 00 00
Mortar boxes welded in place by HM frame supplier

Mode of Operation
One leaf normally closed and locked by mag lock. Presentation of valid card to card reader will release power to mag lock and enable wall switch to activate door operator. Entry by pushing door open or by pushing door operator wall switch. Free egress at all times by pushing exit device rail which will release mag lock and enable operator button.
Upon activation of fire alarm mag locks are to lose power allowing free egress. Mag locks to be locally released by fire alarm pull stations located on either side of opening. Mag locks to be overridden and reset by key switch located at main fire alarm annunciator panel.

Door# D206 - East leaf of double egress pair to receive 55-56-8810 and CEPT-10
Door# D104, D106, D108 - North leaf of double egress pair to receive 55-56-8810 and CEPT-10

Set: 43.0

Single D212, corridor C207 to test library 212, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	7500 (pull side mount)	689	NO
1	Wall Stop	405	US26D	RO
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier
Template overhead stop to maximum degree allowable by site conditions

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 44.0

Single D215, corridor C208 from family therapy room 215, 965 x 2135 x 45, Hollow Metal x , LHR,
Single D216, corridor C201 to wellness room 216, 965 x 2135 x 45, Hollow Metal x , RH,
Single D217b, corridor C201 to lounge 217, 965 x 2135 x 45, Hollow Metal x , LH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	7500 (pull side mount)	689	NO
1	Floor Stop	441H	US26D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 44.1

Single D217, corridor C201 to lounge 217, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Concealed Overhead Stop	6-X36	630	RF
1	Surface Closer	7500 (pull side mount)	689	NO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier
Template overhead stop to maximum degree allowable by site conditions

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 45.0

Single D217a, lounge 217 to coats 217a, 610 x 2135 x 45, Hollow Metal x , LH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Storeroom Lock	ML2057 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Floor Stop	441H	US26D	RO

Set: 46.0

Single D218, corridor C201 from storage 218, 965 x 2135 x 45, Hollow Metal x , LHR,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Storeroom Lock	ML2057 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	CPS7500	689	NO

Set: 47.0

Single D219, corridor C203 from storage 219, 965 x 2135 x 45, Hollow Metal x , RHR,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Storeroom Lock	ML2057 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	CPS7500	689	NO

Set: 47.1

Single D231, corridor C203 from elevator machine room 231, 965 x 2135 x 45, Hollow Metal x , LHR, 45 min

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Storeroom Lock	ML2057 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	CPS7500	689	NO
1	Gasketing	S773BL		PE
1	Sweep	18061CNB TKSP8 WIDTH		PE

Set: 48.0

Single D220, corridor C201 to prayer room 220, 965 x 2135 x 45, Hollow Metal x , RH,
Single D221, corridor C203 to office / supervision 221, 965 x 2135 x 45, Hollow Metal x , LH,
Single D222, corridor C201 to confidential student work room 222, 965 x 2135 x 45, Hollow Metal x , RH,
Single D223, corridor C203 to office / supervision 223, 965 x 2135 x 45, Hollow Metal x , LH,
Single D225, corridor C203 to office / supervision 225, 965 x 2135 x 45, Hollow Metal x , RH,
Single D227, corridor C203 to office / supervision 227, 965 x 2135 x 45, Hollow Metal x , LH,
Single D229, corridor C203 to office / supervision 229, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	7500 (pull side mount)	689	NO
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Floor Stop	441H	US26D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 49.0

Single D224, corridor C204 to research / therapy assessment room 224, 965 x 2135 x 45, Hollow Metal x , LH,
Single D228, corridor C204 to research therapy assessment room 228, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Classroom Lock	ML2055 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Floor Stop	441H	US26D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE

Set: 50.0

Single D224a, corridor C204 to viewing room 224a, 965 x 2135 x 45, Hollow Metal x , LH,
Single D228a, corridor C204 to viewing room 228a, 965 x 2135 x 45, Hollow Metal x , LH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Classroom Lock	ML2055 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Floor Stop	441H	US26D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE

Set: 51.0

Single D226, corridor C204 to office 226, 965 x 2135 x 45, Hollow Metal x , LH,
Single D232, corridor C204 to office 232, 965 x 2135 x 45, Hollow Metal x , RH,
Single D237, reception / copy 235 to admin office 237, 965 x 2135 x 45, Hollow Metal x , LH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Office Lock	ML2051 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE

Set: 52.0

Single D230, corridor C204 to research data / analysis room 230, 965 x 2135 x 45, Hollow Metal x , LH,
Single D233, corridor C202 to large group room 233 , 965 x 2135 x 45, Hollow Metal x , LH,
Single D235, corridor C202 to reception / copy 235, 965 x 2135 x 45, Hollow Metal x , LH,
Single D239, reception copy 239 to seminar 239, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	7500 (pull side mount)	689	NO
1	Floor Stop	441H	US26D	RO
1	Threshold	151A x door width	627	PE
1	Gasketing	supplied by acoustic door and frame supplier		PE
1	Door Bottom	supplied by acoustic door and frame supplier		PE
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 52.1

Single D235a, reception / copy 235 to active storage 235a, 965 x 2135 x 45, Hollow Metal x , LH,

3	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Electrified Mortise Lock	RX-ML20906-SEC NSA M92 CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	7500 (pull side mount)	689	NO
1	Floor Stop	441H	US26D	RO
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Door supplier to provide raceway thru door to electric lock location
Mortar boxes welded in place by HM frame supplier

Mode of Operation

Door normally closed and locked. Presentation of valid card to card reader will unlock door and allow entry by turning lever and pulling / pushing door open.
Free egress at all times from inside by turning lever and pulling / pushing door open.

Set: 53.0

Pair D234, corridor C204 from IT 234, 1930 x 2135 x 45, Hollow Metal x , RHRA/LHR,

6	Hinge	TA2714 Size to Suit (NRP at Outswinging Doors)	US26D	MK
1	Flush Bolt	555	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Storeroom Lock	ML2057 NSA CMK	630	RU
1	Cylinder	100200AT P GMK GGMK Z09	19	MC
1	Surface Closer	CPS8501	689	NO

Set: 54.0

Single D234a, corridor C202 to universal washroom WR234, 965 x 2135 x 45, Hollow Metal x , RH,

3	Hinges	T4A3786 Size to Suit (NRP at Outswing Doors)	652	MK
1	Storeroom Lock	21 8206 LNL x less strike	US32	SA
1	Cylinder	100200AT GMK GGMK (key switch)	19	MC
1	Cylinder	100200AT P GMK GGMK Z20	19	MC
1	Electric Strike	F2364 (fail safe)	630	RCI
1	Push Plate	70C x 152mm x 762mm x CFC x TAPE x B4E (RH)	630	RO
1	Concealed Overhead Stop	6-X36	630	RF
1	Auto Door Operator	SW200i-IS-99-CL	628	BM
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Universal Washroom Call System	CX-WC13AXFM		OT
1	Key Switch	MKA	628	OT
1	Universal Emergency Call System Kit	CX-WEC10K2	630	OT
1	Relay	RB-4-24		SU
1	Door Position Switch	1076-D		OT
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Emergency Instructional Signage	CM-SE21		00
1	Power Supply	BPS-24-1		SU
1	Mortar Box	TA-6410 (to suit door contact location)		OT
1	Mortar Box	TA-6410 (to suit door operator location)		OT
1	Mortar Box	TA-6410 (to suit electric strike location)		OT

Notes: Mortar boxes welded in place by HM frame supplier
Template overhead stop to maximum degree of opening allowable by site conditions

Mode of Operation

Door normally closed and latched. Outside occupancy indicator GREEN. Door can be opened manually by pushing door open or by pushing operator wall switch. Once inside room and with door closed, pressing Push-To-Lock button locks door and disables corridor side wall switch, and changes LED on occupancy indicator to RED from GREEN.

Egress by pushing / pulling door open or by pushing inside wall switch.

Key switch inside secures bathroom if service work required.
Pressing inside wall mounted mushroom button activates washroom and corridor mounted lights and horn. Free egress at all times.

Set: 55.0

Pair DST201, existing stairwell ST201 from corridor C202, 1930 x 2135 x 45, Hollow Metal x , RHRA/LHR, 45 min

6	Hinges	T4A3786 Size to Suit (NRP at Outswing Doors)	652	MK
1	Removable Mullion	12-L980	PC	SA
1	Electrified Rim Exit	12 21 55 8876-24v ETL	US32D	SA
1	Electrified Rim Exit	12 21 55 8874-24v ETL	US32D	SA
1	Cylinder	100200AT P GMK GGMK Z20	19	MC
1	Cylinder	100403VT P GMK GGMK	19	MC
2	Concealed Overhead Stop	6-X36	630	RF
2	Surface Closer	7500 (pull side mount)	689	NO
2	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Gasketing	S773BL		PE
2	Sweep	18061CNB TKSP8 WIDTH		PE
2	Door Position Switch	1076-D		OT
2	ElectroLynx Harness (In Frame)	QC-C1500P		MK
2	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
2	Electric Power Transfer	CEPT-10		SU
1	Wiring Diagrams	POINT TO POINT		00
2	Mortar Box	TA-6410 (to suit current transfer location)		OT

Notes: Mortar boxes welded in place by HM frame supplier
Template overhead stop to maximum degree of opening allowable by site conditions

Mode of Operation

Doors normally closed and locked. Presentation of valid card will unlock exit device trim levers. Entry by turning levers and pulling doors open.
Free egress at all times.

Set: 56.0

Pair DST202, existing stairwell ST202 from corridor C201, 2030 x 2135 x 45, Hollow Metal x , RHRA/LHR, 45 min

6	Hinges	T4A3786 Size to Suit (NRP at Outswing Doors)	652	MK
1	Removable Mullion	12-L980	PC	SA
1	Electrified Rim Exit	12 21 55 8876-24v ETL	US32D	SA
1	Electrified Rim Exit	12 21 55 8874-24v ETL	US32D	SA
1	Cylinder	100200AT P GMK GGMK Z20	19	MC
1	Cylinder	100403VT P GMK GGMK	19	MC
2	Surface Closer	7500 (pull side mount)	689	NO
2	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
2	Wall Stop	405	US26D	RO
1	Gasketing	S773BL		PE
2	Sweep	18061CNB TKSP8 WIDTH		PE
2	Door Position Switch	1076-D		OT
2	ElectroLynx Harness (In Frame)	QC-C1500P		MK
2	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
2	Electric Power Transfer	CEPT-10		SU
1	Wiring Diagrams	POINT TO POINT		00
2	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Mortar boxes welded in place by HM frame supplier

Mode of Operation

Doors normally closed and locked. Presentation of valid card will unlock exit device trim levers. Entry by turning levers and pulling doors open.
Free egress at all times.

Set: 57.0

Single DST203, existing stairwell ST203 from corridor C206, 965 x 2135 x 45, Hollow Metal x , LHR, 45 min

3	Hinge (heavy weight)	T4A3386 Size to Suit (NRP at Outswinging Doors)	US32D	MK
1	Electrified Rim Exit	12 21 55 8876-24v ETL	US32D	SA
1	Cylinder	100403VT P GMK GGMK	19	MC
1	Surface Closer	7500 (pull side mount)	689	NO
1	Kick Plate	K1050 8" x WIDTH 4BE CSK	US32D	RO
1	Wall Stop	405	US26D	RO
1	Gasketing	S773BL		PE
1	Sweep	18061CNB TKSP8 WIDTH		PE
1	Door Position Switch	1076-D		OT
1	ElectroLynx Harness (In Frame)	QC-C1500P		MK
1	ElectroLynx Harness (In Door)	QC-CX00 LENGTH		MK
1	Electric Power Transfer	CEPT-10		SU
1	Card Reader	HID multiCLASS SE RP40		HID
1	Wiring Diagrams	POINT TO POINT		00
1	Mortar Box	TA-6410 (to suit current transfer location)		OT
1	Mortar Box	TA-6410 (to suit door contact location)		OT

Notes: Mortar boxes welded in place by HM frame supplier

Mode of Operation
Door normally closed and locked. Presentation of valid card will unlock exit device trim lever. Entry by turning lever and pulling door open.
Free egress at all times.

Set: 58.0

Single D302, exterior from existing mechanical room 302, 915 x 1842 x 57, Aluminum x , LHR,

1	Continuous Hinge	MCK-12HD x Dr Height	CL	MK
1	Mortise Deadlock	MS1850S-050 1-1/2" BS 1	628	AD
2	Cylinder	100200AT P GMK GGMK Z02	19	MC
1	Cylinder Pull	90	US26D	RO
1	Closer	4041XP SCUSH	689	LC
1	Adapter Plate	4040XP-18PA	689	LC
1	Threshold	252x3AFG WIDTH		PE
1	Sweep	18061CNB TKSP8 WIDTH		PE
1	Door Position Switch	1076-D		OT

Notes: Balance of perimeter weather strip by aluminum door supplier.

Set: 59.0

Description: Power Distribution - power supplies to be mounted on north wall of vestibule 117

1	Cylinder	100200AT GMK GGMK (key switch)	19	MC
1	Key switch	MKA2 (mag lock override / reset - to be installed by main fire alarm annunciator panel)		SU
5	Power Supply	BPS-24-10 x B-24-5(2) (electric locksets and exit devices)		SU
1	Power Supply	BPS-24-4 x CFAR-24 (mag locks)		SU
	Note	low voltage trunk wire from each opening to power supply room supplied and installed by University of Guelph		OT

Set: 60.0

Description: KEYS and KEYING

10	Cut Keys	Medeco M3 GMK	MC
40	Cut Keys	Medeco M3 MK	MC
	Cut Keys	Medeco M3 Change Keys 2 key / lock	MC
2	Key Cabinet	1205A	LU
15	Cut Keys	Corbin Russwin Cut Construction Key	RU

Set 61.0

Description: Elevator cab

1	Card Reader	HID multiCLASS SE RP40	HID

END OF SECTION 087100

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International:
- .1 ASTM E119 Methods for Fire Tests of Building Construction and Materials.
- .2 ASTM E152 Methods of Fire Tests of Door Assemblies.
- .3 ASTM E163 Methods for Fire Tests of Window Assemblies.
- .4 ASTM E2074: Standard Test Method for Fire Tests of Door Assemblies, including Positive Pressure Testing of Side-hinged and Pivoted Swinging Door Assemblies.
- .5 ASTM E2110-1: Standard Test for Positive Pressure of Fire Tests of Window Assemblies.

.2 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
- .2 CAN/CGSB-12.2-M91, Flat, Clear Sheet Glass.
- .3 CAN/CGSB-12.3-M91, Flat, Clear Float Glass.
- .4 CAN/CGSB-12.4-M91, Heat Absorbing Glass.
- .5 CAN/CGSB-12.8-97, Insulating Glass Units.
- .6 CAN/CGSB-12.8-97 (Amendment), Insulating Glass Units.
- .7 CAN/CGSB-12.10-M76, Glass, Light and Heat Reflecting.

.3 Standard Council of Canada:
- .1 ULC Standard CAN4-S101: Fire Tests of Building Construction and Materials.
- .2 ULC Standard CAN4-S104: Fire Tests of Door Assemblies.
- .3 ULC Standard CAN4-S106: Fire Tests of Window Assemblies.

.4 Environmental Choice Program (ECP):
- .1 CCD-045-95(R2005), Sealants and Caulking Compounds.

.5 Glass Association of North American (GANA):
- .1 GANA Glazing Manual - 2008.
- .2 GANA Laminated Glazing Reference Manual - 2009.
- .3 FGMA – Sealant Manual.

.6 National Fire Protection Association (NFPA):
- .1 NFPA 80, 2016 Edition: Fire Doors and Windows.
- .2 NFPA 251: Fire Tests of Building Construction and Materials.
- .3 NFPA 252: Fire Tests of Door Assemblies.
- .4 NFPA 257, 2012 Edition: Fire Tests of Window Assemblies.

.7 Underwriters Laboratories, Inc. (UL):
- .1 UL 9: Standard for Safety of Fire Tests of Window Assemblies.
- .2 UL 10B: Standard for Safety of Fire Tests of Door Assemblies.
- .3 UL 10C: Standard for Safety of Positive Pressure Fire Tests of Door Assemblies.
- .4 UL 263: Fire Tests of Building Construction and Materials.
- .5 UL 752-2005: Standard for Safety for Bullet-Resisting Equipment.

.8 Consumer Product Safety Commission (CPSC):
.1 CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials.

.9 American National Standards Institute (ANSI):
.1 ANSI Z97.1: Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

1.2 SYSTEM DESCRIPTION

.1 Performance Requirements:
.1 Fire Rating: 20, 45, 60, 90 or 120 minutes as specified.
.2 Fire Resistive Wall Assembly Certifications: 60-120 minute fire resistive wall assemblies tested in accordance with ASTM E119, NFPA 251, UL 263 and ULC-S101.
.3 Fire Resistive Door Assembly Certifications: 60-90 minute fire resistive door assemblies tested in accordance with ASTM E119, NFPA 251, UL 263 and ULC-S101.
.4 Fire Protective Door Assembly Certifications: 20-45 minute fire protective door assemblies shall be tested in accordance with NFPA 80, NFPA 252, ASTM E152, ASTM E2074, UL 10B, UL 10C and CAN4-S104.
.5 Fire Protective Window Assembly Certifications: 20-45 minute fire protective window assemblies shall be tested in accordance with NFPA 80, NFPA 257, ASTM E163, ASTM E2010, UL 9 and CAN4-S106.
.6 Ballistic Resistance: Can be customized to meet up to Level 8 (7.62mm Rifle Lead Core Full Metal Copper Jacket Military Ball or .308 Caliber).
.7 Testing Laboratory: Fire test shall be conducted by a nationally recognized independent testing laboratory.

.2 Listings and Labels:
.1 Fire rated framing system shall be under current follow-up service by a nationally recognized independent laboratory approved by OSHA and maintain a current listing or certification. Assemblies shall be labeled in accordance with limits of listings.

.3 Appearance:
.1 Fire rated wall/door assembly shall have a neat finished appearance with minimum joints at decorative cover intersections.

.4 Size glass to withstand wind loads, dead loads and positive and negative live loads acting normal to plane of glass to a design pressure as measured in accordance with ANSI/ASTM E330.

.5 Provide glass type and thickness in accordance the OBC.

.6 Limit glass deflection to 1/200 flexural limit of glass with full recovery of glazing materials.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.

.4 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 If requested, samples may be returned for inclusion into work.
- .3 Submit duplicate 12” x 12” size samples of glazing units and sealant material.

.5 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.6 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .1 Submit testing and analysis of glass under provisions of Section 01 45 00 - Quality Control.
- .2 Submit shop inspection and testing for glass.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 – Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.

1.5 QUALITY ASSURANCE

.1 Fire-rated ceramic clear glazing (wireless):
- .1 Glazing Standards: GAMA Glazing Manual and FGMA Sealant Manual.
- .2 Each lite shall bear permanent, no removable label of UL certifying it for use in tested and rated fire protective assemblies.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect glazing and frames from nicks, scratches, and blemishes.
- .3 Protect prefinished aluminum surfaces with wrapping strippable coating.
- .4 Replace defective or damaged materials with new.

.4 Ordering: Comply with manufacturer’s ordering instructions and lead-time requirements to avoid construction delays.

.5 Delivery: Deliver materials to specified destinations in manufacturer’s or distributor’s packaging undamaged, complete with installation instructions.

1.7 FABRICATION DIMENSIONS

.1 Field Measurements: Verify actual measurements for openings by field measurements before fabrication. Show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.8 AMBIENT CONDITIONS

.1 Ambient Requirements:
- .1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.
- .2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.9 WARRANTY

.1 Warrant the following types of glass against defects in materials and workmanship for the period indicated, commencing from the date of Substantial Performance of the work:
- .1 Fire Rated assemblies: five (5) years

.2 Warranty to cover full replacement including stops, trims, caulking, sealants, all at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS – FIRE RATED DOOR, OPENING AND WALL ASSEMBLY

.1 Manufacturer of Framing System: GPX Architectural Series Framing as manufactured and distributed by SAFTI FIRSTTM Fire Rated Glazing Solutions.

.2 Manufacturer of Glazing Material: (SuperLite TM II-XL) (SuperLite TM II-XL IGU) as manufactured and distributed by SAFTI FIRST TM Fire Rated Glazing Solutions.

.3 Fire rated glass and framing must be provided by a single-source, US manufacturer. Distributors of fire rated glass and framing are not to be considered as manufacturers.

.4 Substitutions: No substitutions permitted.

2.2 MATERIALS – FRAMING

.1 Fire resistive, temperature rise framing system rated for 20 to 120 minutes, as indicated.

.2 Properties:
- .1 Frame thickness: 2-1/2” Standard. 3”, 4-1/8” and 5” also available.
- .2 Internal framing: Internal tube steel framing shall conform to ASTM A501. Formed steel retainers shall be galvanized conforming to ASTM A527.
- .3 Insulation: The framing system shall insulate against the effects of fire, smoke and heat transfer from either side. The perimeter of the framing system to the rough opening shall be firmly packed with mineral wool fire stop insulation or appropriately rated intumescent sealant.

.4 Fasteners: Type recommended by manufacturer.

.5 Framing covers: Powder coated extruded aluminum alloy 6063-T5 (standard) or aluminum alloy 5052 when anodized. Ornamental metal (finish specified by the Architect: stainless steel, bronze, etc.). Wood or wood veneer.

.6 Glazing accessories: The glazing material perimeter shall be separated from the perimeter framing system with approved flame retardant glazing tape. The SuperLite™ glazing panel shall be caulked continuously around the edge to the tube steel frame utilizing neutral cure silicone.

2.3 MATERIALS – GLASS

.1 Assemblies shall be glazed with SuperLiteTM glazing products. If assembly is required to meet ASTM E 119, SuperLiteTM II-XL will be used.

.2 Properties:

.1 Individual Lites shall be permanently identified with a listing mark.

.2 Glazing material installed in “Hazardous Locations” (subject to human impact) shall be certified to meet the applicable requirements for fire rated assemblies referenced in ANSI Z97.1 Standard for Safety Glazing Materials Used In Buildings and/or CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials.

.3 Temperature rise on the unexposed side of glazing material shall be limited to 250 degrees Fahrenheit when required.

.4 Visible daylight transmission: Varies by glazing type. Refer to SuperLiteTM product data for more information.

.5 STC rating shall be a minimum of Varies by glazing type. Refer to SuperLiteTM product data for more information.

.3 Logo: Each piece of fire rated glazing shall be labeled with a permanent logo.

2.4 FABRICATION

.1 Assemblies shall be furnished assembled (should configurations and job site conditions allow.

.2 Door assemblies shall be factory prepared for field mounting of hardware.

.3 Fabrication Dimensions: Fabricate to approved dimensions. The general contractor shall guarantee dimensions within required tolerance. Obtain approved shop drawings prior to fabrication.

2.5 FINISHES

.1 Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designing finishes.

.2 Covers shall be chemically cleaned and pretreated; then, finished with:

.1 Clear Anodized.

.3 Protect finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.

.4 Variations in appearance of abutting or adjacent pieces are acceptable. Noticeable variations in the same piece are not acceptable.

2.6 DOOR HARDWARE FOR SINGLE AND PAIRED DOORS

.1 Hardware shall be supplied with the fire door. Hardware selection shall be from door manufacturer's standard recommended hardware groups as specified below. Please call manufacturer for custom hardware.

.2 Refer to Section 08 70 00 - Door Hardware

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 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glazing installation in accordance with manufacturer's written instructions.
  .1 Visually inspect substrate:
    .1 Verify that openings for glazing are correctly sized and within tolerance.
    .2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.
  .2 Inform Consultant of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied.

3.3 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.4 INSTALLATION

.1 Fire wall/door installation shall be by a licensed contractor and in strict accordance with the approved shop drawings.

.2 Comply with referenced FGMA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.

.3 Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.

.4 Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.

.5 Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.

.6 Place setting blocks located at quarter points of glass with edge block not more than 6 inches from corners.

.7 Glaze vertically into labeled fire-rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.

.8 Place glazing tape on free perimeter of glazing in same manner described above.

.9 Install removable stop and secure without displacement of tape.

.10 Use specified glazing compound, without adulteration; bed glazing material in glazing compound; entirely fill all recess and spaces. Provide visible glazing compound with smooth and straight edges.

.11 Install so that appropriate UL markings remain permanently visible.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
- .1 Leave Work area clean at end of each day.
  - .1 Remove traces of primer, caulking.
  - .2 Remove glazing materials from finish surfaces.
  - .3 Remove labels.
  - .4 Clean glass using approved non-abrasive cleaner in accordance with manufacturer's instructions.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 After installation, mark each light with an "X" by using removable plastic tape or paste.
- .1 Do not mark heat absorbing or reflective glass units.

.3 Repair damage to adjacent materials caused by glazing installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International:

.1 ASTM C 542/A542M-13, Standard Specification for Lock-Strip Gaskets.

.2 ASTM D 790-10, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

.3 ASTM D 1003-13, Standard Test Method for Haze and Luminous Transmittance of Plastics.

.4 ASTM D 1929-14, Standard Test Method for Determining Ignition Temperature of Plastics.

.5 ASTM D 2240-05 (2010), Standard Test Method for Rubber Property - Durometer Hardness.

.6 ASTM E 84-15a, Standard Test Method for Surface Burning Characteristics of Building Materials.

.7 ASTM E 330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.8 ASTM E 546-14, Standard Test Method for Frost/Dew Point of Sealed Insulating Glass Units.

.9 ASTM E 576-14, Standard Test Method for Frost/Dew Point of Sealed Insulating Glass Units in the Vertical Position.

.10 ASTM E 2190-10, Standard Specification for Insulating Glass Unit Performance and Evaluation.

.11 ASTM F 1233-08(2013), Standard Test Method for Security Glazing Materials and Systems.

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.

.2 CAN/CGSB-12.2-M91, Flat, Clear Sheet Glass.

.3 CAN/CGSB-12.3-M91, Flat, Clear Float Glass.

.4 CAN/CGSB-12.4-M91, Heat Absorbing Glass.

.5 CAN/CGSB-12.6-M91, Transparent (One-Way) Mirrors.

.6 CAN/CGSB-12.8-97, Insulating Glass Units.

.7 CAN/CGSB-12.8-97 (Amendment), Insulating Glass Units.

.8 CAN/CGSB-12.9-M91, Spandrel Glass.

.9 CAN/CGSB-12.10-M76, Glass, Light and Heat Reflecting.

.10 CAN/CGSB-12.11-M90, Wired Safety Glass.

.11 CAN/CGSB-12.12-M90, Plastic Safety Glazing Sheets.

.12 CAN/CGSB-12.13-M91, Patterned Glass.

.3 Standard Council of Canada:

.1 ULC Standard CAN4-S106-M80 (R1985): Fire Tests of Window Assemblies.

.4 Environmental Choice Program (ECP):

.1 CCD-045-95(R2005), Sealants and Caulking Compounds.

.5 Glass Association of North American (GANA):

.1 GANA Glazing Manual - 2008.

.2 GANA Laminated Glazing Reference Manual - 2009.

.6 National Fire Protection Association (NFPA):

.1 NFPA 80, 2016 Edition: Fire Doors and Windows.

.2 NFPA 257, 2012 Edition: Fire Tests of Window Assemblies.

.7 Underwriters Laboratories, Inc. (UL):
.1 UL 9 – Fire Tests of Window Assemblies.

.8 Underwriters' Laboratories of Canada (ULC):
.1 CAN-ULC S104-15, Standard Method for Fire Tests of Door Assemblies.
.2 ULC CAN4-S106-M80 (R1985), Standard Method for Fire Tests of Window and Glass Block Assemblies.

1.2 SYSTEM DESCRIPTION

.1 Performance Requirements:
.1 Provide continuity of building enclosure air / vapour using glass and glazing materials as follow:
.1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
.2 Fire-rated ceramic clear glazing (wireless):
.1 Fire-rated glass ceramic clear and wireless glazing material listed for use in non-impact safety-rated locations such as transoms and borrowed lights with fire rating requirements ranging from 20 to 90 minutes with required hose stream test.
.2 Passes positive pressure test standards UBC 7-2 and UBC 7-4.

.2 Size glass to withstand wind loads, dead loads and positive and negative live loads acting normal to plane of glass to a design pressure as measured in accordance with ANSI/ASTM E330.

.3 Provide glass type and thickness in accordance the OBC.

.4 Limit glass deflection to 1/200 flexural limit of glass with full recovery of glazing materials.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada, for curtainwall locations.

.4 Samples:
.1 Submit for review and acceptance of each unit.
.2 If requested, samples may be returned for inclusion into work.
.3 Submit duplicate 12” x 12” size samples of glazing units and sealant material.

.5 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.6 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
.1 Submit testing and analysis of glass under provisions of Section 01 45 00 - Quality Control.
.2 Submit shop inspection and testing for glass.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 – Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.

1.5 QUALITY ASSURANCE

.1 Fire-rated ceramic clear glazing (wireless):

.1 Glazing Standards: GAMA Glazing Manual and FGMA Sealant Manual.

.2 Each lite shall bear permanent, no removable label of UL certifying it for use in tested and rated fire protective assemblies.

.2 Acoustic Testing:

.1 Refer to Section 09 21 16 Gypsum Board Assemblies.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect glazing and frames from nicks, scratches, and blemishes.

.3 Protect prefinished aluminum surfaces with wrapping strippable coating.

.4 Replace defective or damaged materials with new.

1.7 AMBIENT CONDITIONS

.1 Ambient Requirements:

.1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.

.2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.8 WARRANTY

.1 Warrant the following types of glass against defects in materials and workmanship for the period indicated, commencing from the date of Substantial Performance of the work:

.1 Insulating glass: ten (10) years

.2 Warranty to cover full replacement including stops, trims, caulking, sealants, all at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Design Criteria:

.1 Ensure continuity of building enclosure vapour and air barrier using glass and glazing materials as follow:

.1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.

.2 Thickness and glass types specified and as indicated on drawings are minimum. Provide glass thicknesses in float, heat-strengthened or tempered glass to ASTM E330 and as required to suit wind loads, dead loads and positive and negative live loads, thermal stresses, building codes and as required by manufacturer's recommendations. Confirm any proposed substitutions from the specified glass with Consultant.

.3 Limit glass deflection to 1/200 flexural limit of glass with full recovery of glazing materials.

.2 Flat Glass:

.1 Float glass: to CAN/CGSB-12.3, colour clear.

.3 Heat strengthened glass: ASTM C1048-976. Perform heat strengthening using the horizontal tong-free method.

.4 Safety glass: to CAN/CGSB-12.1, transparent complete with polished edges, to minimum thickness as follows:

.1 Type 1: tempered, 6 mm / ¼" thick minimum.

.2 Type 2: laminated with 0.76 mm / $^{5}/_{64}$" minimum PVB interlayer, 6 mm / ¼" thick.

.5 Silvered mirror glass: plate glass to CAN/CGSB-12.5, 6 mm / 1/4" thick.

.6 One-way mirrored glass: to CAN/CGSB-12.6, 6 mm / 1/4" thick coated float glass developed for use as a one-way mirror.

.1 Acceptable product: 'Mirropane' as manufactured by Pilkington Building Products (LOF), PPG Canada Inc., Viracon Inc., or approved alternate

.7 Spandrel glass: to CAN/CGSB-12.9, 6 mm / 1/4" thick heat, tempered complete with opacifier coating, colour as later selected by Consultant from manufacturer's complete colour range.

.1 Acceptable product: 'Opaci-Coat 300' by Industrial Control Development Inc., or approved alternate.

.8 Insulating Glass Units:

.1 Insulating glass units: to CAN/CGSB-12.8, double unit, 1" overall thickness, safety glass both lights where indicated.

.1 Glass: to CAN/CGSB-12.3 CAN/CGSB-12.1 CAN/CGSB-12.2 CAN/CGSB-12.4 CAN/CGSB-12.10.

.2 Glass thickness: to requirements of OBC for condition and glazing type indicated, but to minimum type and thickness as indicated.

.1 Curtain Wall Insulated Units: overall thickness 1", with 1/4" exterior pane.

.3 Inter-cavity space thickness: to suit overall thickness and glass thickness, argon filled, with non-conductive warm edge spacers.

.4 Glass coating: Sputter Low "E" on no. 2 surface. Inert gas fill: argon.

.5 Colour: clear .

.9 Interior Back Painted Glass: to CAN/CGSB-12.9

.1 6mm thick heat tempered complete with opacified coating

.2 Custom colour as later selected by Consultant.

.3 Acceptable Product: 'Opaci-Coat 3000' by Industrial Control Development inc. or approved alternate.

.10 Glazing Film: dimensionally stable, decorative translucent film with uniform appearance of acid etched glass with a soft frosted appearance, size to suit.

.1 Acceptable manufacturer: '7725-314 Dusted Crystal' by 3M or equivalent by Madico, Inc. as distributed by Window Film Systems, or, or LLumar, or approved alternate.

.11 Sealant: in accordance with Section 07 92 00 - Joint Sealants.

2.2 FIRE PROTECTIVE GLASS

.1 Ceramic fire-rated and impact-safety rated glass: polished premium surface, 1/4" with applied safety film to CAN-ULC S104,ULC CAN4-S106 and ANZI-97 Cat II.

.1 Acceptable manufacturer's:

.1 Keralite as distributed by F1 Glazing Solutions, Etobicoke, Ontario, phone number 1-416-768-6873, email fultonF1@gmail.com.

.2 Pyran Platinum as distributed by Glassopolis, phone number 1 800 262 9600, web site http://www.glassopolis.com

.3 Firelite as distributed by Technical Glass ProductsMilton, Ontario, phone number 1 800 426 0279, web site sales@fireglass.com, or approved alternate.

.4 Or approved alternate.

.2 Maximum sheet sizes based on surface finish:

.1 Premium: 48 inches by 96 inches.

.3 Labeling: Permanently label each piece of fire-rated ceramic clear glass with the UL logo and fire rating in sizes up to 2.145 m² / 23 ft² and with manufacturer's label only for sizes that exceed the listing (as approved by the local authority having jurisdiction).

.4 Fire Rating: Fire rating listed and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with ASTM E2074-00 and ASTM E2010-01 ULC Standards CAN4 S-104 and CAN4 S-106 NFPA 257 and UL 9 and UL 10B.

.5 Accessories:

.1 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 square inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.

.2 Glazing Compound: DAP 33 putty.

.3 Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable.

.1 Available Products: Dow Corning 795 - Dow Corning Corp., or Silglaze-II 2800 - General Electric Co., or Spectrem 2 - Tremco Inc., or approved alternate.

.4 Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.

.5 Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

2.3 ACCESSORIES

.1 Setting blocks: EPDM Shore A durometer hardness to ASTM D 2240 as recommended by manufacturer to suit glazing method, glass light weight and area.

.2 Spacer shims: neoprene Shore A durometer hardness to ASTM D 2240, 3” long x one half height of glazing stop x thickness to suit application. Self-adhesive on one face.

.3 Glazing tape:

.1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D 2240; coiled on release paper; 1/4" wide x 1/8” thick size; black colour.

.1 Acceptable product: ‘Polyshim II Tape’, by Tremco.

.4 Glazing splines: resilient polyvinyl chloride, extruded shape to suit glazing channel retaining slot, black colour.

.5 Glazing clips: manufacturer's standard type.

.6 Lock-strip gaskets: to ASTM C 542.

.7 Stainless Steel standoffs: 25mm diameter x 19mm, 316 stainless steel standoff

.1 Finish: brushed stainless steel

.2 Accessories: brushed stainless steel cap

.3 Acceptable Prodcuts: ‘SOB1034BS’ and ‘CAP1BS’ by C.R. Laurence or approved equal.

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 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glazing installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate:

.1 Verify that openings for glazing are correctly sized and within tolerance.

.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.3 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.4 INSTALLATION: EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

.1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, 1/4” below sight line. Seal corners by butting tape and dabbing with sealant.

.3 Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.

.4 Place setting blocks at 1/4 points, with edge block maximum 6” from corners.

.5 Rest glazing on setting blocks and push against tape and heel head of sealant with sufficient pressure to attain full contact at perimeter of light or glass unit.

.6 Install removable stops with spacer strips inserted between glazing and applied stops 1/4” below sight line. Place glazing tape on glazing light or unit with tape 5/8” below sight line.

.7 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 3/8” below sight line.

.8 Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.5 INSTALLATION: INTERIOR - DRY METHOD (TAPE AND TAPE)

.1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, projecting 1/16” above sight line.

.3 Place setting blocks at 1/4 points, with edge block maximum 6” from corners.

.4 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.

.5 Place glazing tape on free perimeter of glazing in same manner described.

.6 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

.7 Knife trim protruding tape.

3.6 INSTALLATION: ONE-WAY MIRRORS

.1 Install one-way mirrors in accordance with adhesive manufacturer's instructions.

.2 Place one-way mirror with reflective coating on the subject’s (observed people) side.

3.7 FIRE PROTECTIVE GLASS

.1 Comply with referenced FGMA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.

.2 Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.

.3 Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.

.4 Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.

.5 Place setting blocks located at quarter points of glass with edge block not more than 6 inches from corners.

.6 Glaze vertically into labeled fire-rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.

.7 Place glazing tape on free perimeter of glazing in same manner described above.

.8 Install removable stop and secure without displacement of tape.

.9 Use specified glazing compound, without adulteration; bed glazing material in glazing compound; entirely fill all recess and spaces. Provide visible glazing compound with smooth and straight edges.

.10 Install so that appropriate UL markings remain permanently visible.

3.8 INSTALLATION: MIRRORS

.1 Set mirrors with adhesive, applied in accordance with adhesive manufacturer's instructions.

.2 Set mirrors with custom frame as indicated. Anchor rigidly to wall construction.

.3 Set in custom frame.

.4 Place plumb and level.

3.9 INSTALLATION: GLAZING FILM

.1 Installation: Install plastic film with adhesive, applied in accordance with film manufacturer's instructions.

.2 Place without air bubbles, creases or visible distortion.

.3 Fit tight to glass perimeter with razor cut edge.

3.10 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.1 Remove traces of primer, caulking.

.2 Remove glazing materials from finish surfaces.

.3 Remove labels.

.4 Clean glass using approved non-abrasive cleaner in accordance with manufacturer's instructions.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.11 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 After installation, mark each light with an "X" by using removable plastic tape or paste.

.1 Do not mark heat absorbing or reflective glass units.

.3 Repair damage to adjacent materials caused by glazing installation.

3.12 SCHEDULE

.1 Exterior Entrance Doors, Sidelights, Windows, Transoms and Curtain Wall, unless otherwise indicated: Insulating Glass Units, glass types as indicated.

.2 Interior Screens and Transoms: glass types as indicated unless otherwise noted.

.3 Labeled Doors and Screens: as indicated on door and screen schedule.

.4 Mirrors: where indicated.

.5 One-way Mirrors:

.1 Install one-way mirrors where indicated on drawings.

.6 Fire Protective Glazing:

.1 Install fire-rated ceramic clear glazing where indicated on drawings.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 The Aluminum Association Inc. (AAI)
- .1 AAI DAF-45-2003, Designation System for Aluminum Finishes - 9th Edition.

.2 Air Movement and Control Association International (AMCA)
- .1 AMCA 500-D-12, Laboratory Methods of Testing Dampers for Rating.
- .2 AMCA 500-L-12, Laboratory Methods of Testing Louvers for Rating.
- .3 AMCA 501-09, Application Manual for Air Louvers.
- .4 AMCA 511-10(Rev.8-13), Certified Ratings Program for Air Control Devices.

.3 American National Standards Institute (ANSI)
- .1 ANSI H35.1/H35.1M-2013, Alloy and Temper Designation Systems for Aluminum.

.4 American Society for Testing and Materials International (ASTM)
- .1 ASTM A 167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM A653/A653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .3 ASTM A 1008/A 1008M-15, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardenable.
- .4 ASTM B 32-08(2014), Standard Specification for Solder Metal.
- .5 ASTM B 209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .6 ASTM B 221-14, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- .7 ASTM B 370-14, Standard Specification for Copper Sheet and Strip for Building Construction.
- .8 ASTM D 523-14, Standard Test Method for Specular Gloss.
- .9 ASTM D 822/D822M-13, Standard Practice for Filtered Open-Flame Carbon-Arc Exposure of Paint and Related Coatings.

.5 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.213-2004, Etch Primer (Pre-treatment Coating of Tie Coat) for Steel and Aluminum.
- .2 CAN/CGSB 93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29–Health and Safety Requirements and manufacturer’s instructions.

.3 Shop Drawings:
- .1 Indicate fabrication and erection details, including anchorage, accessories, and finishes.
- .2 Show frame detail, screening and finish.

.3 Where colour is not indicated, submit manufacturer's standard colours to Consultant for selection.

.4 Samples:
- .1 Submit duplicate samples of each type of louvre and vent showing colour and finish.
- .2 Show frame detail, screening and finish.
- .3 Where colour is not indicated, submit manufacturer's standard colours to Consultant for selection.

.5 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 – Quality Control.
- .1 Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning.

.6 Closeout Submittals:
- .1 Provide operation and maintenance data for manual or motorized operated louvres for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:
- .1 Deliver, store and handle in accordance with Section 01 61 00 – Common Product Requirements.
- .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .3 Deliver materials to the site in undamaged condition.

.2 Storage and Protection:
- .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Protect louvres from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Weather resistant louvres, with bird screens made to withstand a wind load of not less than 1.44 kilopascals.

.2 Wall louvres: complete with AMCA certified ratings program seal for air performance and water penetration in accordance with AMCA 500-D, AMCA 500-L and AMCA 511.

.3 Ratings to indicate water penetration of 0.06 kilograms or less per square metre of free area at free velocity of 244 metres per minute

.4 Galvanized steel sheet: commercial quality to ASTM A 653/A 653M with Z275 zinc coating.

.5 Aluminum sheet: to ASTM B 209 ANSI H35.1/H35.1M, alloy 3003 5005 with temper as required for forming mill finish plain pattern utility sheet.

.6 Aluminium extrusions: to AAI DAF-45 ANSI H35.1/H35.1M, AA 6063-T5, ASTM B 221, alloy 6063 T52.

.7 Stainless steel sheet: to ASTM A 167, Type 304 with brushed finish.

.8 Fasteners: same material as fabricated items.

.9 Gaskets: vinyl.

.10 Primer: to CAN/CGSB-1.213 for aluminum surfaces.

.11 Prefinished steel sheet:

.12 Door louvres: Refer to Division 25

2.2 MECHANICAL ALUMINUM LOUVRES

.1 Exterior Wall Louvres unless otherwise noted (horizontal blades):
- .1 Extruded Aluminum Wall Louvre, stationary, 6063 alloy frame and storm proof drainable blades with sliding interlocking mullions, 2 mm thick x 100 mm deep / 5/64” thick x 4” deep, size to suit condition size and shape as indicated, complete louvre assembly to have 40 - 50 % free vent area.
  - .1 Acceptable material: ‘Model A4097’, by Construction Specialties Inc., or equivalent by K.N. Crowder, E.H. Price, or M.W. McGill, or approved alternate.
  - .2 Finish for all exposed exterior surfaces including blank-off panels.
- .2 Finish for all exposed exterior surfaces including blank-off panels.
  - .1 Kynar 500, 3-coat 70% to AAMA 2605, dry film thickness 2.0 mil based fluoropolymer coating.
- .3 Colour: to match adjacent exterior cladding.

.2 Exterior Wall Louvres for Mechanical Room and Electrical Room (vertical blades):
- .1 Extruded aluminum wall louvre, stationary, size and shape as indicated with combination vertical and horizontal drainable blades with vertical storm-proof blades and interlocking frames, 3 mm thick x 100 mm deep / 1/8” thick x 4” deep, complete louvre assembly to have 40 - 50 % free vent area.
- .2 Curtain wall adapter for integration into new curtain wall. Refer to Section 08 44 13 - Glazed Aluminum Curtain Walls
- .3 Acceptable material: ‘Model ‘RS-4600', by Construction Specialties Inc., or equivalent by K.N. Crowder, E.H. Price, or M.W. McGill, or approved alternate.
- .4 Finish for all exposed exterior surfaces including blank-off panels.
  - .1 Kynar 500, 3-coat 70% to AAMA 2605, dry film thickness 2.0 mil based fluoropolymer coating.
- .5 Colour: to match adjacent exterior cladding.

.3 Aluminum Angles: Design and fabricate aluminum angles in accordance with OBC and manufacturer’s requirements.

.4 Sill extensions: extruded aluminum, depth to suit wall condition, concealed clip anchors, drip deflectors at sill ends.

.5 Insulated Blank-off Panels 3” thick rigid polyisocyanurate board insulation, faced both sides with 20 ga. thick aluminum sheet, perimeter of panel framed with extruded aluminum section, close cell perimeter gasket. Coordinate with Mechanical.

.6 Bird screens: crimped aluminum wire cloth secured to 1/16” thick extruded aluminum frame mitered at corners and secured with corner locks, 1/2" size mesh.

.7 Condensation Gutters: aluminum condensation gutters, broke formed aluminum sheet, full length, of type and size and profile indicated, 16 ga. thick anodized aluminum c/w watertight formed ½" high upstand, chairs and anchoring devices.

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 datasheets.

3.2 INSTALLATION

.1 Install louvres and vents where indicated.

.2 Install in accordance with CAN/CSA-A440.

.3 Arrange components to prevent abrupt variation in colour.

.4 Install wall louvres using jamb fasteners as appropriate for wall construction and in accordance with manufacturer's recommendations.

.5 Install louvres. Do not exceed3 mm in 3.0 m / 1/8" in 10'-0" variation from plumb and level.

.6 Provide deflection heads where indicated and to other locations where deflection is anticipated.

.7 Set adjustable louvre blades for uniform alignment in open and closed positions.

.8 Adjust louvres so moving parts operate smoothly.

.9 Attach bird insect screen to inside face of louvre or vent.

.10 Install insulated blank-off panels at unused portions of louvres.

.11 Repair damage to louvres and vents to match original finish.

3.3 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.4 PROTECTION

.1 Where aluminum contacts metal other than zinc, paint dissimilar metal with primer and two coats of aluminum paint.

.2 Paint metal in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

.3 Paint wood or other absorptive materials that may become repeatedly wet and in contact with metal with two coats of aluminum paint or coat of heavy-bodied bituminous paint.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Aluminum Association (AA):
- .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 ASTM International:
- .1 ASTM C475/C475M-15, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- .2 ASTM C 514-04(2014), Standard Specification for Nails for the Application of Gypsum Board.
- .3 ASTM C 557-03(2009) e1, Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
- .4 ASTM C 840-13, Standard Specification for Application and Finishing of Gypsum Board.
- .5 ASTM C 954-15, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
- .6 ASTM C 1002-14, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- .7 ASTM C 1047-11, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- .8 ASTM C 1280-13a, Standard Specification for Application of Gypsum Sheathing.
- .9 ASTM C 1177/C 1177M-13, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- .10 ASTM C 1178/C 1178M-13, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Board.
- .11 ASTM C 1396/C 1396M-14a, Standard Specification for Gypsum Wallboard.

.3 Association of the Wall and Ceilings Industries International (AWCI):
- .1 AWCI Levels of Gypsum Board Finish-97.

.4 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .2 CAN/CGSB-71.25-M88, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.

.5 Underwriters' Laboratories of Canada (ULC):
- .1 CAN/ULC-S102-10, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum board assemblies 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 Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store gypsum board assemblies materials level off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.

.3 Protect from weather, elements and damage from construction operations.

.4 Handle gypsum boards to prevent damage to edges, ends or surfaces.

.5 Protect prefinished aluminum surfaces with wrapping or strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

.6 Replace defective or damaged materials with new.

1.4 AMBIENT CONDITIONS

.1 Maintain temperature 10°C minimum, 21°C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.

.2 Apply board and joint treatment to dry, frost free surfaces.

.3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

1.5 QUALITY CONTROL

.1 Mock-up:

.1 Construct mock-up in accordance with Section 01 45 00 – Quality Control.

.2 Construct one room, as directed by Consultant.

.3 Room to be complete with all doors, ceilings, and finishes that impact the acoustic performance of the space.

.4 Mock-up may be part of finished work.

.5 Allow 48 hours for review of mock-up by Consultant.

.6 Perform acoustic testing specified.

.7 When accepted, mock-up with demonstrated minimum standard of quality required for this work.

.2 Acoustic Testing

.1 Prior to issuance of substantial performance, noise insulation measurements shall be taken of the following:

.1 Mock-up room.

.2 Four test locations as directed by Consultant, after completed installation of mechanical and electrical work but prior to mechanical and electrical system commissioning.

.3 Four test locations as directed by Consultant, after completed commissioning of mechanical and electrical work.

.2 The purpose of the test is to verify that the partition construction will meet the noise insulation requirements for the project.

.3 Measurements shall be taken in accordance to ASTM E336-17.

.4 A full report in accordance to ASTM E336 is not required, however, at a minimum, the following shall be reported:
- .1 Source and Receiver room dimensions
- .2 Description and photos of the test setup, test specimen, source and receiver rooms.
- .3 Receiver room reverberation time and background sound in one-third octave bands from 125 Hz to 4 kHz
- .4 Apparent Transmission Loss (ATL) in one-third octave bands from 125 Hz to 4 kHz
- .5 Apparent Sound Transmission Class (ASTC) rating.

.5 To confirm compliance with the intent of the partition design, the measured ASTC rating shall not be more than 5 dB below the partition composite STC rating.

.6 Any notable flanking paths shall be noted in the test report, and suggestions for potential remediation measures provided.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Standard Board: to ASTM C36/C1396 and CAN/CSA-A82.27 regular and Type X, thickness as indicated, 4'-0" wide x maximum practical length, ends square cut, edges rounded and bevelled.
- .1 Acceptable products:
  - .1 'Sheetrock Brand Gypsum Panels' by CGC.
  - .2 'ProRoc by CertainTeed Gypsum, Inc.
  - .3 'Tough Rock Fireguard Gypsum Board', by Georgia-Pacific.
  - .4 'Firecheck' by Lafarge Canada Inc.
  - .5 Or approved alternate.

.2 Water/Mold Resistant Board: to ASTM C1396, ASTM D3273 and CAN/CSA-A82.27, moisture and mold resistant board, thickness as indicated Type X,1200 mm / 4'-0" wide x maximum practical length.
- .1 Acceptable products:
  - .1 'Mold Tough Interior Panel' by CGC.
  - .2 'M2Tech Moisture and Mold Resistant Gypsum Board' by CertainTeed Gypsum, Inc.
  - .3 'Tough Rock Mold-Guard Gypsum Board', by Georgia-Pacific.
  - .4 'Fire Watercheck' by Lafarge Canada Inc.
  - .5 Or approved alternate.

.3 Cement Board: moisture and mold resistant to ASTM D3273, thickness ad indicated, 36" x 60".
- .1 Acceptable products:
  - .1 'Durock Next Gen Cement Board' by CGC.
  - .2 'Fiber Cement Underlayment/Backer Board' by CertainTeed Gypsum, Inc.
  - .3 'Durock Cement Board Next Gen' by USG.
  - .4 Or approved alternate.

.4 Tile Backer Board: moisture and mold resistant, fully embedded glass mat gypsum tile backer to , ASTM D3273 , ASTM C1278., 15.9 mm / 5/8" thick Type X, 1200 mm / 4'-0" wide x maximum practical length.

.1 Acceptable products:

.1 'Fiberrock Acua-Tough Tile Backerboard' by CGC.

.2 'Diamondback GlasRoc Tile Backer' by CertainTeed Gypsum, Inc.

.3 'DensShield Tile Backer', by Georgia-Pacific.

.4 Or approved alternate.

.5 Abuse Board: abuse resistant gypsum panels, to ASTM C 1396, and CAN/CSA-A82.27, thickness as indicated, Type X.

.1 Acceptable products:

.1 'Sheetrock Abuse-Resistant Gypsum Panels' by CGC.

.2 'ProRoc Abuse Resistant Gypsum Board' by CertainTeed Gypsum, Inc.

.3 Sheetrock Brand Abuse-Resistant Gypsum Panels by USG.

.4 'Tough Rock Fireguard Abuse Board', by Georgia-Pacific.

.5 'Protecta AR 100' by Lafarge Canada Inc.

.6 Or approved alternate.

.6 Exterior Sheathing (Fiberglass Faced Gypsum Board): to ASTM C1177 regular and Type X, thickness as indicated, 1220 mm / 4'-0" wide x maximum practical length.

.1 Acceptable products:

.1 'Securock Glass-Mat Sheathing', by CGC.

.2 'Glasroc Sheathing by CertainTeed Gypsum, Inc.

.3 'Dens-Glass Sheathing', by Georgia Pacific.

.4 'Firecheck Sheathing' by Lafarge Canada Inc.

.5 Or approved alternate.

.7 Gypsum Liner Board: Gypsum board meeting fire rating requirements indicated, labeled by ULC.

.1 Acceptable products:

.1 'Sheetrock' by CGC.

.2 'Shaft Liner Type X' by Certainteed.

.3 'Densglass Shafliner' by Georgia Pacific.

.4 'Firecheck Shaftliner' by Lafarge Canada Inc.

.5 Or approved alternate

.8 Metal Furring Runners, Hangers, Tie Wires, Inserts, Anchors: to CSA A82.30-M1980.

.9 Drywall Furring Channels: hat shaped, zinc-coated by hot-dip process 25 ga. base thickness, 7/8" x 2 3/4" x 25 ga. core thickness galvanized steel channels for screw attachment of gypsum board.

.1 Acceptable Product: 'D-1001 Drywall Furring Channels' by Bailey Metal Products Limited, or approved alternate.

.10 Resilient Channels Clips Drywall Furring: 1/2" x 2 1/4" x 25 ga. base steel thickness galvanized steel for resilient attachment of gypsum board.

.1 Acceptable product: 'RC Plus' by Bailey Metal Products Limited, or approved alternate.

.11 Reveal Moldings: 13 mm reveal, depth to suit application

.1 Type 1: 13 mm reveal, depth to suit application

.1 Acceptable product: "Z Reveal" by Fry Reglet or approved equal.

.2 Type 2: 13 mm reveal, depth to suit application

.1 Acceptable product: "Reveal" by Fry Reglet or approved equal.

.12 Acoustic Trim: acoustic isolation trim at both sides of gypsum board assemblies at connection to exterior window mullions:

.1 Acceptable product: “Mull-It Over” by Mull-It Over Products.

.13 Steel Drill Screws: to ASTM C 1002.

.14 Stud Adhesive: to CAN/CGSB-71.25 ASTM C 557.

.15 Casing Beads, Corner Beads, J Beads, Control Joints and Edge Trim: to ASTM C 1047, fill type only (non-fill type will not be accepted), 25 ga. base thickness, perforated flanges, one piece length per location.

.16 Special Beads, Trims and Profiles: to provide reveals as indicated, fill type only (non-fill type will not be accepted), 0.5 mm / 25 ga. base thickness commercial grade sheet steel with Z275 zinc finish to ASTM A653/A653M, perforated flanges; one piece length per location.

.17 Sealants: in accordance with Section 07 92 00 - Joint Sealants Acoustic sealant: in accordance with Section 07 92 00 - Joint Sealants.

.18 Polyethylene Dust Barrier: to CAN/CGSB-51.34, Type 2, 0.10 mm / 10 mil thick.

.19 Insulating Strip: rubberized, moisture resistant, 3mm /1/8” thick closed cell neoprene strip,12mm / 1/2" wide, with self-sticking permanent adhesive on one face, lengths as required.

.20 Joint Reinforcement for Water Resistant Board and Tile Backer Board: glass-fiber mesh tape, alkali-resistant self-adhering glass-fibre tape, 50 mm / 2” wide, 10 by 10 or 10 by 20 threads/inch.

.21 Joint Compound: to ASTM C 475, asbestos-free. acceptable products:

.1 Interior use, all locations unless otherwise noted: ‘All Purpose Joint Compound’, by CGC, or ‘ProRoc All Purpose Joint Compound’ by CertainTeed, or ‘Rapid Coat’ by Lafarge Canada Inc., or approved alternate.

.2 Interior use, all locations to receive Water / Mold Resistant Board: ‘Mold Resistant Lite All-Purpose Joint Compound’ by CertainTeed, or approved alternate.

.3 Interior use, all locations to receive abuse board or cement board: ‘Durabond 90’, by CGC, or ‘ProRoc Moisture and Mold Resistant 90’ by CertainTeed, or ‘Rapid Coat 90’ by Lafarge Canada Inc., or approved alternate.

.4 Exterior use: ‘Durabond 90’, by CGC, or ‘ProRoc Moisture and Mold Resistant 90’ by CertainTeed, or ‘Rapid Coat 90’ by Lafarge Canada Inc., or approved alternate.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for gypsum board assemblies’ installation in accordance with manufacturer's written instructions.

.1 Examine work of other trades that gypsum board assemblies will be applied, for conformity to drawings. Visually inspect substrate.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 ERECTION

.1 Do application and finishing of gypsum board to ASTM C 840 except where specified otherwise.

.2 Do application of gypsum sheathing to ASTM C 1280.

.3 Erect hangers and runner channels for suspended gypsum board ceilings to ASTM C 840 except where specified otherwise.

.4 Support light fixtures by providing additional ceiling suspension hangers within 6” of each corner and at maximum 2’-0” around perimeter of fixture.

.5 Install work level to tolerance of 1:1200.

.6 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.

.7 Install22 mm x 64 mm / 7/8" x 2 1/2" drywall furring channels parallel to, and at exact locations of steel stud partition header track.

.8 Install drywall resilient channels parallel to, and at exact locations of steel stud partition header track.

.9 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.

.10 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

.11 Install wall furring for gypsum board wall finishes to ASTM C 840, except where specified otherwise.

.12 Furr openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.13 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

.14 Erect drywall resilient furring transversely across studs or joists between the layers of gypsum board, spaced maximum 610mm /2’-0” on centre and not more than 150mm /6” from ceiling/wall juncture. Secure to each support with 11 mm / 7/16” pan framing screws.

.15 Install 150mm /6” continuous strip of12.7mm / 1/2" gypsum board along base of partitions where resilient furring installed.

3.3 APPLICATION

.1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work has been approved.

.2 At metal deck locations where gypsum board assemblies are identified to be installed to underside of structure, scribe top of gypsum board to fit tightly into metal deck profile.

.3 Apply single or double layer gypsum board to metal furring or framing using screw fasteners for first layer, screw fasteners for second layer. Maximum spacing of screws 300 mm / 12” on centre.

- .1 Single-layer application:
  - .1 Apply gypsum board on ceilings prior to application of walls to ASTM C 840.
  - .2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.

.2 Double-layer application:
.1 Install gypsum board for base layer and exposed gypsum board for face layer.
.2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250mm10”.
.3 Apply base layers at right angles to supports unless otherwise indicated.

.4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 10” with base layer joints. Apply single layer gypsum board to concrete block surfaces, where indicated, using laminating adhesive.
.1 Comply with gypsum board manufacturer's recommendations.
.2 Brace or fasten gypsum board until fastening adhesive has set.
.3 Mechanically fasten gypsum board at top and bottom of each sheet.

.5 Exterior Soffits and Ceilings: install Gypsum Sheathing perpendicular to supports; stagger end joints over supports. Install with 1/4” gap where boards abut other work.

.6 Standard Board: to all locations unless otherwise noted.

.7 Apply Tile Backer Board to all walls identified to receive ceramic tile. Apply water resistant sealant to edges, ends, cut outs which expose gypsum core and to fastener heads. Do not apply joint treatment on areas to receive tile finish.

.8 Apply Abuse Board to all walls where indicated from floor level to top of all door frames with Standard Board above, using screw fasteners at maximum spacing of 305 mm / 12” o/c.

.9 Apply water/mold resistant gypsum board in washrooms, kitchens, janitors closets, where adjacent to slop sinks, at all window head and jamb returns and where indicated. Apply water-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads.

.10 Apply12mm / 1/2" diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts, in partitions where perimeter sealed with acoustic sealant.

.11 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250mm / 10”.

.12 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.

.13 Install gypsum board with face side out.

.14 Do not install damaged or damp boards.

.15 Locate edge or end joints over continuous supports. Stagger vertical joints over different studs on opposite sides of wall.

.16 Install Exterior Sheathing to receive air/vapour sound and free of sharp protrusions, gaps, and voids exceeding 3/4" in width. Use repair materials and methods acceptable to air/vapour barrier membrane manufacturer. For voids that exceed 13 mm / 1/2" in width refer also Sections 07 26 70 Vapour Retarders, 07 27 70 Air Barriers and 07 28 70 Air/Vapour Barrier for void coverings.
.1 Provide metal framing backing as required to accept air/vapour barrier void coverings.

3.4 INSTALLATION

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150mm / 6” on centre and/or using contact adhesive for full length as indicated.

.2 Install fill type casing beads around perimeter of suspended ceilings.

.3 Install fill type casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.5 Install shadow mould at gypsum board/ceiling juncture as indicated. Minimize joints; use corner pieces and splicers.

.6 Construct control joints of preformed units two back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint.

.7 Provide continuous polyethylene dust barrier behind and across control joints.

.8 Locate control joints at approximate 30’-0” spacing on long corridor runs and at approximate 50’ spacing on ceilings to Consultant approval.

.9 Install control joints straight and true.

.10 Splice corners and intersections together and secure to each member with 3 screws.

.11 Install access doors to electrical and mechanical fixtures specified in respective sections.
- .1 Rigidly secure frames to furring or framing systems.

.12 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.13 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with AWCI Levels of Gypsum Board Finish:
- .1 Levels of finish:
  - .1 Level 1: embed tape for joints and interior angles in joint compound. Surfaces to be free of excess joint compound; tool marks and ridges are acceptable.
    - .1 Provide Level 1 finish for plenum areas above ceilings, in attics or in areas where the assembly will be concealed.
  - .2 Level 2: embed tape for joints and interior angles in joint compound and apply one separate coat of joint compound over joints, angles, fastener heads and accessories; surfaces free of excess joint compound; tool marks and ridges are acceptable.
    - .1 Provide Level 2 finish for water resistant gypsum backing board is used as a substrate for tile, and at fire separations in concealed spaces such as above finished ceilings.
  - .3 Level 3: N/A.
  - .4 Level 4: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.
    - .1 Provide Level 4 finish for light textures or wall coverings are to be applied.

.5 Level 5: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; apply a thin skim coat of joint compound to entire surface; surfaces smooth and free of tool marks and ridges.
.1 Provide Level 5 finish for all locations unless otherwise indicated.

.14 Apply skim coat of joint compound as follows:
.1 Mix joint compound for skim coating slightly thinner than for joint taping.
.2 Apply thin skim coat to provide a light, thin coating of joint compound to entire surface using trowel or drywall broad knife to fill surface texture differences, variations or tool marks to following locations:
.1 Walls scheduled to receive gloss, semi-gloss or eggshell paints.
.2 On long walls with side lighting where differences in texture between finished sanded compound and gypsum board surface would be noticeable.
.3 All abuse board scheduled to be painted.
.3 Allow skim coat to dry completely.
.4 Remove ridges by light sanding or wiping with damp cloth.

.15 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.16 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.

.17 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.18 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

.19 Apply one coat of white primer sealer over surface to be textured. When dry apply textured finish in accordance with manufacturer's instructions.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
.1 Leave Work area clean at end of each day.
.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by gypsum board assemblies' installation.

3.7 SCHEDULES

.1 Construct fire rated assemblies to ULC design numbers where indicated. In case of conflict between the provisions of the tested assembly and the assembly noted in the contract documents, the more stringent provisions shall apply.

.2 Install the following gypsum board types to the following locations:

- .1 Standard Board: to all locations unless otherwise noted.
- .2 Water/Mold Resistant Board: to all gypsum board assembly wall types in washrooms and all window head and jamb returns.
- .3 Tile Backer Board: to all gypsum board assembly wall types to receive ceramic tile.
- .4 Cement board: where indicated.
- .5 Abuse resistant gypsum: waiting areas.

.3 Exterior grade gypsum sheathing unless noted otherwise

.4 All other materials as indicated on drawings.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
- .1 ASTM C 645-14, Specification for Nonstructural Steel Framing Members.
- .2 ASTM C 754-15, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.3 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - current edition.
  - .1 MPI #26, Primer, Galvanized Metal, Cementitious.

1.2 REGULATORY REQUIREMENTS

.1 Where fire resistant ratings are specified for Work of this section, carry out Work in strict accordance with fire test report data as per manufacturers written recommendations for ULC tested procedures. Work shall include, but is not limited to, fire separations, infill panels for Work of other sections with a fire resistance rating, backing for equipment located in a fire separation, shaft walls and shaft wall construction where indicated.

.2 Prior to proceeding with Work, submit to the Consultant, product data and application requirements for ULC tested systems for all shaft wall construction for vertical and horizontal applications.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for metal framing and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Acoustic Testing:
- .1 Refer to Section 09 21 16 Gypsum Board Assemblies.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect metal framing from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Non-Load Bearing Channel Stud Framing: to ASTM C 645, stud size as indicated, roll formed, hot dipped galvanized steel sheet, for screw attachment of gypsum board. Knock-out service holes at 460mm /18” centres. Provide roll formed minimum gauge thickness for wall types as follows:
- .1 25 gauge for all board types in non-loadbearing walls unless otherwise indicated.
- .2 20 gauge for all non-loadbearing walls identified with a fire resistance rating.
- .3 20 gauge for all non-loadbearing walls identified to receive Abuse Board or Cement Board.

.2 Floor and Ceiling Tracks: to ASTM C 645, in widths to suit stud sizes, 1 1/4" flange height.

.3 Deflection Ceiling Track: purpose made with 2 ½” leg x width to suit stud depth, pre-punched 1 1/2" long slots spaced at 1” o/c.
- .1 Acceptable product: ‘Multi-slot MST 250’ by Bailey Metal Products Limited, or approved alternate.

.4 Metal Channel Stiffener: Size to suit, 1/16” thick cold rolled steel, coated with rust inhibitive coating.

.5 Acoustical Sealant: In accordance with Section 07 92 00 – Joint Sealing.

.6 Insulating Strip: rubberized, moisture resistant 3 mm / 16 ga. thick closed cell neoprene strip,12 mm / 1/2" wide, with self-sticking adhesive on one face, lengths as required.

.7 Acoustic insulating gasket: rubberized, moisture resistant 6 mm. thick closed cell neoprene strip, width to suit stud, with self-sticking adhesive on one face, lengths as required.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for non-structural metal framing application in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 ERECTION

.1 Refer to Section 05 41 00 – Structural Metal Stud Framing, for all exterior wall framing.

.2 Align partition tracks at floor and ceiling and secure at 610mm / 24” on centre maximum.

.3 Install damp proof course under stud shoe tracks of partitions on slabs on grade.

.4 Install acoustic isolation gasket under stud shoe and top track of interior partitions.

.5 Place studs vertically at 600mm / 24” on centre and not more than 50mm/2” from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.

.6 Erect metal studding to tolerance of 1:1000.

.7 Attach studs to bottom and ceiling track using screws.

.1 Where walls are to accommodate deflection, erect studs using purpose made deflection ceiling tracks.

.8 Coordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.9 Coordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.10 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified.

.1 Secure studs together,50mm / 2” apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.11 Install heavy gauge single jamb studs at openings.

.12 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.

.13 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.14 Provide40mm / 1 5/8” stud or furring channel secured between studs as required to accommodate wood blocking for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions. Coordinate with Section 06 08 99 Rough Carpentry.

.15 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.16 Extend partitions to ceiling height except where noted otherwise on drawings.

.17 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.

.1 Use 2 1/2" leg purpose made deflection ceiling tracks as specified.

.18 Install continuous insulating strips to isolate studs from uninsulated surfaces.

.19 Install two continuous beads of acoustical sealant continuous insulating strip under studs and tracks around perimeter of sound control partitions.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by non-structural metal framing application.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American National Standards Institute (ANSI)/Ceramic Tile Institute (CTI):
- .1 ANSI A108.1-99, Specification for the Installation of Ceramic Tile (Includes ANSI A108.1A-C, 108.4-.13, A118.1-.10, ANSI A136.1).
- .2 CTI A118.3-92, Specification for Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive (included in ANSI A108.1).
- .3 CTI A118.4-92, Specification for Latex Cement Mortar (included in ANSI A108.1).
- .4 CTI A118.5-92, Specification for Chemical Resistant Furan Resin Mortars and Grouts for Tile Installation (included in ANSI A108.1).
- .5 CTI A118.6-92, Specification for Ceramic Tile Grouts (included in ANSI A108.1).

.2 American Society for Testing and Materials International (ASTM):
- .1 ASTM C 144-11, Specification for Aggregate for Masonry Mortar.
- .2 ASTM C 207-06(2011), Specification for Hydrated Lime for Masonry Purposes.
- .3 ASTM C 847-14a, Specification for Metal Lath.
- .4 ASTM C979/C979M-10, Specification for Pigments for Integrally Coloured Concrete.

.3 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB-51.34-M86 (R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .2 CGSB 71-GP-22M-78, Adhesive, Organic, for Installation of Ceramic Wall Tile.
- .3 CAN/CGSB-75.1-M88, Tile, Ceramic.
- .4 CAN/CGSB-25.20-95, Surface Sealer for Floors.

.4 Canadian Standards Association (CSA International):
- .1 CSA A123.3-05(R2015), Asphalt Saturated Organic Roofing Felt.
- .2 CAN/CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.5 Terrazzo Tile and Marble Association of Canada (TTMAC):
- .1 Tile Specification Guide 09 30 00 2006/2007, Tile Installation Manual.
- .2 Tile Maintenance Guide 2000.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Include manufacturer's information on:
  - .1 Ceramic tile, marked to show each type, size, and shape required.
  - .2 Chemical resistant mortar and grout (Epoxy and Furan).
  - .3 Cementitious backer unit.
  - .4 Dry-set cement mortar and grout.
  - .5 Divider strip.
  - .6 Elastomeric membrane and bond coat.
  - .7 Reinforcing tape.

.8 Levelling compound.
.9 Latex cement mortar and grout.
.10 Commercial cement grout.
.11 Organic adhesive.
.12 Slip resistant tile.
.13 Waterproofing isolation membrane.
.14 Fasteners.

.3 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
.1 Base tile: submit x 12” sample of each colour, texture, size, and pattern of tile.
.2 Floor tile: submit full tile sample panels of each colour, texture, size, and pattern of tile.
.3 Wall tile: submit full tile sample of each colour, texture, size and pattern of tile.
.4 Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, colour, and size.
.5 Adhere tile samples to 7/16” thick plywood and grout joints to represent project installation.

1.3 QUALITY ASSURANCE

.1 Quality Assurance Submittals:
.1 Manufacturer's Instructions: manufacturer's installation instructions.
.2 Tile installer shall have a minimum of 10 years experience and be a member in good standing with the TTMAC and the TTMGO.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Packing, Shipping, Handling, and Unloading:
.1 Deliver, store, and handle materials in accordance with Section 01 61 00 -Common Product Requirements.

1.5 AMBIENT CONDITIONS

.1 Maintain air temperature and structural base temperature at ceramic tile installation area above 12°C for 48 hours before, during, and 48 hours after, installation.

.2 Do not install tiles at temperatures less than 12°C or above 38°C.

.3 Do not apply epoxy mortar and grouts at temperatures below 15°C or above 25°C.

1.6 MAINTENANCE

.1 Extra Materials:
.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
.2 Provide minimum 2% of each type and colour of tile required for project for maintenance use. Store where directed.
.3 Maintenance material same production run as installed material.

PART 2 - PRODUCTS

2.1 FLOOR TILE

.1 Porcelain Floor Tile (CFT):
- .1 Acceptable product: 'Brit Stone' by Coem, supplied by Centura Tile.
- .2 Size: 24" x 48".
- .3 Colour: 'Ivory'.
- .4 Installation: stacked.

2.2 WALL TILE

.1 Porcelain/Ceramic Wall Tile (CWT):
- .1 Type 1 (CWT-1):
  - .1 Acceptable product: 'Verve' by Centura Tile.
  - .2 Size: 10" x 12" herringbone mosaic.
  - .3 Colour: 'Silver'.
  - .4 Installation: chevron.
- .2 Type 2 (CWT-2):
  - .1 Acceptable product: 'Penny Round' by Centura Tile.
  - .2 Size: 12" x 12" mosaic.
  - .3 Colour: 'White Glossy'.
  - .4 Installation: stacked.
- .3 Type 3 (CWT-3):
  - .1 Acceptable product: 'Vision' by Centura Tile.
  - .2 Size: 4" x 12".
  - .3 Colour: 'Glossy White'.
  - .4 Installation: stack bond.

2.3 BASE TILE

.1 Ceramic Base Tile (CBT):
- .1 4" cut tile from same tile as adjacent floor tile.

2.4 TRIM SHAPES

.1 Corner Joint: clear satin anodized aluminum, profile for inside corners, and at floor and wall transitions, coved-shaped capable of absorbing movement, c/w corner, end cap adaptors, and all accessories for complete system.
- .1 Acceptable product: for floor/wall transitions and for inside wall corners, c/w corner and end cap adaptors, 'DILEX-AHK', by Schluter, or approved alternate.

.2 Transition Trim: purpose made metal extrusion; satin aluminum beads and trims at all outside corners, floor, wall and floor base transitions, and edge protection.
- .1 At locations where ceramic floor tile meets adjacent floor finishes.
  - .1 Acceptable product: 'Satin anodized aluminum Schlüter – Schiene', by Schlüter or approved alternate.

.2 At locations where ceramic floor tile is not flush with the adjacent floor finishes.
  .1 Acceptable product: 'Satin anodized aluminum Schlüter – Renu-U or Reno-V', by Schlüter or approved alternate.
.3 At all outside corner locations, terminating exposed tile edges and above all ceramic floor tile bases.
  .1 Acceptable product: 'Anodized aluminum Schlüter – Jolly', by Schlüter or approved alternate.

2.5 TILE UNDERLAYMENT

.1 Tile Underlayment (Waterproof Membrane): 0.508 mm / 20-mil thick, sheet applied or liquid applied polyethylene waterproof membrane and vapour retarder for tiled floors, walls and ceilings, anchoring fleece laminated to both sides, water vapor permeance of 0.18 perms, as listed by cUPC and evaluated by ICC-ES.
  .1 Accessories: as required for a complete system as recommended by manufacturer to provide waterproof membrane including but not limited to preformed seamless inside / outside corners, seamless corners for waterproofing floor / wall / ceiling / shower base connections, prefabricated sections with overmolded rubber gaskets to seal pipe protrusions through the waterproofing membrane (e.g., at showerheads and faucets) and protect moisture-sensitive backing panels at the mixing valve.
    .1 Acceptable product: 'Kerdi', by Schlüter, 'Hyrdo-ban' by Laticrete or approved alternate.

.2 Tile Underlayment (Acoustic Membrane):
  .1 Accessories: as required for a complete system as recommended by the manufacturer.
    .1 Acceptable product: "QuietDown High Bond" by Symar as distributed by KN Rubber
    .2 Company, or approved alternate.

2.6 MORTAR AND ADHESIVE MATERIALS

.1 Cement: to CAN/CSA-A3000.

.2 Sand:
  .1 To ASTM C 144.
  .2 Crushed or pit run consisting of hard durable particles free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
  .3 Gradations to be within limits specified when tested to ASTM C136. Sieve sizes to CAN/CGSB 8.1.
  .4 Table:

Sieve Designation	% Passing
4.75 mm / # 4	100
2.36 mm / # 8	95 - 100
1.18 mm / # 16	60 - 100
0.600 mm / # 30	35 - 80
0.300 mm / # 50	15 - 50
0.150 mm / # 100	2 - 15
0.075 mm / # 200	0 - 5

.3 Hydrated lime: to ASTM C207.

.4 Latex additive: formulated for use in cement mortar.

.5 Water: potable and free of minerals which are detrimental to mortar and grout mixes.

.6 Dry set mortar:
- .1 To ANSI A108.1
- .2 Water retentive cement mortar.

.7 Elastomeric adhesive: to CGSB 71 GP 29M.

.8 Epoxy adhesive: to CGSB 71 GP 30M, Type 1.

.9 Modified mortar adhesive: to CGSB 71 GP 30M, Type 2.

.10 Furan resin mortar to ANSI/CTI A108.1.

.11 Colour pigment: non fading mineral oxides, unaffected by lime or cement and which will not stain tile.

2.7 BOND COAT

.1 Floor and wall tile: to ANSI A118.4 and A118.11, polymer-modified, sag-resistant mortar having the following physical characteristics:
- .1 28 Day Shear Strength for impervious ceramic tile (porcelain) mosaics: 2.59 to 3.45 MPa.
- .2 Acceptable product: ‘56SR’, by Flextile Ltd., or equivalent by Mapei, or equivalent by Latacrete, or approved alternate.

2.8 WALL GROUT

.1 Colouring Pigments:
- .1 Pure mineral pigments, limeproof and nonfading, complying with ASTM C 979.
- .2 Colouring pigments to be added to grout by manufacturer.
- .3 Job coloured grout are not acceptable.
- .4 Use in Commercial Cement Grout, Dry-Set Grout, and Latex Cement Grout.
- .5 Colour: not more than one (1) colour as later selected by Consultant from manufacturer’s standard colour range.

.2 Epoxy Grout: 100% solids epoxy grout, stain resistant, crack and shrink resistant, mold and mildew resistant, to ANSI A118.3, not more than three (3) colours as later selected by Consultant.
- .1 Initial Cure: 24 hours.
- .2 Final Cure: 7 days.
- .3 Tensile Strength: 8.4 MPa.
- .4 Compressive Strength: 60.0 MPa.
- .5 Thermal Shock: 3.9 MPa.
- .6 Shore D Hardness (24hr.): 85.
- .7 Linear Shrinkage: 0%.
- .8 Specific Gravity (paste): 1.40.
- .9 Acceptable product: ‘Flex-Epoxy 100’ by Flextile, or equivalent by Mapei, or Latacrete, or approved alternate.

2.9 FLOOR GROUT

.1 Epoxy Grout: 100% solids epoxy grout, stain resistant, crack and shrink resistant, mold and mildew resistant, to ANSI A118.3, not more than one (1) colour as later selected by Consultant, having the following characteristics:

- .1 Final Cure: 7 days.
- .2 Tensile Strength: 8.4 MPa.
- .3 Compressive Strength: 60.0 MPa.
- .4 Thermal Shock: 3.9 MPa.
- .5 Shore D Hardness (24hr.): 85.
- .6 Linear Shrinkage: 0%.
- .7 Specific Gravity (paste): 1.40.
- .8 Acceptable product: 'Flex-Epoxy 100' by Flextile, or equivalent by Mapei, or Latacrete, or approved alternate.

2.10 ACCESSORIES

.1 Reinforcing Mesh: 2" x 2" x 1/16" x 1/16" galvanized steel wire mesh, welded fabric design, in flat sheets.

.2 Sealant: in accordance with Section 07 92 00 - Joint Sealants.

.3 Floor Sealer and Protective Coating: for intended use to tile and grout manufacturer's recommendations.

2.11 MIXES

.1 Cement:

- .1 Scratch coat: 1 part cement, 1/5 to 1/2 parts hydrated lime to suit job conditions, 4 parts sand, 1 part water, and latex additive where required. Adjust water volume depending on water content of sand.
- .2 Slurry bond coat: cement and water mixed to creamy paste. Latex additive may be included.
- .3 Mortar bed for floors: 1 part cement, 4 parts sand, 1 part water. Adjust water volume depending on water content of sand. Latex additive may be included.
- .4 Mortar bed for walls and ceilings: 1 part cement, 1/5 to 1/2 parts hydrated lime to suit job conditions, 4 parts sand and 1 part water. Adjust water volume depending on water content of sand. Latex additive may be included.
- .5 Levelling coat: 1 part cement, 4 parts sand, minimum 1/10 part latex additive, 1 part water including latex additive.
- .6 Bond or setting coat: 1 part cement, 1/3 part hydrated lime, 1 part water.
- .7 Measure mortar ingredients by volume.

.2 Mix bond and levelling coats, and grout to manufacturer's instructions.

.3 Adjust water volumes to suit water content of sand.

2.12 PATCHING AND LEVELLING COMPOUND

.1 Cement base, acrylic polymer compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.

.2 Have not less than the following physical properties:
- .1 Compressive strength - 25 MPa.
- .2 Tensile strength - 7 MPa.
- .3 Flexural strength - 7 MPa.
- .4 Density - 1.9.

.3 Capable of being applied in layers up to 2”, being brought to feather edge, and being trowelled to smooth finish.

.4 Ready for use in forty-eight (48) hours after application.

2.13 CLEANING COMPOUNDS

.1 Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.

.2 Materials containing acid or caustic material are not acceptable.

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 datasheets.

3.2 WORKMANSHIP

.1 Do tile work in accordance with TTMAC Tile Installation Manual 2006/2007, "Ceramic Tile", except where specified otherwise.

.2 Tile Underlayment (Waterproof Membrane): Install tile underlayment at all floor tile locations.
- .1 Prepare substrate as per manufacturer’s recommendations.
- .2 Install all products as per manufacturer’s standard installation instructions.
- .3 Apply membrane in two coats. Apply first coat to minimum thickness of 25 mils wet. Apply second coat 25 mils wet film thickness to achieve total combined thickness of 50 mils wet, curing to dry film thickness of 30 mils.

.3 Tile Underlayment (Acoustic Membrane): Install tile underlayment at second floor Lounge 217.
- .1 Prepare substrate as per manufacturer’s recommendations.
- .2 Install all products as per manufacturer’s standard installation instructions.

.4 Apply tile to clean and sound surfaces.

.5 Fit tile around corners, fitments, fixtures, drains and other built-in objects. Maintain uniform joint appearance. Cut edges smooth and even. Do not split tiles.

.6 Maximum surface tolerance 1:800.

.7 Make joints between tile uniform and approximately 1/16” wide, plumb, straight, true, even and flush with adjacent tile. Ensure sheet layout not visible after installation. Align patterns.

.8 Lay out tiles as indicated on drawings.

.9 Sound tiles after setting and replace hollow-sounding units to obtain full bond.

.10 Make internal angles square, external angles rounded.

.11 Use round edged tiles at termination of wall tile panels, except where panel abuts projecting surface or differing plane.

.12 Install divider strips at junction of tile flooring and dissimilar materials.

.13 Allow minimum twenty-four (24) hours after installation of tiles, before grouting.

.14 Clean installed tile surfaces after installation and grouting cured.

.15 Control Joints:

.1 Make control joints at 25’ in each direction and at abutting dissimilar materials. Make joint width same as tile joints. Fill control joints with sealant in accordance with Section 07 92 00 - Joint Sealants.

.2 Install control joints as recommended by material manufacturer. Set control joints slightly lower than finish tile surface.

3.3 FLOOR AND WALL TILE

.1 Do tile work in accordance with Installation Manual 200, "Ceramic Tile", produced by Terrazzo Tile and Marble Association of Canada (TTMAC), except where specified otherwise.

3.4 FLOOR SEALER AND PROTECTIVE COATING

.1 Apply in accordance with manufacturer's instructions.

3.5 FIELD QUALITY CONTROL

.1 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.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

.1 Clean flooring, wall and base surfaces to manufacturer's printed instructions.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes:
- .1 Materials and application of acoustical units for direct application or for application and installation within a suspended ceiling.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C 423-09a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
- .2 ASTM E 1264-14, Standard Classification for Acoustical Ceiling Products.
- .3 ASTM E 1477-98a (2013), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction and Amendment No. 1 1988.
- .2 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.

.3 Canadian Standards Association (CSA International)
- .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

.4 Department of Justice Canada (Jus)
- .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
- .2 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.6 Underwriter's Laboratories of Canada (ULC)
- .1 CAN/ULC-S102-10, Surface Burning Characteristics of Building Materials and Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data: Submit WHMIS MSDS in accordance with 01 35 29 –Health and Safety Requirements and manufacturer’s instructions.

.3 Submit duplicate full size samples of each type acoustical units.

1.4 QUALITY ASSURANCE

.1 Regulatory Requirements:
- .1 Fire-resistance rated floor/ceiling and roof/ceiling assembly: certified by Canadian Certification Organization accredited by Standards Council of Canada.

.2 Acoustic Testing:
- .1 Refer to Section 09 21 16 Gypsum Board Assemblies.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Storage and Protection:
- .1 Protect acoustic panels from dampness. Arrange for delivery after work causing abnormal humidity has been completed.
- .2 Store acoustic panels indoors, in dry, well ventilated room, off floor, in accordance with manufacturer's recommendations.
- .3 Protect acoustic panels from scratches, handling marks and other damage.
- .4 Store acoustic panels away from direct sunlight.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Permit wet work to dry before beginning to install.

.2 Maintain uniform minimum temperature of 15 degrees C and humidity of 20-40% before and during installation.

.3 Store materials in work area 48 hours prior to installation.

.4 Store and manage hazardous materials in accordance with Section 00 14 01 - Special Project Requirements.

1.7 EXTRA MATERIALS

.1 Provide extra materials of acoustic units in accordance with Section 01 78 00 – Closeout Submittals.

.2 Provide acoustical units amounting to 10% of gross ceiling area for each pattern and type required for project.

.3 Ensure extra materials are from same production run as installed materials.

.4 Clearly identify each type of acoustic unit, including colour and texture.

.5 Deliver to Owner, upon completion of the work of this section.
- .1 Store where directed by Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Acoustic units for suspended ceiling system, Type 1 (ACT 1): to CAN/CGSB-92.1, non-fire rated, wet-formed mineral fibre acoustic ceiling panels with factory applied vinyl latex paint:

.1 Type Square tegular.
.2 Class A.
.3 Pattern as noted on drawings , Class A.
.4 Textures: smooth.
.5 Flame spread rating of 25 or less in accordance with CAN/ULC-S102.
.6 Smoke developed 50 or less in accordance with CAN/ULC-S102.
.7 Minimum Ceiling Attenuation Class (CAC) rating 35, in accordance with ASTM E 1264
.8 Minimum Sound Absorption NRC rating 0.7
.9 Light Reflectance (LR) range of 0.90.
.10 Edge type: 9/16 square tegular.
.11 Colour: white.
.12 Size: 24” x 24” x 1” thick.
.13 Acceptable material: ‘Calla’ by Armstrong.

.2 Acoustic units for suspended ceiling system, Type 1 (ACT 1): to CAN/CGSB-92.1, non-fire rated, wet-formed mineral fibre acoustic ceiling panels with factory applied vinyl latex paint:

.1 Type Square tegular.
.2 Class A.
.3 Pattern as noted on drawings , Class A.
.4 Textures: smooth.
.5 Flame spread rating of 25 or less in accordance with CAN/ULC-S102.
.6 Smoke developed 50 or less in accordance with CAN/ULC-S102.
.7 Minimum Ceiling Attenuation Class (CAC) rating 35, in accordance with ASTM E 1264
.8 Minimum Sound Absorption NRC rating 0.7
.9 Light Reflectance (LR) range of 0.90.
.10 Edge type: 9/16 square tegular.
.11 Colour: white.
.12 Size: 48” x 48” x 1” thick.
.13 Acceptable material: ‘Lyra with Plant-based Binder High CAC’ by Armstrong.

.3 Adhesive: low VOC type recommended by acoustic unit manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Do not install acoustical panels and tiles until work above ceiling has been reviewed by Consultant.

3.2 INSTALLATION

.1 Install acoustical panels and tiles in ceiling suspension system.

3.3 APPLICATION

.1 Install acoustic units to clean, dry and firm substrate.

.2 Install acoustical units. Refer to reflected ceiling plan.

.3 Scribe acoustic units to fit adjacent work. Butt joints tight.

3.4 INTERFACE WITH OTHER WORK

.1 Coordinate with Section 09 53 00.01 – Acoustical Suspension.

.2 Coordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.
  - .1 Clean flooring and base surfaces to flooring manufacturer's printed instructions.

3.6 SCHEDULE

.1 Refer to Room Finish Schedule and Reflected Ceiling Plans.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International
- .1 ASTM C635/C635M-13a, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
- .2 ASTM C636/C636M-13, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for acoustical suspension and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
- .1 Submit for review and acceptance of each unit.
- .2 Submit one representative model of each type ceiling suspension system.
- .3 Ceiling system to show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes, acoustical unit installation.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 – Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for acoustical suspension for incorporation into manual.

1.4 QUALITY ASSURANCE

.1 Fire-resistance rated suspension system: certified by a Canadian Certification Organization accredited by Standards Council of Canada.

.2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store, and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground, indoors, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect acoustical ceiling tiles and tracks from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

.1 Design Requirements: maximum deflection: 1/360th of span to ASTM C 635/ASTM C635M deflection test.

2.2 MATERIALS

.1 Heavy duty system to ASTM C 635/ASTM C635M.

.2 Basic Materials for Suspension System: commercial quality cold rolled steel zinc coated.

.3 Suspension System: non fire rated, made up as follows:
- .1 2 directional exposed tee bar grid.
- .2 2 directional concealed tee spline.
- .3 Concealed tee access spline.
- .4 Concealed tongue and groove runner.
- .5 Concealed H runner, tee spline, and flat steel spline.
- .6 Concealed zee runner and flat steel spline.
- .7 Metal pan special tee system.

.4 Exposed tee bar grid components: shop painted satin sheen white. Components die cut. Main tee with double web, rectangular bulb and 1” rolled cap on exposed face. Cross tee with rectangular bulb; web extended to form positive interlock with main tee webs; lower flange extended and offset to provide flush intersection.

.5 Hanger Wire: galvanized soft annealed steel wire:
- .1 3/16” diameter for access tile ceilings.
- .2 To ULC design requirements for fire rated assemblies.

.6 Hanger Inserts: purpose made.

.7 Acceptable Material: 9/16 dimensional T system: 'Interlude XL HRC' by Armstrong or approved alternate. Surface Finish: prefinished baked polyester, or enamel.

.8 Accessories:

.1 Splices, clips, wire ties, retainers and wall moulding flush reveal, to complement suspension system components, as recommended by system manufacturer.

.2 Perimeter trims: aluminum

.1 Material: Aluminum, finish as later selected by consultant from manufacturer's standard range.

.2 Blind Pocket: 5" x 5" x 5" perimeter pocket with connection to extension/face plate

.3 Faceplate: 4" faceplate with acoustical flange complete with slotted pattern of 2 slots at 3/4" x 23".

.4 Faceplate: 4" faceplate with gypsum wallboard flange complete with slotted pattern of 2 slots at 3/4" x 23"

.5 Closure clips and endcaps as required.

.6 Gypsum to acoustic ceiling tile transitions, depth as required to suit application.

.7 Acceptable product: 'Axiom Perimeter Trims' by Armstrong or approved alternate.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for acoustical ceiling tile and track installation in accordance with manufacturer's written instructions.

.1 Examine work of other trades that acoustical suspension systems will be applied, for conformity to drawings.

.2 Visually inspect substrate.

.3 Inform Consultant of unacceptable conditions immediately upon discovery.

.4 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Installation: to ASTM C 636/C 636M except where specified otherwise.

.3 Install suspension system to manufacturer's instructions and Certification Organizations tested design requirements.

.4 Do not erect ceiling suspension system until work above ceiling has been inspected by Consultant.

.5 Secure hangers to overhead structure using attachment methods acceptable to Consultant.

.6 Install hangers spaced at maximum 4'-0" centres and within 6" from ends of main tees.

.7 Lay out according to reflected ceiling plan. Report all discrepancies immediately upon discovery to Consultant prior to commencing with work for acoustical suspension systems.

.8 Ensure suspension system is coordinated with location of related components.

.9 Install wall moulding to provide correct ceiling height.

.10 Completed suspension system to support super-imposed loads, such as lighting fixtures, diffusers, grilles and speakers.

.11 Support at light fixtures diffusers with additional ceiling suspension hangers within 6” of each corner and at maximum 2’-0” around perimeter of fixture.

.12 Interlock cross member to main runner to provide rigid assembly.

.13 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.

.14 Install access splines to provide 50% ceiling access.

.15 Finished ceiling system to be square with adjoining walls and level within 1:1000.

.16 Install system to seismic requirements in accordance with manufacturer’s written instructions.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.
- .1 Touch up scratches, abrasions, voids and other defects in painted surfaces.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by acoustical suspension installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM):
- .1 ASTM F 1066-(2014) e1, Standard Specification for Vinyl Composition Floor Tile.
- .2 ASTM F 1344-15, Standard Specification for Rubber Floor Tile.

.2 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB-25.20-95, Surface Sealer for Floors.
- .2 CAN/CGSB-25.21-95, Detergent-Resistant Floor Polish.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
- .1 Material Safety Data Sheets (MSDS).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Test Reports:
- .1 Submit two (2) copies of ASTM 1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- .2 Submit two (2) copies of ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

.3 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for resilient tile flooring and include product characteristics, performance criteria, physical size, finish and limitations.

.4 Samples:
- .1 Submit duplicate samples, 6” x 6”.

.5 Closeout Submittals:
- .1 Provide maintenance data for resilient flooring for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.3 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials:
- .1 Provide maintenance materials of resilient tile flooring, base and adhesive in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Provide 100 ft² of each colour, pattern and type flooring material required for this project for maintenance use.
- .3 Extra materials from same production run as installed materials.
- .4 Identify each container of floor tile and each container of adhesive.
- .5 Deliver to Owner, upon completion of the work of this section.
- .6 Store where directed by Owner.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect specified materials from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

1.5 SITE CONDITIONS

.1 Ambient Conditions:
- .1 Maintain air temperature and structural base temperature at flooring installation area above 20 degrees C for 48 hours before, during and for 48 hours after installation.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Resilient Sheet Flooring (RSF1): to ASTM F 1913-98, CAN/ULC S102-2M88, sheet Flooring with all necessary accessories for complete installation, 2.0 mm / 5/64”, antibacterial and fungicidal, non-directional, homogeneous vinyl:
- .1 Acceptable Product: ‘Forbo Sphera Element ’ by Centura, colour ‘Greige’..

.2 Resilient Base (RB):3 mm / 1/8” thick, coloured vinyl base, flat base; colour as later selected by Consultant from manufacturers full colour range. Not more than three (3) colours.
- .1 100 mm / 4” high to all locations unless otherwise indicated.
- .2 Acceptable manufacturer: Johnsonite, Tightlock or approved alternate.

.3 Primers and adhesives: types recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade.

.4 Sub-floor filler and leveller: as recommended by flooring manufacturer for use with their product.

.5 Transition trim:
- .1 Metal edge strips: aluminum extruded, smooth, mill finish with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.

.6 Cleaner, Sealer and Finisher: as recommended by flooring manufacturer’s printed instructions.

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 datasheets.

3.2 INSPECTION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for resilient sheet flooring work in accordance with manufacturer's written instructions.

.1 Examine substrate and work of other trades that resilient flooring systems will be applied, for conformity to drawings.

.2 Conduct the following tests on concrete slab before product installation:

.1 ASTM F1869: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

.2 ASTM F2170: Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.1 Proceed with installation only after unacceptable conditions have been remedied.

.3 Ensure concrete floors are dry and prepped for flooring installation, by using test methods recommended by tile manufacturer.

3.3 SUB-FLOOR TREATMENT

.1 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.

.2 Prime or Seal concrete slab. Prepare and finish to resilient flooring manufacturer's printed instructions.

3.4 SUB FLOOR FILLER AND LEVELER

.1 Where resilient flooring abuts other flooring of different thickness, provide cementitious underlayment allowing for smooth and level transition between finished floor surfaces.

.2 Mix, apply and finish underlayment in accordance with latex admixture manufacturer's recommendations.

3.5 GENERAL

.1 Provide adaptors, filler strips, edge guards, transition strips, & reducers to manufacturers written instructions, at all locations where floor covering changes material, or terminates. Provide cove caps at top of all integral (flash cove) floor bases.

.2 Install resilient flooring on all floor surfaces including under all millwork and equipment.

3.6 APPLICATION: FLOORING

.1 Acclimatize subfloor, all flooring material and adhesive for forty eight (48) hours prior, during and after the installation by maintaining the room temperature between 18°C / and 24°C.

.2 Provide high ventilation rate, with maximum outside air, during installation, and for 48 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.

.3 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.

.4 Lay flooring with seams parallel to building lines to produce minimum number of seams. Border widths minimum 1/3 width of full material.

.5 Run sheets in direction of traffic. Double cut sheet joints and continuously seal heat weld according to manufacturer's printed instructions.

.6 Heat weld seams of vinyl sheet flooring in accordance with manufacturer's printed instructions.

.7 As installation progresses and after installation, roll flooring with roller to ensure full adhesion using methods and roller weight to manufacturer's written recommendations.

.8 Install feature strips and floor markings where indicated. Fit joints tightly.

.9 Install flooring in pan type floor access covers. Maintain floor pattern.

.10 Unless otherwise indicated, cut flooring around fixed objects.

- .1 Continue flooring over areas which will be under built-in furniture.
- .2 Continue flooring through areas to receive plumbing fixtures such as but not limited to water closets without interrupting floor pattern. Caulk joint neatly with clear opaque sealant in accordance with Section 07 92 00 Joint Sealants for sealant type.
- .3 Continue flooring through areas to receive movable type partitions without interrupting floor pattern.
- .4 Continue flooring through areas to receive millwork without interrupting floor pattern.

.11 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.

.12 Install metal edge strips at unprotected or exposed edges where flooring terminates.

3.7 BASE APPLICATION

.1 Lay out base to keep number of joints at minimum. Base joints at maximum length available or at internal or premoulded corners.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using 6.5 lbs. hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.

.7 Cope internal corners. Use formed straight base material for external corners of other angles, minimum 12” each leg. Wrap around toeless base at external corners.

3.8 FIELD QUALITY CONTROL

.1 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 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

.1 Clean flooring and base surfaces to flooring manufacturer's printed instructions.

.3 Remove excess adhesive from floor, base and wall surfaces without damage.

.4 Clean, seal and wax floor and base surface to flooring manufacturer's instructions. In carpeted areas clean, seal and wax base surface before carpet installation.

.5 Coordinate with Owner for the cleaning, sealing and polishing of resilient floors by Owner immediately after installation.

.6 Provide verification to Owner's and Consultant satisfaction that floors have been installed in accordance with manufacturer's directions prior to requesting acceptance.

3.10 PROTECTION

.1 Protect new floors from time of final set of adhesive after initial waxing until final inspection.

.2 Prohibit traffic on floor for 48 hours after installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International:
- .1 ASTM C 241/C 241M-15e1, Standard Test Method for Abrasion Resistance of Stone Subject to Foot Traffic.
- .2 ASTM D 2370-98(R2010), Standard Test Method for Tensile Properties of Organic Coatings.

.2 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB-51.34-M86 (R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .2 CAN/CGSB-25.20-95, Surface Sealer for Floors.

.3 CSA Group:
- .1 CSA A23.1/A23.2-09 (R2014), Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .2 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
- .1 Material Safety Data Sheets (MSDS).

.5 Terrazzo, Tile and Marble Association of Canada (TTMAC):
- .1 Maintenance Guide.
- .2 TTMAC/CSCTEK-AID 09 40 00, Portland Cement Terrazzo Digest.
- .3 TTMAC 2012/2014 Specification Guide 09 30 00 Tile Installation Manual.
- .4 TTMAC 09 66 00 Terrazzo Installation Manual.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for Portland cement terrazzo flooring and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit four (4) copies of TTMAC Maintenance Guide for inclusion in operations and maintenance manual prepared and submitted in accordance with Section 01 78 00 - Closeout Submittals. Provide specific warning of maintenance practices or materials that may damage or disfigure finished work.
- .3 Submit WHMIS MSDS sheets for floor sealer products.

.3 Samples:
- .1 Submit duplicate300 x 300 x 20 mm / 12” x 12” x 3/4" thick samples of each colour terrazzo.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data as set out in TTMAC publication for terrazzo work for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: trained and experienced in tile work. Company must be registered as members in good standing with Terrazzo, Tile and Marble Association of Canada. If requested by, Consultant submit listing of at least three previously completed projects of similar size and scope.

.2 Supplier: a member in good standing with Terrazzo, Tile and Marble Association of Canada, providing materials meeting the minimum standards of TTMAC.

.3 Mock-ups: construct mock-ups in accordance with Section 01 45 00 – Quality Control.

.1 Provide mock-up for evaluation of surface finishes and workmanship.

.2 Construct mock-up 10 m² / 100 ft² of Portland cement terrazzo including one inside corner, one outside corner, change of material, and transition to existing terrazzo.

.3 Construct mock-up where directed.

.4 Allow 48 hours for inspection of mock-up by Consultant before proceeding with work.

.5 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work to Consultant approval.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect specified materials from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS

.1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of materials.

.2 Ventilation:

.1 Provide continuously during and after installation. Run system 24 hours per day during installation; provide continuous ventilation for 7 days after completion of installation.

.2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.

.3 Temperature:

.1 Maintain air temperature and structural base temperature at terrazzo installation area above 12 degrees C for 24 hours prior to, during, and for 24 hours following installation.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Cement:
- .1 To CAN/CSA-A3000.
- .2 Type 10, grey for underbed.
- .3 White for topping.
- .4 6 % air-entrainment.

.2 Sand, fine and coarse aggregates:
- .1 To CSA-A23.1/A23.2
- .2 Clean, washed, locally available.
- .3 Oval aggregate.

.3 Water: potable.

.4 Marble chips:
- .1 Graded in accordance with TTMAC standard.
- .2 Abrasion resistance to ASTM C 241.
- .3 No deleterious or foreign matter.
- .4 Colour: colour and texture to match existing.

.5 Pigments:
- .1 Compatible with Portland cement.
- .2 Alkali-resistant, colour-stable.
- .3 Lime-proof mineral.

.6 Epoxy bonding agent: two components, epoxy resin and epoxy hardener conforming to following performance properties after cure schedule of 28 days at25 degrees C.
- .1 Viscosity: mixed viscosity not less than 0.04 Pa.s or more than 0.5 Pa.s.
- .2 Gel time: not less than half hour at 20 degrees C.
- .3 Flexibility: Gardiner flexibility test, passes bending over 12 mm mandrel, without cracking.
- .4 Elongation: ASTM D 2370, minimum 10%.
- .5 Bond strength: 2 MPa, with 100% concrete failure at minimum coverage, test concrete specimen minimum compressive strength 20 MPa.
- .6 Coverage: 0.3 L/m ² minimum, dry film thickness not less than 0.2 mm.

.7 Divider Strips: ”L” shape, 16 gauge thick material to match existing with depth to suit required floor thickness.

.8 Accessories: base caps and base divider strips, separator strips, purpose made and of same material to match divider strips.

.9 Reinforcing steel: billet steel, grade 300, plain, deformed bars.

.10 Welded steel wire fabric: to 50 x 50 x 1.6 x 1.6 mm wire, galvanized, in flat sheets only.

.11 Slip sheet: polyethylene sheet to CAN/CGSB-51.34, Type 2, 0.05 mm thick.

.12 Non-slip aggregate: aluminum oxide of size and colour to match marble chips. Curing compound: to manufacturer's standard.

.13 Cleaning compound: to TTMAC standard as recommended by manufacturer.

.14 Sealants:
- .1 To CAN/CGSB-25.20.
- .2 Sealants: Refer to Section 07 92 00 – Joint Sealants.

.15 Finishing compound: to TTMAC standard 3001.

2.2 MIXES

.1 Slurry coat: cement and water mixed to creamy paste.

.2 Underbed: 1 part cement to 4 parts sand by volume.

.3 Terrazzo topping: colour and texture to match existing.

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 datasheets.

3.2 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for Portland cement terrazzo flooring installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate and inform Consultant of unacceptable conditions immediately upon discovery.
- .2 Proceed with installation only after unacceptable conditions have been.

3.3 INSPECTION

.1 Examine area to receive terrazzo for defects in existing work which may affect proper execution of terrazzo work.

.2 Ensure tolerances of concrete slab work do not deviate from tolerance set for finished terrazzo floor.

.3 Terrazzo contractor to start work only when all defects are corrected.

3.4 INSTALLATION

.1 Do terrazzo's work in accordance with TTMAC 09 66 00 Terrazzo Installation Manual.

.2 Install terrazzo after concrete slabs have cured 28 days.

.3 Install divider strips true and level to detailed pattern.

.4 Install covers at building expansion joints.

.5 Install control joints above control joints in subfloor.

.6 Slope finished terrazzo floors to drains.

.7 Produce terrazzo finished surfaces to match existing.

.8 Floors:
- .1 Monolithic terrazzo: provide 16 mm minimum terrazzo topping bonded to concrete base slab.
- .2 Bonded terrazzo: to TTMAC detail No. 1.
- .3 Floating standard terrazzo: to TTMAC detail No. 2.
- .4 Venetian terrazzo: to TTMAC detail No. 2V.
- .5 Epoxy bonded terrazzo: provide 16 mm maximum topping and epoxy concrete adhesive underbed bonded to concrete base slab.

.9 Bases:
- .1 Terrazzo bases: to match existing.

3.5 FIELD QUALITY CONTROL

.1 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.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.
- .1 Clean flooring and base surfaces to flooring manufacturer's printed instructions.

.3 Remove excess adhesive from floor, base and wall surfaces without damage.

.4 Clean, seal and wax floor and base surface to flooring manufacturer's instructions. In carpeted areas clean, seal and wax base surface before carpet installation.

3.7 CLEANING

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.2 Clean, seal and finish terrazzo surfaces to TTMAC recommendations.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB):
- .1 CAN/CGSB-1.186-1996, High Performance Glazed Coating System, Interior.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
- .1 Material Safety Data Sheets (MSDS).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Manufacturer's Instructions, Recommendations and Technical Data:
- .1 For each type of product indicated, include manufacturer's technical data, application instructions, and recommendations.
- .2 Indicate special handling criteria, installation sequence, cleaning procedures.

.3 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29 – Health and Safety Requirements and manufacturer’s instructions. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for high build glazed coatings. Indicate VOC content.

.4 Provide samples in accordance with Section 01 33 00 – Submittal Procedures.
- .1 Submit duplicate 8” x 16” samples of each colour and finish and decorative effects, coating applied to smooth hardboard.

.5 Provide installer / applicator certification from manufacturer complete with a list of completed projects of similar size and complexity.

.6 Closeout Submittals:
- .1 Provide maintenance data for coatings for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.3 QUALITY ASSURANCE

.1 Installer Qualifications: Engage an installer / applicator that is experienced in applying resinous flooring systems similar in material, design, and extent to those indicated for this Project.
- .1 Installer / applicator must be certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated and have completed at least 10 projects of similar size and complexity.

.2 Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, through one source from a single manufacturer, with not less than ten years of successful experience in manufacturing and installing principal materials described in this section. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.

.3 Manufacturer Field Technical Service Representatives: Resinous flooring manufacture shall retain the services of Field Technical Service Representatives who are trained specifically on installing the system to be used on the project.

.1 Field Technical Services Representatives shall be employed by the system manufacture to assist in the quality assurance and quality control process of the installation and shall be available to perform field problem solving issues with the installer.

.4 Construct mock-ups in accordance with Section 01 45 00 – Quality Control.

.1 Apply full-thickness coating of each finish and decorative effect to 100 sq.ft. area of surface to be treated.

.2 Allow 48 hours for inspection of mock-up by Consultant before proceeding with coating work.

.3 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work to Consultant approval.

.5 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.

.1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.

.2 Twice during progress of Work at 25% and 60% complete.

.3 Upon completion of Work, after cleaning is carried out.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.1 Deliver and store materials in manner to prevent damage and deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

.2 Ensure materials remain in original wrapping and containers until used.

1.5 SITE CONDITIONS

.1 Safety:

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of materials.

.2 Ensure no open flame heating devices are used.

.3 Discourage occupancy of treated space until volatile materials are no longer being emitted and there is no odour.

.4 Provide adequate respiratory protection to exposed individuals.

.2 Ventilation:

.1 Provide ventilation continuously during and after coating application. Run system 24 hours per day during application; provide continuous ventilation for 7 days after completion of application.

.3 Environmental Limitations:

.1 Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.

.2 Maintain material and substrate temperature between 18 and 30 degrees C during resinous flooring application and for not less than 24 hours after application.

.4 Lighting:
.1 Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.

.5 Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

.6 Concrete substrate shall be properly cured for a minimum of 30 days. A vapor barrier must be present for concrete subfloors on or below grade. Otherwise, an osmotic pressure resistant grout must be installed prior to the resinous flooring.

1.6 WARRANTY

.1 Manufacture shall furnish a single, written warranty covering both material and workmanship for a period of four (4) full years from date of installation or provide a joint and several warranty signed on a single document by material manufacturer and applicator jointly and severally warranting the materials and workmanship for a period of Four (4) full years from date of substantial completion.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Available Products: Subject to compliance with requirements.

.2 Confirm inclusion of 25mil body coat, and broadcast quartz into primer increasing bond strength. r ducts that may be incorporated into the work include:

.3 Acceptable resinous flooring system:
.1 Stonhard, Inc.; Stontec UTF®. Basis of Design.

.4 System Characteristics:
.1 Colour and Pattern: Select from manufactures standard patterns as noted on drawing.
.2 Wearing Surface: Standard.
.3 Overall System Thickness: 6mm Nominal.

.5 System Components: Manufacturer's standard components that are compatible with each other and as follows:
.1 Primer:
.1 Material Basis: Stonhard UTF Primer.
.2 Resin: Urethane.
.3 Formulation Description: (2) two component, low viscosity, urethane.
.4 Application Method: Squeegee and nap roller.
.5 Number of Coats: one (1).
.6 Aggregates: Broadcast quartz into wet primer coat.

.6 Body Coat(s):
.1 Material Basis: Stontec UTF Undercoat.
.2 Resin: Polyaspartic Urethane.

.3 Formulation Description: three (3) component polyaspartic urethane resin, aliphatic isocyanate and filler.

.4 Application Method: Squeegee and medium nap roller.

.1 Thickness of Coats: 25-30 mils with standard primer coat.

.2 Number of Coats: One (1).

.7 Broadcast:

.1 .Material Basis: Stontec Flakes.

.2 Formulation Description: Decorative flake (1 /16" or 14).

.3 Type: Tweed (chips to be mixed in Mfg. facility).

.4 Finish: Broadcast to rejection.

.5 Number of Coats: one (1).

.8 Topcoat:

.1 Material Basis: Stontec UTF Sealer.

.2 Resin: Urethane.

.3 Formulation Description: (2) two component, UV resistant, aliphatic polyaspartic urethane.

.4 Type: Clear.

.5 Finish: Gloss.

.6 Number of Coats: two (2).

.9 Note: Components listed above are the basis of design intent; all bids will be compared to this standard including resin chemistry, colour, wearing surface, thickness, and installation procedures, including number of coats. Contractor shall be required to comply with all the requirements of the Specifications and all of the components required by the Specifications, whether or not such products are specifically listed above.

.10 System Physical Properties:

.1 Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:

.1 Compressive Strength: 10,000 psi after 7 days per ASTM C 579.

.2 Tensile Strength: 1,750 psi per ASTM C 307.

.3 Flexural Strength: 4,000 psi per ASTM C 580.

.4 Water Absorption :< 1% per ASTM C 413.

.5 Impact Resistance :> 160 in. lbs. per ASTM D 2794.

.6 Flammability: Class 1 per ASTM E-648.

.7 Hardness: 85 to 90, Shore D per ASTM D 2240.

.11 Accessory Materials:

.1 Patching and Fill Material: Resinous product as per resinous flooring manufacturer written recommendation to suit application.

.2 Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated, including but not limited to joint fill material and concrete crack treatment.

.3 Adaptors, Filler strips, Edge Guards, Transition Strips, Reducers and Cove Caps: thickness and width to suit floor thickness and condition,

.1 Acceptable manufacture: Johnsonite, or approved alternate.

2.2 MIXES

.1 Mix coatings according to manufacturer's instructions.

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 datasheets.

3.2 EXAMINATION

.1 Examine conditions, substrates and work to receive work of this Section.
- .1 Coordinate with Section 01 71 00 - Examination and Preparation.

.2 Examine substrate surfaces to receive high-build glazed coatings.
- .1 Visually inspect substrate prior to commencing with Work of this section, in presence of Consultant.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

.3 Verification of Conditions:
- .1 Verify that:
  - .1 Substrate conditions which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation resinous epoxy flooring coatings.
  - .2 Field conditions are acceptable and are ready to receive work.
- .2 Commencing installation means acceptance of existing substrates.

3.3 PREPARATION

.1 Prepare surfaces in accordance with CAN/CGSB-1.186 and coating material manufacturer's instructions.

.2 Substrate shall be sound, non-dusting, and free of grease, oil, dirt and other matter detrimental to adhesion and appearance of coating. Provide clean, dry, and neutral Ph. substrate for resinous flooring application.

.3 Mechanically prepare substrates as follows:
- .1 Mechanically prepare with the use of Diamond grinding equipment to provide surface sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring. Or,
- .2 Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
- .3 Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.

.4 Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.

.5 Verify that concrete substrates are dry.
- .1 Perform in situ probe test, ASTM F 2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 80 percent.
- .2 Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. of slab in 24 hours.
- .3 Perform additional moisture tests recommended by manufacturer. Proceed with application only after substrates pass testing.

.6 Verify that concrete substrates have neutral Ph and that resinous flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

.7 Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

.8 Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

.9 Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations. Allowances should be included for Stonflex MP7 joint fill material.

.10 Mask surrounding surfaces to provide neat, clean juncture lines.

.11 Protect adjacent surfaces and equipment from damage by overspray.

3.4 APPLICATION

.1 General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
- .1 Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
- .2 Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
- .3 At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.
  - .1 Apply joint sealant to comply with manufacturer's written recommendations.

.2 Mix and apply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates

.3 Broadcast: Immediately broadcast quartz silica aggregate into the primer using manufacturer's specially designed spray caster. Strict adherence to manufacturer's installation procedures and coverage rates is imperative.

.4 Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and top coating of cove base. Round internal and external corners. Refer to detail drawings.

.5 Body coat: Mix base material according to manufacturer's recommended procedures. Uniformly spread mixed material over previously primed substrate using manufacturer's installation tool. Roll material with strict adherence to manufacturer's installation procedures and coverage rates.

.6 Broadcast: Immediately broadcast decorative flakes into the body coat. Strict adherence to manufacturer's installation procedures and coverage rates is imperative.

.7 First Sealer: Remove excess un-bonded flakes by lightly brushing and vacuuming the floor surface. Mix and apply sealer with strict adherence to manufacturer's installation procedures.

.8 Second sealer: Lightly sand first sealer coat. Mix and apply second sealer coat with strict adherence to manufacturer’s installation procedures.

.9 Terminations:

.1 Chase edges to “lock” the flooring system into the concrete substrate along lines of termination.

.2 Penetration Treatment: Lap and seal resinous system onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.

.3 Trenches: Continue flooring system into trenches to maintain monolithic protection. Treat cold joints to assure bridging of potential cracks.

.4 Treat floor drains by chasing the flooring system to lock in place at point of termination.

.10 Joints and Cracks:

.1 Treat control joints to bridge potential cracks and to maintain monolithic protection.

.2 Treat cold joints and construction joints to bridge potential cracks and to maintain monolithic protection on horizontal and vertical surfaces as well as horizontal and vertical interfaces.

.3 Discontinue floor coating system at vertical and horizontal contraction and expansion joints by installing backer rod and compatible sealant after coating installation is completed. Provide sealant type recommended by manufacturer for traffic conditions and chemical exposures to be encountered.

3.5 FIELD QUALITY CONTROL

.1 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.

3.6 CLEANING, PROTECTING AND CURING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.1 Clean surfaces to coating manufacturer's printed instructions.

.2 Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process. Close area of application for a minimum of 18 hours.

.3 Protect resinous flooring materials from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application.

.4 Remove temporary covering and clean resinous flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer.

3.7 SCHEDULES

.1 Refer to Room Finish Schedule for locations of resinous epoxy flooring system.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American Association of Textile Chemists and Colorists (AATCC)
- .1 AATCC Test Method 16.3-2014, Colorfastness to Light.
- .2 AATCC Test Method 23-2010, Colorfastness to Burn Gas Fumes.
- .3 AATCC 125-2013, Colorfastness to Perspiration and Light (Reaffirmed and Editorial Revision 2009).
- .4 AATCC 128-2009, Wrinkle Recovery of Fabrics: Appearance Method.
- .5 AATCC Test Method 129-2011, Colourfastness to Ozone in the Atmosphere Under High Humidities.
- .6 AATCC Test Method 134-2011, Electrostatic Propensity of Carpets.
- .7 AATCC Test Method 171-2010, Carpets: Cleaning of; Hot Water Extraction Method.
- .8 AATCC Test Method 175-2013, Stain Resistance: Pile Floor Coverings.
- .9 AATCC Test Method 189-2012, Fluorine Content of Carpet Fibers.

.2 ASTM International
- .1 ASTM D 297-15, Standard Test Methods for Rubber Products-Chemical Analysis.
- .2 ASTM D 1335-12, Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings.
- .3 ASTM D 2661-14, Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings.
- .4 ASTM D 1667-05(2011), Standard Specification for Flexible Cellular Materials-Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).
- .5 ASTM D 3574-11, Standard Test Methods for Flexible Cellular Materials - Slab, Bonded, and Molded Urethane Foams.
- .6 ASTM D 3936-12, Standard Test Method for Resistance to Delamination of the Secondary Backing of Pile Yarn Floor Covering.

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-4.2 No. 11.1-94(R2013), Textile Test Methods - Bursting Strength - Diaphragm Pressure Test.
- .2 CAN/CGSB-4.2 No. 12.2-2012, Textile Test Methods - Tearing Strength - Trapezoid Method.
- .3 CAN/CGSB-4.2 No. 22-2004, Textile Test Methods - Colourfastness to Rubbing (Crocking).
- .4 CAN/CGSB-4.2 No.27.6-2015, Textile Test Methods - Flame Resistance - Methemine Tablet Test for Textile Floor Coverings.
- .5 CAN/CGSB-4.2 No. 76-94/ISO 2551: 1981, IDT (R2013) Textile Test Methods - Machine-Made Textile Floor Coverings - Determination of Dimensional Changes Due to the Effects of Varied Water and Heat Conditions.
- .6 CAN/CGSB-4.2 No.77.1-94/ISO 4919:1978(R2012), Textile Test Methods - Carpets - Determination of Tuft Withdrawal Force.
- .7 CAN/CGSB-4.129-93(R1997), Carpets for Commercial Use.

.4 Carpet and Rug Institute (CRI)
- .1 CRI Carpet Installation Standard 2009.
- .2 CRI Green Label Indoor Air Quality Testing Program.
- .3 CRI Green Label Plus Indoor Air Quality Testing Program.

.5 Health Canada
.1 C.R.C., c.923-10, Hazardous Products Act - Carpet Regulations, Part II of Schedule 1.

.6 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.7 National Floor Covering Association (NFCA)
.1 National Floor Covering Specification Manual 2007.

.8 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S102-07, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
.2 CAN/ULC-S102.2-10, Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Sequencing: sequence with other work in accordance with Section 01 32 16 Construction Progress Schedule - Bar Chart. Comply with manufacturer's written recommendations for sequencing construction operations.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for each carpet tile undercushion adhesive carpet protection subfloor patching compound and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
.1 Submit for review and acceptance of each unit.
.2 Submit duplicate samples of each type of carpet tile specified and duplicate tiles for each colour selected.

.4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.5 Qualification Statements:
.1 Compliance: to CAN/ULC-S102 and CAN/ULC-S102.2.
.2 Testing: passes testing requirements of:
.1 Green Label Plus Indoor Air Quality Testing Program.
.3 Tuft bind: meets requirements of CAN/CGSB-4.129 when tested to CAN/CGSB-4.2 No.77.1.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 – Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for installed products for incorporation into manual.

.3 Warranty Documentation: submit warranty documents specified.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra stock materials in accordance with Section 01 78 00 Closeout Submittals: deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.

- .1 Quantity: provide minimum 2% of:
  - .1 Carpet tile.
  - .2 Floor base.
  - .3 Adhesives.
- .2 Delivery, storage and protection: comply with Owner's requirements for delivery, storage and protection of extra materials.

1.6 QUALITY ASSURANCE

.1 Regulatory Requirements:

- .1 Prequalification: compliance with Health Canada regulations under "Hazardous Products Act", Part II of Schedule 1, to CAN/CGSB-4.2 No. 27.6.

.2 Qualifications:

- .1 Manufacturer: capable of providing field service representation during construction and approving application method.
- .2 Flooring Contractor:
  - .1 Experienced in performing work of this Section who has specialized in installation of work similar to that required for this project.
  - .2 Certified by carpet manufacturer prior to tender submission.
  - .3 Must not sub-contract labour without written approval of Consultant.
  - .4 Responsible for proper product installation, including floor testing and preparation as specified and in accordance with carpet manufacturer's written instructions.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

.3 Store and protect carpet tile and adhesive in original containers or wrapping with manufacturer's seals and labels intact.

.4 Store carpet and adhesive at minimum temperature of 18 degrees C and relative humidity of maximum 65% for minimum of 48 hours before installation.

.5 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness.

.6 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

.7 Replace defective or damaged materials with new.

1.8 SITE CONDITIONS

.1 Ambient Conditions:

.1 Moisture: ensure substrate is within moisture limits and alkalinity limits recommended by manufacturer. Prepare moisture testing and provide report to Consultant.

.2 Temperature: maintain ambient temperature of not less than 18 degrees C from 48 hours before installation to at least 48 hours after completion of work.

.3 Relative humidity: maintain between 10% and 65% for 48 hours before, during and 48 hours after installation.

.4 Install carpet after space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete.

1.9 WARRANTY

.1 Manufacturer's warranty: submit, for Consultant's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and does not limit other rights Owner may have under Contract Documents.

.2 Warranty period: 1 year, commencing on date of substantial performance of work.

.1 Warranty covers labour and repair or replacement of defective components for 1 year after date of substantial performance.

PART 2 - PRODUCTS

2.1 CARPET TILE MATERIAL (CPT)

.1 Carpet Tile:

.1 Performance.

.1 Indoor Air Quality: Green label Plus Certified # GLP0820.

.2 Backing: Standard type, GlacBac Tile.

.2 Carpet tile dimensions: 500mm x 500m.

.3 Construction: Tufted Textured Loop.
.4 Soil / Stain protected
.5 Yarn System 100% Recycled Content Type 6. Nylon.
.6 Dye Method: 100% Solution Dyed.
.7 Total Recycled Content: 61%.
.8 Product Specifications:
  .1 Pile Thickness: 0.103".
  .2 Pile Density: 6,291 oz/yd^3.
.9 Colours and Patterns: Garbanzo (Schmick).
.10 Acceptable product: 'Extra-Curricular, Cartera Collection" by Interfaceflor Canada.

.2 Adhesive:
  .1 Pressure sensitive adhesive connectors.
    .1 Acceptable product: Tactiles adhesive connectors by Interfaceflor Canada.

2.2 RUBBER BASE (RB)

.1 Rubber Base:
  .1 1/8" thick, coloured rubber base, flat base at carpeted areas and coved base elsewhere, colour as later selected by Consultant from manufacturer standard colour range. Not more than four (4) colours.
    .1 4" high at all locations, unless otherwise indicated.
  .2 Acceptable manufacturer: Johnsonite, Tightlock or approved alternate.

PART 3 – EXECUTION

3.1 INSTALLERS

.1 Use experienced and qualified technicians to carry out assembly and installation of tile carpet.

3.2 EXAMINATION

.1 Examine conditions, substrates and work to receive work of this Section, co-ordinate with Section 01 71 00 - Examination and Preparation.

.2 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for carpet tile installation in accordance with manufacturer's written instructions.
  .1 Inform Consultant of unacceptable conditions immediately upon discovery.
  .2 Proceed with installation only after unacceptable conditions have been remedied.

3.3 PREPARATION

.1 Subfloor Preparation:
- .1 Inspect concrete and determine special care required to make it a suitable for carpet.
- .2 Fill and level cracks 1/8” wide or protrusions over 1/16” with appropriate and compatible latex polymer fortified patching compound.
- .3 Comply with manufacturer's written recommendations for maximum patch thickness.
- .4 Prime large patch areas with compatible primer.
- .5 Ensure concrete substrates are cured, clean and dry.
- .6 Ensure concrete substrates are free of paint, dirt, grease, oil, curing or parting agents, and other contaminates, including sealers, that interfere with the bonding of adhesive.
- .7 Where powdery or porous concrete surface is encountered, apply primer compatible with adhesive to provide a suitable surface for glue-down installation.

.2 Surface Preparation: prepare surface in accordance with manufacturer's written recommendations and co-ordinate with Section 01 71 00 - Examination and Preparation.
- .1 Prepare floor surfaces in accordance with CRI Carpet Installation Standard.

.3 Tile Carpeting Preparation:
- .1 Pre-condition carpeting: following manufacturer's written instructions.

3.4 INSTALLATION

.1 Install carpet tiles in accordance with manufacturer's written instructions, and CRI Carpet Installation Standard and co-ordinate with Section 01 73 00 - Execution.

.2 Co-ordinate tile carpeting work with work of other trades, for proper time and sequence to avoid construction delays.

.3 Install carpet tile after finishing work is completed but before demountable office partitions and telephone and electrical pedestal outlets are installed.

.4 Install carpet tile as per manufacturer's recommendation. This can include quarter-turn 90 degree format, monolithic, random, quarter turn ashlar, horizontal, and herringbone or vertical ashlar.

.5 Snugly join carpet tiles in completed installation.
- .1 Measure distance covered by 11 carpet tiles (10 joints) and ensures distance is in compliance with manufacturer specifications.
- .2 Do not trap yarn between carpet tiles.

.6 Apply thin film of pressure-sensitive adhesive according to manufacturer's recommendations.

.7 Ensure finished installation presents smooth wearing surface free from conspicuous seams, burring and other faults.

.8 Use material from same dye lot.
- .1 Ensure colour, pattern and texture match within visual areas.
- .2 Maintain constant pile direction.

.9 Fit around architectural, mechanical, electrical and telephone outlets, and furniture fitments, around perimeter of rooms into recesses, and around projections.

.10 Extend carpet tiles into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

.11 Install carpet tiles smooth and free from bubbles, puckers, and other defects.

.12 Protect exposed carpet tile edges at transition to other flooring materials with suitable transition strips.

3.5 BASE APPLICATION

.1 Lay out base to keep number of joints at minimum. Base joints at maximum length available or at internal or premoulded corners.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using 3 kg/ 6.5 lbs. hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.

.7 Cope internal corners. Use premoulded corner units for right angle external corners. Use formed straight base material for external corners of other angles, minimum 300 mm each leg. Wrap around toeless base at external corners.

.8 Install toeless type base before installation of carpet on floors.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
  .1 Leave Work area clean at end of each day.
  .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.
    .1 Vacuum carpets clean immediately after completion of installation.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Prohibit traffic on carpet for period of 24 hours minimum after installation and until adhesive is cured.

.3 Install carpet protection to satisfaction of Consultant.

.4 Repair damage to adjacent materials caused by tile carpeting installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.2 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - February 2004.
- .2 Standard GPS-1-05, MPI Green Performance Standard for Painting and Coatings.

.3 National Fire Code of Canada.

.4 Society for Protective Coatings (SSPC)
- .1 Systems and Specifications, SSPC Painting Manual 2005.

1.2 QUALITY ASSURANCE

.1 Qualifications:
- .1 Contractor: to have a minimum of five (5) years proven satisfactory experience. When requested, provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
- .2 Journeymen: Qualified journeypersons as defined by local jurisdiction to be engaged in painting work
- .3 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.
- .4 Conform to latest MPI requirements for exterior painting work including preparation and priming.
- .5 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.
- .6 Paint materials such as linseed oil, shellac, and turpentine to be highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and to be compatible with other coating materials as required.
- .7 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Consultant.
- .8 Standard of Acceptance:
  - .1 Walls: No defects visible from a distance of 3’-0” at 90 degrees to surface.
  - .2 Soffits: No defects visible from floor at 45 degrees to surface when viewed using final lighting source.
  - .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.3 PERFORMANCE REQUIREMENTS

.1 Environmental Performance Requirements:
- .1 Provide paint products meeting MPI "Environmentally Friendly" E2, E3 ratings based on VOC (EPA Method 24) content levels.
- .2 Green Performance in accordance with MPI Standard GPS-1.

1.4 SCHEDULING

.1 Submit work schedule for various stages of painting to Consultant for approval. Submit schedule minimum of 48 hours in advance of proposed operations.

.2 Obtain written authorization from Consultant for changes in work schedule.

.3 Schedule painting operations to prevent disruption of occupants in and about building.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

- .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section01 35 29 – Health and Safety Requirements and manufacturer’s instructions.

.3 Upon completion, submit records of products used. List products in relation to finish system and include the following:

- .1 Product name, type and use.
- .2 Manufacturer's product number.
- .3 Colour numbers.
- .4 MPI Environmentally Friendly classification system rating.
- .5 Manufacturer's Material Safety Data Sheets (MSDS).

.4 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.

- .1 Submit duplicate 8” x 12” sample panels of each paint, stain, clear coating, special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Painting Specification Manual standards submitted on the following substrate materials:
  - .1 1/8” plate steel for finishes over metal surfaces.
  - .2 1/2” birch plywood for finishes over wood surfaces.
  - .3 1/2" gypsum board for finishes over gypsum board and other smooth surfaces.
  - .4 3/8” maple for finishes over wood surfaces.
- .2 When approved, samples will become acceptable standard of quality for appropriate on-site surface with one of each sample retained on-site.
- .3 Submit full range of available colours where colour availability is restricted.

1.6 QUALITY CONTROL

.1 Provide mock-up in accordance with Section 01 45 00 – Quality Control.

.2 When requested by Consultant or Paint Inspection Agency, prepare and paint designated surface, area, room or item to requirements specified herein, with specified paint or coating showing selected colours, number of coats, gloss/sheen, textures and workmanship to MPI Painting Specification Manual standards for review and approval. When approved, surface, area, room and/or items shall become acceptable standard of finish quality and workmanship for similar on-site work.

1.7 MAINTENANCE

.1 Extra Materials:

.1 Submit maintenance materials in accordance with Section 01 78 00 – Closeout Submittals.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements, supplemented as follows:

.1 Deliver and store materials in original containers, sealed, with labels intact.

.2 Labels: to indicate:

.1 Manufacturer's name and address.

.2 Type of paint or coating.

.3 Compliance with applicable standard.

.4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Provide and maintain dry, temperature controlled, secure storage.

.5 Observe manufacturer's recommendations for storage and handling.

.6 Store materials and supplies away from heat generating devices.

.7 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.

.8 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.9 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Consultant. After completion of operations, return areas to clean condition to approval of Consultant.

.10 Remove paint materials from storage only in quantities required for same day use.

.11 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

.12 Fire Safety Requirements:

.1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.

.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.9 AMBIENT CONDITIONS

.1 Heating, Ventilation and Lighting:

.1 Ventilate enclosed spaces.

.2 Do not perform painting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.

.3 Where required, provide continuous ventilation for seven days after completion of application of paint.

.4 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.

.5 Perform no painting work unless a minimum lighting level of 323 Lux is provided on surfaces to be painted. Adequate lighting facilities to be provided by General Contractor.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless specifically pre-approved by and product manufacturer, perform no painting work when:

.1 Ambient air and substrate temperatures are below 10 degrees C.

.2 Substrate temperature is over 32 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's prescribed limits.

.4 Relative humidity is above 85 % or when dew point is less than 3 degrees C variance between air/surface temperature.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.2 Perform no painting work when maximum moisture content of substrate exceeds:

.1 12% for concrete and masonry (clay and concrete brick/block).

.2 15% for wood.

.3 12% for plaster and gypsum board.

.3 Conduct moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple "cover patch test".

.4 Test concrete, masonry and plaster surfaces for alkalinity as required.

.3 Surface and Environmental Conditions:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits noted herein.

.3 Apply paint when previous coat of paint is dry or adequately cured.

.4 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.

.5 Do not apply paint when:

.1 Temperature is expected to drop below 10 degrees C before paint has thoroughly cured.

.2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.

.3 Surface to be painted is wet, damp or frosted.

.6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.

.7 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.

.8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Paint materials listed in latest edition of MPI Approved Products List (APL) are acceptable for use on this project.

.2 Paint materials for paint systems: to be products of single manufacturer.

.3 Only qualified products with E2, E3 "Environmentally Friendly" ratings are acceptable for use on this project.

.4 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids, to be as follows:

- .1 Be water-based, water soluble and water clean-up.
- .2 Be non-flammable and biodegradable.
- .3 Be manufactured without compounds which contribute to ozone depletion in upper atmosphere.
- .4 Be manufactured without compounds which contribute to smog in the lower atmosphere.
- .5 Do not contain methylene chloride, chlorinated hydrocarbons, and toxic metal pigments.

.5 Water-borne surface coatings must be manufactured and transported in a manner that steps of processes, including disposal of waste products arising therefrom, will meet requirements of applicable governmental acts, by-laws and regulations including, for facilities located in Canada, Fisheries Act and Canadian Environmental Protection Act (CEPA).

.6 Water-borne surface coatings must not be formulated or manufactured with aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavelant chromium or their compounds.

.7 Water-borne surface coatings and recycled water-borne surface coatings must have flash point of 61.0 degrees C or greater.

.8 Both water-borne surface coatings and recycled water-borne surface coatings must be made by a process that does not release:

- .1 Matter in undiluted production plant effluent generating a 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.
- .2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.

.9 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes must meet a minimum "Environmentally Friendly" E2 rating.

.10 Recycled water-borne surface coatings must contain 50 % post-consumer material by volume.

.11 Recycled water-borne surface coatings must not contain:

- .1 Lead in excess of 600.0 ppm weight/weight total solids.
- .2 Mercury in excess of 50.0ppm weight/weight total product.
- .3 Cadmium in excess of 1.0ppm weight/weight total product.
- .4 Hexavelant chromium in excess of 3.0 ppm weight/weight total product.
- .5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.

.12 The following must be performed on each batch of consolidated post-consumer material before surface coating is reformulated and canned. These tests must be performed at a laboratory or facility which has been accredited by the Standards Council of Canada.

.1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.

.2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.

.3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

2.2 COLOURS

.1 Consultant will provide Colour Schedule after Contract award.

.2 Colour schedule will be based upon selection of five (5) base colours. No more than five (5) colours will be selected for entire project and no more than three colours will be selected in each area.

.3 Selection of colours will be from manufacturer’s full range of colours.

.4 Entrance canopy columns shall match RGB, R-225, G-100, B-30. Submit samples to Consultant for approval.

.5 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed only with Consultant's written permission.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Add thinner to paint manufacturer's recommendations. Do not use kerosene or organic solvents to thin water-based paints.

.4 Thin paint for spraying according in accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Consultant.

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss: defined as sheen rating of applied paint, in accordance with following values:

Gloss Level-Category	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 – (Matte Finish)	Max. 5	Max. 10
Gloss Level 2 – (Velvet)	Max.10	10 to 35
Gloss Level 3 – (Eggshell)	10 to 25	10 to 35
Gloss Level 4 – (Satin)	20 to 35	min. 35
Gloss Level 5 – (Semi-Gloss)	35 to 70	
Gloss Level 6 – (Traditional Gloss)	70 to 85	
Gloss Level 7 – (High Gloss)	More than 85	

.2 Gloss level ratings of painted surfaces as specified and as noted on Finish Schedule.

2.5 EXTERIOR PAINTING SYSTEMS

.1 Asphalt Surfaces: zone/traffic marking for drive and parking areas, etc.
- .1 EXT 2.1A - Latex zone/traffic marking finish.

.2 Structural Steel and Metal Fabrications:
- .1 EXT 5.1G – Pigmented polyurethane finish lower epoxy zinc rich primer and high build epoxy.

.3 Galvanized Metal: not chromate passivated
- .1 EXT 5.3B - Alkyd gloss level 6 finish.

.4 Bituminous Coated Surfaces: cast iron pipe, concrete, etc.:
- .1 EXT 10.2A - Latex gloss level 6finish.

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 datasheets.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.2 EXAMINATION

.1 Exterior painting work: Notify Consultant in writing minimum of one (1) week prior to beginning work.

.2 Exterior surfaces requiring painting: Prior to commencing with exterior painting Work, examine surfaces to be painted for defects and acceptance. Notify Consultant in writing of defects or problems, prior to commencing painting work, or after surface preparation if unseen substrate damage is discovered.

.3 Commence with exterior painting Work only after preparation, repair or replacement of such unforeseen or noted defects are corrected.

3.3 PREPARATION

.1 Perform preparation and operations for exterior painting in accordance with manufacturer's written instructions and MPI Maintenance Painting Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

.3 Clean and prepare exterior surfaces to be painted in accordance with manufacturer's written instructions and MPI Maintenance Repainting Manual requirements. Refer to the MPI Manual in regard to specific requirements and as follows:

- .1 Remove dust, dirt, and surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
- .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
- .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
- .4 Allow surfaces to drain completely and allow to dry thoroughly. Allow sufficient drying time and test surfaces using electronic moisture meter before commencing work.
- .5 Use water-based cleaners in place of organic solvents where surfaces will be repainted using water based paints.
- .6 Many water-based paints cannot be removed with water once dried. Minimize use of kerosene or such organic solvents to clean up water-based paints.

.4 Clean metal surfaces to be painted by removing rust, dirt, oil, grease and foreign substances in accordance with manufacturer's written instructions and MPI requirements. Remove such contaminates from surfaces, pockets and corners to be painted by brushing with clean brushes, blowing with clean dry compressed air, or brushing/vacuum cleaning as required.

.5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer, paint, or pretreatment as soon as possible after cleaning before deterioration occurs.

.6 Do not apply paint until prepared surfaces have been reviewed by Consultant.

.7 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1’-0”.

3.4 EXISTING CONDITIONS

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter, except test concrete floors for moisture using a simple "cover patch test" and report findings to Consultant. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Maximum moisture content as follows:

- .1 Stucco: 12%.
- .2 Concrete: 12%.
- .3 Clay and Concrete Block/Brick: 12%.
- .4 Wood: 15%.

3.5 PROTECTION

.1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Consultant.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.4 Protect passing pedestrians, building occupants and general public in and about building.

.5 Remove light fixtures, surface hardware on doors, and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Store items and re-install after painting is completed.

.6 Move and cover exterior furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.7 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas to approval of Consultant.

3.6 APPLICATION

.1 General:

.1 Finish all exposed to view unfinished materials and all previously painted surfaces.

.2 Finish paint all primed surfaces.

.3 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.

.4 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

.5 Do not paint baked enamel, chrome plated, stainless steel, aluminum or other surfaces finished with final finish in factory.

.6 Provide finish uniform in sheen, colour and texture, free from streaks, shiners and brush or roller marks or other defects.

.7 Paint entire plane of areas exhibiting incomplete or unsatisfactory coverage and of areas, which have been cut and patched. Patch paint will not be accepted.

.8 Advise Consultant when each applied paint coat may be inspected. Do not recoat until directed by Consultant in writing. Tint each coat slightly to differentiate between applied coats.

.9 Sand smooth enamel and varnish undercoats prior to recoating.

.10 Apply primer coat soon after surface preparation is completed to prevent contamination of substrate.

.11 Apply materials in accordance with manufacturer's directions and specifications. Do not use adulterants. Any reduction of coating’s viscosity to only be permitted in accordance with manufacturer’s directions.

.12 Finishes and number of coats specified hereinafter in Exterior Finishes Schedule are intended as minimum requirements guide only. Refer to manufacturer’s recommendations for exact instructions for thickness of coating to obtain optimum coverage and appearance. Some materials and colours may require additional coats and deeper colours may require use of manufacturers’ special tinted primers. Unless otherwise specified, provide 3 coats of finish minimum.

.13 Obtain colour chart giving colour schemes and gloss value for various areas as directed by Consultant. Colour chart shall give final selection of colours and surface textures of all finishes, and whether finishes are transparent (natural) or opaque (paint).

.14 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access and when specifically authorized by Consultant.

.15 Apply coats of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.16 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.17 Sand and dust between coats to remove visible defects.

.2 Apply paint by brush, roller, air sprayer, airless sprayer. Method of application to be as approved by Consultant. Conform to manufacturer's application instructions unless specified otherwise.

.1 Brush and Roller Application:

.1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.

.2 Work paint into cracks, crevices and corners.

.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Consultant.

.5 Remove runs, sags and brush marks from finished work and repaint.

.2 Spray Application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.3 Apply paint in a uniform layer, with overlapping at edges of spray pattern.

.4 Brush out immediately runs and sags.

.5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.

.6 Spray paint all doors and frames scheduled to be painted. Final coat may be brushed or rolled to accommodate finished adjacent surfaces.

.7 Spray paint overhead doors.

3.7 MECHANICAL / ELECTRICAL EQUIPMENT

.1 Unless otherwise specified, paint exterior exposed conduits, piping, hangers, duct work and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as noted otherwise.

.2 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.3 Do not paint over nameplates.

.4 Paint fire protection piping red.

.5 Paint steel electrical light standards. Do not paint outdoor transformers and substation equipment.

3.8 FIELD QUALITY CONTROL

.1 Inspection:

.1 Field inspection of exterior painting operations to be carried out by Consultant.

.2 Advise Consultant when each surface and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.3 Co-operate with inspection firm and provide access to areas of work.

.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.

.2 Schedule site visits, to review Work and obtain written reports from manufacturer verifying compliance of Work at 25%, 65% and at completion of the Work, in handling, applying, finishing, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 – MANUFACTURE'S FIELD SERVICES.

3.9 CLEANING

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.1 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

3.10 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Consultant. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Consultant.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Material and installation of site applied paint finishes to new interior surfaces, including site painting of shop primed surfaces.

.2 The Painting Contractor will produce a 'Properly painted surface.' A properly painted surface is defined as uniform in appearance, colour, texture, hiding and sheen. It is also free of foreign material, lumps, skins, runs, sags, holidays, misses, or insufficient coverage. It is also a surface free of loose, chipped, broken or bubbled paint, as well as drips, pin holes, spatters, spills or overspray whether or not caused by the Painting Contractor's workforce.

.3 Preparation finish levels:

.1 Level 1 - Basic:

.1 This surface preparation level requires basic cleanliness of surfaces to ensure the adhesion of new finishes to the surfaces to which they are applied with less concern for the adhesion of existing paint coats and quality of appearance of the finished surfaces. Preparation shall include the removal of surface dust, dirt, obvious loose paint and other surface contaminants by washing, light power washing or pressure washing, hand cleaning, including the use of a duster brush or broom, and mildew treatment. This level of preparation should ensure that subsequently applied coats of paint will adhere to existing paint coats.

.2 Level 2 - Standard:

.1 This surface preparation level requires basic cleanliness of surface to ensure the adhesion of new finishes to the surfaces to which they are applied as well as the examination of existing coatings to assess their adhesion. With this level of surface preparation, good adhesion and longevity of finish is of primary concern and appearance is of secondary concern. This level of surface preparation includes that described in Level 1 plus other procedures necessary to create a sound surface for repainting including solvent cleaning, basic patching/filling, caulking, light sanding/abrading, and "feather edge" sanding.

.3 Level 3 - Superior:

.1 The level 3, superior, surface preparation level incorporates the requirements of Levels 1 and 2 with added emphasis on the quality of appearance of finish painted surfaces. This level of surface preparation includes filling, patching, taping cracks in drywall, and properly dealing with "nail pops," approximate matches to existing textures, and thorough sanding to minimize existing runs, sags, brush/roller marks, and the surface profile of cracked and peeling areas, and other existing surface defects. Under this level of preparation the general surface profile is retained but defects causing abrupt surface profile differences exceeding 1/16 inch or 62.5 mils will be corrected.

.4 Level 4: Supreme:

.1 The Level 4, supreme, surface preparation level incorporates the requirements of Levels 1, 2 and 3 with even more emphasis on the quality of appearance of finish painted surfaces. Under this level of surface preparation, all necessary preparation techniques will be employed to improve the quality of appearance except Restoration/Resurfacing. Thorough filling and sanding will be accomplished to eliminate defects causing abrupt surface profile differences exceeding 1/32 inch or 31 mils.

.5 Level 5 - Restoration/Resurfacing:

.1 This degree of surface preparation is required when existing conditions indicate that the surfaces are severely deteriorated or there is substrate damage. Existing coatings may be completely or nearly completely removed. Abrasion, chemical removers or applied heat may be employed in order to remove a failed coating and/or to expose a failing substrate. Substrates may have to be completely replaced, repaired or resurfaced.

1.2 REFERENCES

.1 Department of Justice Canada (Jus)

.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33

.2 Environmental Protection Agency (EPA)

.1 EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 - 1995, (for Surface Coatings).

.3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.4 Master Painters Institute (MPI)

.1 MPI Architectural Painting Specifications Manual, 2004.

.5 National Fire Code of Canada - 1995

.6 Society for Protective Coatings (SSPC)

.1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

.7 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

1.3 QUALITY ASSURANCE

.1 Qualifications:

.1 Contractor: minimum of five (5) years proven satisfactory experience. Provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.

.2 Journeymen: qualified journeymen who have "Tradesman Qualification Certificate of Proficiency" engaged in painting work.

.3 Apprentices: working under direct supervision of qualified trades person in accordance with trade regulations.

.4 Paint materials such as linseed oil, shellac, and turpentine to be highest quality product of an approved manufacturer and to be compatible with other coating materials as required.

.5 Retain purchase orders, invoices and documents to prove conformance when requested by Consultant.

.2 Mock-Ups:

.1 Construct mock-ups in accordance with Section 01 45 00 – Quality Control.

.1 Provide full-sized mock-up in areas designated by Consultant Prepare and paint designated surface, area, room or item (in each colour scheme) to specified requirements, with specified paint or coating showing selected colours, gloss/sheen, textures. The sample is to include surface preparation, and the application of the primer, intermediate, finish coat and touch-up materials.

.2 Mock-up area shall leave exposed a sampling of the approved substrate before and after any specified surface preparation for the system mock-up. In addition, there should be left a separate and individual sampling of each designated and subsequently applied coating and any intercoat surface preparation.

.3 Mock-up will be used:
.1 To judge workmanship, substrate preparation, operation of equipment and material application and workmanship to MPI Architectural Painting Specification Manual standards.

.4 Locate where directed.

.5 Allow 48 hours for inspection of mock-up before proceeding with work.

.6 Standard of Acceptance: mock-up and subsequent paint standards shall be examined without magnification at a distance of thirty-nine (39) inches or one (1) meter, under finished lighting conditions and from a normal viewing position.

.7 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work to Consultant approval Remove mock-up and dispose of materials when no longer required and when directed by Consultant.

.3 Health and Safety:
.1 Do construction occupational health and safety in accordance with Section 01 35 29 – Health and Safety Requirements.

1.4 MANUFACTURER'S FIELD SERVICES

.1 Arrange for initial job start-up site attendance, periodic site attendance of paint manufacturer's technical representative during installation work, together with written report.

.2 The Contractor must at all times enable and facilitate access to the work site by said representative.

.3 Notify Consultant of date and time of inspection, a minimum of 48 hours prior to inspection. Provide one copy of manufacturer's report to the Consultant within 48 hours of inspection being carried out.

1.5 SCHEDULING

.1 Submit work schedule for various stages of painting to Consultant for review. Submit schedule minimum of 48 hours in advance of proposed operations.

.2 Obtain written authorization from Consultant for changes in work schedule.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
.1 Submit product data and instructions for each paint and coating product to be used.
.2 Submit product data for the use and application of paint thinner.
.3 Submit two (2) copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 – Submittal Procedures. Indicate VOCs during application and curing.

.3 Samples:
.1 Submit full range colour sample chips to indicate where colour availability is restricted.
.2 Submit duplicate 8” x 12” sample panels of each paint, stain, clear coating, special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:
.1 1/8” plate steel for finishes over metal surfaces.
.2 1/2" birch plywood for finishes over wood surfaces.
.3 / 2” concrete block for finishes over concrete or concrete masonry surfaces.
.4 1/2” gypsum board for finishes over gypsum board and other smooth surfaces.
.5 3/8” maple for finishes over wood surfaces.
.3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
.4 Test reports: submit certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
.1 Lead, cadmium and chromium: presence of and amounts.
.2 Mercury: presence of and amounts.
.3 Organochlorines and PCBs: presence of and amounts.
.5 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.6 Manufacturer's Instructions:
.1 Submit manufacturer's installation and application instructions.
.7 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals as well as separately submitted package to the University Manager of Architectural Services which includes following:
.1 Product name, type and use.
.2 Manufacturer's product number.
.3 Colour numbers and name.
.4 Sheen
.5 Point of purchase
.6 Floor plan showing placement of all colours.
.7 MPI Environmentally Friendly classification system rating.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Packing, Shipping, Handling and Unloading:
.1 Pack, ship, handle and unload materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's written instructions.

.2 Acceptance at Site:
.1 Identify products and materials with labels indicating:
.1 Manufacturer's name and address.
.2 Type of paint or coating.
.3 Compliance with applicable standard.
.4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Storage and Protection:
  .1 Provide and maintain dry, temperature controlled, secure storage.
  .2 Store materials and supplies away from heat generating devices.
  .3 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.

.5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.

.7 Remove paint materials from storage only in quantities required for same day use.

.8 Fire Safety Requirements:
  .1 Provide one 9 kg / 20 lbs. Type ABC dry chemical fire extinguisher adjacent to storage area.
  .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
  .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

1.8 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:
  .1 Ventilate enclosed spaces.
  .2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.
  .3 Provide continuous ventilation for seven days after completion of application of paint.
  .4 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
  .5 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:
  .1 Unless pre-approved written approval by Consultant and product manufacturer, perform no painting when:
    .1 Ambient air and substrate temperatures are below 10 degrees C.
    .2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.
    .3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.
    .4 The relative humidity is under 85% or when the dew point is more than 3 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.
    .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
    .6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.

.2 Perform painting work when maximum moisture content of the substrate is below:
  .1 Allow new concrete and masonry to cure minimum of 28 days.
  .2 15% for wood.
  .3 12% for plaster and gypsum board.
.3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".
.4 Test concrete, masonry and plaster surfaces for alkalinity as required.

.3 Surface and Environmental Conditions:
.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.
.3 Apply paint when previous coat of paint is dry or adequately cured.

.4 Additional interior application requirements:
.1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.2 Acceptable manufacturers:
.1 Sherwin Williams
.2 ICI
.3 Benjamin Moore
.4 General Point

.3 Provide paint materials for paint systems from single manufacturer.

.4 Conform to latest MPI requirements for interior painting work including preparation and priming.

.5 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.

.6 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required.

.7 Provide paint products meeting MPI "Environmentally Friendly" E2 or E3 ratings based on VOC (EPA Method 24) content levels.

.8 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids:
.1 Water-based Water soluble Water clean-up.
.2 non-flammable biodegradable.
.3 Manufactured without compounds which contribute to ozone depletion in the upper atmosphere.
.4 Manufactured without compounds which contribute to smog in the lower atmosphere.
.5 Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.

.9 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

.10 Flash point:61.0 degrees C or greater for water-borne surface coatings and recycled water-borne surface coatings.

.11 Ensure manufacture and process of both water-borne surface coatings and recycled water-borne surface coatings does not release:
- .1 Matter in undiluted production plant effluent generating 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to natural watercourse or sewage treatment facility lacking secondary treatment.
- .2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to natural watercourse or a sewage treatment facility lacking secondary treatment.

.12 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes to meet minimum "Environmentally Friendly" E2 rating.

.13 Recycled water-borne surface coatings to contain 50 % post-consumer material by volume.

.14 Recycled water-borne surface coatings must not contain:
- .1 Lead in excess of 600.0 ppm weight/weight total solids.
- .2 Mercury in excess of 50.0ppm weight/weight total product.
- .3 Cadmium in excess of 1.0ppm weight/weight total product.
- .4 Hexavelant chromium in excess of 3.0 ppm weight/weight total product.
- .5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.

2.2 COLOURS

.1 Consultant will provide Colour Schedule after Contract award.

.2 Colour schedule will be based upon selection of six (6) base colours and four (4) accent colours. Not more than ten (10) colours will be selected for entire project and not more than four colours will be selected in each area.

.3 Selection of colours from manufacturers full range of colours.

.4 Where specific products are available in restricted range of colours, selection based on limited range.

.5 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. Obtain written approval from Consultant for tinting of painting materials.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer's instructions. . If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Consultant.

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

Gloss Level-Category	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 – (Matte Finish)	Max. 5	Max. 10
Gloss Level 2 – (Velvet)	Max.10	10 to 35
Gloss Level 3 – (Eggshell)	10 to 25	10 to 35
Gloss Level 4 – (Satin)	20 to 35	min. 35
Gloss Level 5 – (Semi-Gloss)	35 to 70	
Gloss Level 6 – (Traditional Gloss)	70 to 85	
Gloss Level 7 – (High Gloss)	More than 85	

.2 Gloss level ratings of painted surfaces as indicated and as noted on Finish Schedule.

2.5 INTERIOR PAINTING SYSTEMS

.1 Concrete horizontal surfaces: Floors and stairs:
- .1 INT 3.2C - Epoxy finish.
- .2 INT 3.2F - Concrete floor sealer.
- .3 INT 3.2G - Waterborne concrete floor sealer.

.2 Masonry units: smooth and split face block and brick:
- .1 INT 4.2G Epoxy (tile-like) finish for wet environments.

.3 Structural steel and metal fabrications: columns, beams, joists:
- .1 INT 5.1R - High performance architectural latex gloss level 5 finish.

.4 Galvanized metal: doors, frames, railings, misc. steel, pipes, overhead decking, and ducts.
- .1 INT 5.3M - High performance architectural latex gloss level 5 finish.
- .2 (over self-priming epoxy) gloss level 6 finish.
- .3

.5 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:
- .1 INT 9.2M - Institutional low odour/low VOC gloss level 3 finish.

2.6 SOURCE QUALITY CONTROL

.1 Perform following tests on each batch of consolidated post-consumer material before surface coating is reformulated and canned. Testing by laboratory or facility which has been accredited by Standards Council of Canada.
- .1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.
- .2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.
- .3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

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.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.2 GENERAL

.1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

.3 If sprayed applied, all walls and ceilings must be back-rolled on final coat.

.4 Apply paint using brushes and rollers of high quality grade and as appropriate for the task.

.5 Existing glossy painted surfaces shall be properly prepared by cleaning and deglossing.

.6 Patch Painting will not be acceptable, total affected area shall be painted. Terminate painting only at corners or joints.

.7 The paint contractor is responsible for protection of all adjacent surfaces. The contractor shall at all times protect those surfaces with approved materials.

.8 Enamel and varnish undercoats are to be sanded smooth prior to the re-coating. Tops and bottoms of wood and metal doors are to be finished in the same manner as door facing.

.9 New plaster and other masonry surfaces shall not be primed until it has been determined these substrates have dried sufficiently to safely accept paint. Unacceptable moisture content should be reported by appropriate authority.

.10 Paints, stains, and coatings shall be specifically manufactured for the intended use.

.11 The final coats to exhibit uniformity of colour and uniformity of sheen across the full surface area.

.12 Ensure compatible paint products are being used on all surfaces.

.13 All walls and ceilings, new or existing shall receive at least two finish coats of the specified paint.

3.3 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Maximum moisture content as follows:
  .1 Stucco, plaster and gypsum board: 12%.
  .2 Concrete:12%.
  .3 Wood:15%.

3.4 PREPARATION

.1 Protection:
  .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Consultant.
  .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
  .3 Protect factory finished products and equipment.
  .4 Protect passing pedestrians, building occupants and general public in and about the building.

.2 Surface Preparation:
  .1 Surface preparation Level 4 – Supreme.
  .2 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
  .3 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
  .4 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Consultant.

.3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
  .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
  .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, grease, oil and other surface contaminants.
  .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
  .4 Allow surfaces to drain completely and allow to dry thoroughly.
  .5 Patch, repair, and smoothen minor substrate defects and deficiencies, e.g. machine, tool and sand paper marks, shallow gouges, pin holes, marks, and nibs.
  .6 Remove all rust, scale, loose paint and other deleterious matters from existing surfaces which require re-painting. Thoroughly clean and prepare such surfaces to accept positive and permanent bond of new paint finish. If such preparation exposes bare surface, provide touch up primer.
  .7 Where finish hardware has been installed, remove, store, and re-install finish hardware to accommodate painting. Do not clean hardware with solvent that will remove permanent lacquer finishes.
  .8 Clean existing cementitious surfaces by pressure washing, indicate on drawings, with a TSP solution and pressure range of 1500 - 4000 PSI at 6 - 12". Rinse areas with clean water and allow to thoroughly dry. Provide for collection and disposal of water.
  .9 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
  .10 Use trigger operated spray nozzles for water hoses.
  .11 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.

.4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
  .1 Apply vinyl sealer to manufacturer's written instructions to MPI #36 over knots, pitch, sap and resinous areas.
  .2 Apply wood filler to nail holes and cracks.
  .3 Tint filler to match stains for stained woodwork.

.6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 3'3".

.7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes, blowing with clean dry compressed air, or vacuum cleaning.

.8 Touch up of shop primers with primer as specified.

.9 Do not apply paint until surfaces are properly prepared in accordance with manufacture's written recommendations.

3.5 APPLICATION

.1 General:
  .1 Finish all exposed to view unfinished materials and all previously painted surfaces in area of new Work and as scheduled.
  .2 Finish paint all primed surfaces.
  .3 Do not paint baked enamel, chrome plated, stainless steel, aluminum or other surfaces finished with final finish in factory.
  .4 Provide finish uniform in sheen, colour and texture, free from streaks, shiners and brush or roller marks or other defects.
  .5 Paint entire plane of areas exhibiting incomplete or unsatisfactory coverage and of areas, which have been cut and patched. Patch paint will not be accepted.
  .6 Sand smooth enamel and varnish undercoats prior to recoating.
  .7 Apply primer coat soon after surface preparation is completed to prevent contamination of substrate.
  .8 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.
  .9 Apply coats of paint continuous film of uniform thickness.
    .1 Repaint thin spots or bare areas before next coat of paint is applied.
  .10 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
  .11 Sand and dust between coats to remove visible defects.
  .12 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting window stool ledges.
  .13 Finish closets and alcoves as specified for adjoining rooms.
  .14 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

.2 Apply paint by brush, roller, air sprayer, airless sprayer. Method of application to be as approved by Consultant. Conform to manufacturer's application instructions unless specified otherwise.

.1 Brush and Roller Application:

.1 Apply paint in uniform layer using brush and/or roller type suitable for application.

.2 Work paint into cracks, crevices and corners.

.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.

.5 Remove runs, sags and brush marks from finished work and repaint.

.2 Spray application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.

.4 Brush out immediately all runs and sags.

.5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.

.6 Spray paint all doors and frames scheduled to be painted. Final coat may be brushed or rolled to accommodate finished adjacent surfaces.

.7 Spray paint overhead doors. Doors to be spray painted in a controlled environment (automotive paint booth).

.3 Caulking:

.1 The application of painter’s caulk shall be assumed within the scope of work:

.1 Joints between wood or wood composite materials, trim, baseboard, molding, and casements. These joints include and are limited to wood to wood or wood composite substrates, and wood to gypsum drywall, plaster or similar wall surfaces. These joints shall only be between field painted surfaces.

.2 The application of painter’s caulk shall be assumed not within the scope of work:

.1 Surface defects, cracks, joints, voids or holes greater than 1/8 inch (3.18mm) wide, deep or across in wood, masonry, gypsum drywall, plaster or any other substrate.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.

.2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.

.3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.

.4 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.5 Do not paint over nameplates.

.6 Keep sprinkler heads free of paint.

.7 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.

.8 Paint fire protection piping red.

.9 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.10 Paint natural gas piping yellow.

.11 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

.12 Do not paint interior transformers and substation equipment.

3.7 SITE TOLERANCES

.1 Walls: no defects visible from a distance of 3’-0” at 90 degrees to surface.

.2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.8 FIELD QUALITY CONTROL

.1 Interior painting and decorating work shall be inspected by a Paint Inspection Agency (inspector) acceptable to the specifying authority and local Painting Contractor's Association. Painting contractor shall notify Paint Inspection Agency a minimum of one week prior to commencement of work and provide a copy of project painting specification, plans and elevation drawings (including pertinent details) as well as a Finish Schedule.

.2 Interior surfaces requiring painting shall be inspected by Paint Inspection Agency who shall, Prior to commencing with interior painting Work, examine surfaces to be painted for defects and acceptance. Notify Consultant and General Contractor in writing of defects or problems, prior to commencing painting work, or after prime coat shows defects in substrate.

.3 Commence with interior painting Work only after preparation, repair or replacement of such noted defects are corrected.

.4 Where "special" painting, coating or decorating system applications (i.e. elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Consultant.

.5 Manufacturer's Field Services: Schedule site visits, to review Work and obtain written reports from manufacturer verifying compliance of Work at 25%, 65% and at completion of the Work, in handling, applying, finishing, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 – MANUFACTURE’S FIELD SERVICES.

.6 Standard of Acceptance:
  .1 Walls: no defects visible from a distance of 3'-0" at 90 degrees to surface.
  .2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.
  .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

.7 Field inspection of painting operations to be carried out by independent inspection firm as designated by Consultant.

.8 Advise Consultant when each applied paint coat may be inspected. Do not recoat until directed by Consultant in writing. Tint each coat slightly to differentiate between applied coats.

.9 Cooperate with inspection firm manufacturer's representative and provide access to areas of work.

.10 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Consultant.

3.9 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.
  .1 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

3.10 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Consultant. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Consultant.

3.11 CLEANING

.1 Proceed in accordance with Section 01 74 11 – Cleaning.
  .1 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Aluminum Association (AA):
- .1 DAF 45-03 (R2009), Designation System for Aluminum Finishes.

.2 American National Standards Institute (ANSI):
- .1 ANSI A135.4-2004, Hardboard Standard.
- .2 ANSI A208.1-2009, Particleboard.
- .3 ANSI A208.2-2009, Medium Density Fiberboard for Interior Use.

.3 ASTM International:
- .1 ASTM A 653/A 653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM A 924/A 924M-14, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.4 CSA International:
- .1 CSA O121-08 (R2013), Douglas Fir Plywood.
- .2 CSA O151-09 (R2014), Canadian Softwood Plywood.
- .3 CAN/CSA-Z809-08, Sustainable Forest Management.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for whiteboards and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Installation Drawings:
- .1 Submit installation drawings.
- .2 Indicate location, type, size, panel arrangement, backing, hardware, anchor or mounting details, frame or trim and accessories.

.4 Samples:
- .1 Submit duplicate 300 x 300 mm / 12” x 12” sample of whiteboard and 300 mm long sample of each type trim.

.5 Closeout Submittals:
- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Affix maintenance instruction labels to whiteboards.

1.3 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Manufacturer/Source: Obtain each type of glass product from a single primary glass manufacturer and a single manufacturer/fabricator for each glass product type.

.3 Installer Qualifications: Experienced Installer with minimum of 5 successful completed projects of similar materials and scope, approved by glass product manufacturer/fabricator.

.4 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.4 WARRANTY

.1 Provide a 5 year limited Warranty on Manufacturer's standard form, signed by manufacturer, agreeing to provide replacement glass for units that display delamination exceeding those allowed by ASTM C 1172

.2 Warranty for Laminated Glass: Manufacturer/fabricator's standard form, signed by manufacturer/fabricator, agreeing to replace laminated-glass units that display edge separation, delamination, and blemishes exceeding those allowed by ASTM C 1172, within five years of date of manufacture.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect whiteboards from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Laminating adhesive: to manufacturer's standard.

.2 Joint reinforcement: concealed mechanical jointing system to provide straight, rigid, continuously supported, tight butt, flush joints at surface.

.3 Anchor clips, brackets and fasteners: concealed type recommended by whiteboard manufacturer selected by Consultant for fixed mounting.

.4 Facings:
- .1 to CAN/CGSB-12.9, 5/16" thick magnetic laminated glass complete with opacifier coating, colour as later selected by Consultant from manufacturer’s complete colour range.
  - .1 Acceptable product: ‘Opaci-Coat 300’ by Industrial Control Development Inc., or approved alternate.

2.2 COMPONENTS

.1 Extruded aluminum: aluminum Association alloy AA 6063-T5. Minimum 1.5 mm / $^{1}/_{16}$" thick.

2.3 TRIM AND ACCESSORIES

.1 Fixed magnetic whiteboards:

.1 Material: 1.5 mm / $^{1}/_{16}$" minimum wall thickness, extruded aluminum clear anodized sections AA6063-T5, satin finish.

.2 Perimeter trim: anodoixes aluminum perimeter trim and transitions between the whiteboards and tile.

.3 Marker rail below each board:

.1 65 mm / 2½" deep x full width of board removable aluminum magnetic accessory tray smooth angle cut ends, finish to match trim, or approved alternate.

.4 Top and bottom tails: anodized aluminum mounting rails as recommended by the manufacturer.

2.4 FABRICATION

.1 Fabricate whiteboard panels to sizes indicated.

.2 Factory prepare whiteboards, consisting of facing sheet, with core and backing sheet with adhesive in accordance with manufacturer's recommendations.

.3 Make finished panels flat and rigid and fit with joint reinforcement.

.4 Fit joints between abutting whiteboard panels with joint reinforcement except where covering trim is required.

.5 Factory fit assemblies too large for shipment to site in one piece, disassemble for delivery and make ready for reassembly on site.

2.5 MANUFACTURER

.1 Acceptable Product: 5/16" 'GlasPro-GL Magnetic Glass' by Glass Pro, or approved alternate.

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 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for whiteboard installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.3 INSTALLATION

.1 Install whiteboards where indicated in accordance with manufacturer's instructions, parallel to floor with uniform vertical surface, plumb and level, to provide rigid, secure writing surface.

.2 Install trim and framing around whiteboard panels.
- .1 Make mitres and joints to hair-line fit, free of rough edges.
- .2 Use concealed brackets to reinforce and hold joints tight and flush.
- .3 No exposed fasteners permitted.
- .4 Overlap trim 6 mm onto panels.

.3 Mechanical attachment:
- .1 To concrete or solid masonry use lag screw and expansion bolts or screws and fibre plugs as appropriate for stresses involved.
- .2 To hollow masonry use toggle bolts or equivalent.
- .3 To wood or sheet metal use screws. Secure into framing members in stud walls.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
- .1 Leave Work area clean at end of each day.
- .2 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .3 Clean surfaces after installation using manufacturer's recommended cleaning procedures.
- .4 Clean aluminum with damp rag and approved non-abrasive cleaner.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by whiteboard installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International:

.1 ASTM A 167-99 (2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.2 ASTM B 456-11, Standard Specification for Electrodeposited Coatings of Copper plus Nickel Plus Chromium and Nickel Plus Chromium.

.3 ASTM A 653/A 653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.4 ASTM A 924/A 924M-14, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.

.2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.

.3 CGSB 31-GP-107MA-90, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.

.3 Canadian Standards Association (CSA International):

.1 CAN/CSA-B651.2-07 (R2012), Accessible Design for the Built Environment.

.2 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA Z316.6-14, Evaluation of single-use and reusable medical sharps containers for biohazardous and cytotoxic waste.

1.2 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 data sheets and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.

.4 Samples:

.1 Submit samples if requested by Consultant.

.2 Samples will be returned for inclusion into work, if requested.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.4 MAINTENANCE MATERIAL SUBMITTALS

.1 Tools:

.1 Provide special tools required for assembly, disassembly or removal for toilet and bath accessories in accordance with requirements specified in Section 01 78 00 – Closeout Submittals.

.2 Deliver special tools to Owner.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect toilet and bathroom accessories from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Sheet steel: to ASTM A 653/A 653M with ZF001 designation zinc coating.

.2 Stainless steel sheet metal: to ASTM A 167, Type 304, with satin finish.

.3 Stainless steel tubing: to AISI No. 4, commercial grade, seamless welded, 1.2mm18 gauge wall thickness, satin luster finish.

.4 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.2 MANUFACTURER

.1 Products specified are manufactured by Frost unless otherwise indicated. Should an alternate product to Frost be specified, provide only the specified product or an approved alternate.

.2 Equivalent products by Bobrick or Watrous will be acceptable to Frost products unless otherwise indicated.

.3 Supply only those products listed or approved alternates in accordance with Section 00 21 13 – Instructions to Bidders.

.4 Provide all accessories with concealed fasteners and concealed tamperproof screws.

2.3 COMPONENTS

.1 The following toilet and bath accessories are to be supplied by the Owner, and installed by the Contractor:

- .1 Toilet Tissue Dispenser (TTD1): '1093W' by iView
- .2 Soap/Sanitizer Dispenser (SD): STOKO Spray Dispenser or '9325 Foam-eeze' by Impact Products
- .3 Towel Dispenser (TD): '1091W' by iView
- .4 Sanitary Napkin Disposal (SND): 'Automatic Feminine Hygiene Disposal Service' by Citron Hygiene
- .5 Biohazard Sharps Disposal (BSD): Frost 878.

.2 The following toilet and bath accessories are to be supplied and installed by the Contractor:

- .1 Adult Change Station (ACS):
  - .1 Size: 810 mm wide x 1830 mm
  - .2 Operation: folding electrically height adjustability between 500 mm and 850 mm above the finished floor
  - .3 Fastening: wall mounted as per manufacturers instructions
  - .4 Capacity: designed to carry a minimum load of 1.33kN
  - .5 Accessories: roll guard
  - .6 Acceptable Product: 'Nursing Bench 1000' by Pressalit Care.
- .2 Toilet tissue dispenser with shelf (TTD2): double roll type 12-1/2" long x 1-1/2" high x 4" deep, surface mounted, chrome plated steel frame, capacity of 500 double ply roll, roll under spring tension for controlled delivery.
  - .1 Acceptable product (double roll): 'B-2740' by Bobrick or approved alternate
- .3 Surface mounted waste receptacle (WR): 304 stainless steel, surface mounted, waste receptacle, open top loading, approximately 24-1/4" high x 15-1/4" wide x 11-1/2" deep:
  - .1 Acceptable product: "Code 400-14C" by Frost.
- .4 Grab bars: 1 ¼" diameter 18 ga. wall tubing of stainless steel, 3 ¼" diameter wall flanges, exposed concealed screw attachment, flanges welded to tubular bar, provided with steel back plates and all accessories. Knurl bar at area of hand grip. Grab bar material and anchorage to withstand downward pull of 2.2 kN.
  - .1 Acceptable product: 'Code 1000 series', by Frost.
    - .1 GB2: L-shaped, 760 x 760 mm / 30" x 30" long.
      - .1 Acceptable material: 'Code 1003 30" x 30"' by Frost.
    - .2 GB1: 24" long straight bar.
      - .1 Acceptable material: 'Code 1001-24' by Frost.
- .5 Robe hook (RH): stainless steel , single robe hook,
  - .1 Acceptable product: "Code 1138S" by Frost.
- .6 Fixed Mirror: refer to Section 08 80 50 – Glazing.
- .7 Shelf: heavy duty, 22 ga. stainless steel brushed finish with rounded corners, size as indicated.
  - .1 Acceptable product: '950-4' by Frost
- .8 Toilet Backrest (BR): 1 ¼" tubing stainless steel finish, solid plastic laminate backrest.
  - .1 Acceptable product:
    - .1 'Code 1028' by Frost.

.9 Infant Change Table: Wall Surface Mounted (ICT - WSM): high density polyethylene, 912 mm / 36” long x 517 mm / 20” deep (in down position) x 565 mm / 22¼" high, with deep concave flip down table with 100 mm / 4” depth in up position, 115 kg. (250 lbs.) load capacity, oversized hinge with safety stop system, child protection strap, diaper bag hooks an tamper proof hardware.

.1 Acceptable product: ‘Code 1125’ by Frost.

.10 Mop and Broom Holder: formed channel, 20 ga., Type 304 No. 4 brushed finish, size indicated.

.1 Acceptable material:

.1 (MBH 2): 915 mm / 36” long with 4 holders. ‘Code 1114’, by Frost.

2.4 FABRICATION

.1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.

.2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.

.3 Brake form sheet metal work with 1/16” radius bends.

.4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

.5 Back paint components where contact is made with building finishes to prevent electrolysis.

.6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CAN/CSA-G164.

.7 Shop assemble components and package complete with anchors and fittings.

.8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.

.9 Provide steel anchor plates and components for installation on studding and building framing.

2.5 FINISHES

.1 Chrome and nickel plating: to ASTM B 456, satin polished finish.

.2 Baked enamel: condition metal by applying one coat of metal conditioner to CGSB 31-GP-107Ma, apply one coat Type 2 primer to CAN/CGSB-1.81 and bake, apply two coats Type 2 enamel to CAN/CGSB-1.88 and bake to hard, durable finish. Sand between final coats. Colour as later selected from standard colour range by Consultant.

.3 Manufacturer's or brand names on face of units not acceptable.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrates and surfaces to receive toilet and bathroom accessories previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to toilet and bathroom accessories installation.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install and secure accessories rigidly in place as follows:

.1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.

.2 Hollow masonry units, existing plaster or drywall: use toggle bolts drilled into cell or wall cavity.

.3 Solid masonry, marble, stone or concrete: use bolt with lead expansion sleeve set into drilled hole.

.4 Toilet and shower compartments: use male to female through bolts.

.2 Install grab bars on built-in anchors provided by bar manufacturer.

.3 Install adult and infant change stations in accordance with load and support requirements of the Ontario Building Code and recommendations from the manufacturer.

.4 Use concealed tamper proof screws/bolts for fasteners.

.5 Fill units with necessary supplies shortly before final acceptance of building.

3.3 ADJUSTING

.1 Adjust toilet and bathroom accessories components and systems for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by toilet and bathroom accessories installation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Aluminum Association (AA)
- .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 ASTM International
- .1 ASTM A 167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM B 456-11, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
- .3 ASTM A 653/A 653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .4 ASTM A 924/A 924M-14, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
- .2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.
- .3 CGSB 31-GP-107MA-90, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.

.4 CSA International
- .1 CAN/CSA-B651.2-0 7(R2012), Accessible Design for the Built Environment.
- .2 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.2 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 data sheets and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details.

.4 Samples:
- .1 Submit samples if requested by Consultant.
- .2 Samples will be returned for inclusion into work.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for miscellaneous specialties for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.4 MAINTENANCE MATERIAL SUBMITTALS

.1 Tools:
- .1 Provide special tools required for assembly, disassembly or removal for miscellaneous specialties in accordance with requirements specified in Section 01 78 00 – Closeout Submittals.
- .2 Deliver special tools to Owner.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect miscellaneous specialties from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

PART 2 – PRODUCTS

2.1 TACTILE WARNING SURFACE

.1 Stainless steel tactile indicator domes: shall be drilled and set into existing terrazzo landings.
- .1 Size: 23 mm diameter truncated dome
- .2 Conformance: CSA B651-12,
- .3 Finish: Stainless Steel
- .4 Acceptable product: UAS-SS2218’ by Urban access Solutions or approved alternate.

2.2 WALL PROTECTION

.1 Corner guards: provide 4” x 4” x 40” stainless steel corner guards at all exposed corners.
- .1 Acceptable products:
  - .1 Corner Guard: ‘Code 1117’ by Frost, or approved alternate.

.2 Chair rails: provide 4” high chair rail, lengths and locations as indicated, colour to later select by consultant from manufacturers full range of colours.
- .1 Acceptable products:
  - .1 Chair rail: ‘SCR-40N’ as manufactured by Construction specialties, or approved alternate.

2.3 NON-SLIP STAIR NOSING

.1 Non-slip Stair Nosing: mineral coated high-friction slip resistant tape, 76 mm / 3” wide tread width suitable for installation on exiting stair treads.
- .1 Acceptable product: ”Safety-Walk Slip Resistant General Purpose Treads’, by3M or approved alternate.

2.4 MAILBOXES AND DROP BOX

.1 Recessed Secure Mail Drop:
- .1 Acceptable product: 'Model 1700' by Canadian Mailbox Company.
- .2 Options:
  - .1 Rear collection box complete with high security Medeco lock.
- .3 Depth: Custom depth to fit flush mounted within a 152mm metal stud assembly.
- .4 Height: custom height as indicated to suit application.
- .5 Finish: brushed stainless steel.

.2 Mailboxes
- .1 Acceptable product: 'Model 1301' by Canadian Mailbox Company.
- .2 Access: Front loading
- .3 Mailbox Size: 3" x 12-7/8" size 'C'
- .4 Quantity: 30 compartment – 3 wide x 10 high
- .5 Finish: clear anodized.
- .6 Options:
  - .1 Mail slot in each door 1/2" (12.7mm) High x 10" (254mm) Wide

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrates and surfaces to receive miscellaneous specialties previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to miscellaneous specialties installation.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install and secure miscellaneous specialties rigidly in place where required in accordance with manufacturer's instructions.

.2 Use concealed fasteners where possible.

.3 Install miscellaneous specialties where indicated.

.4 Install and secure miscellaneous specialties rigidly in place, level and true to manufacturers written recommendations using concealed fasteners.

3.3 WALL PROTECTION

.1 Preparation:
- .1 Surface preparation: Prior to installation, clean substrate to remove dirt, debris and loose particles. Perform additional preparation procedures as required by manufacturer's instructions.

.2 Installation:

.1 Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.

.2 Install the work of this section in strict accordance with the manufacturer's recommendations using approved adhesive.

.3 Lay out centre line of wall protection both ways, to provide balanced sheets at room perimeter with sheet size not less than 50% of standard widths. Report all discrepancies immediately upon discovery to Consultant prior to commencing with work.

.4 Temperature at the time of installation must be between 18 and 24ºC with relative humidity not exceeding 80%. Maintained temperature and relative humidity for at least 48 hours following installation to allow for proper adhesive set up.

.5 Do not expose wall covering to direct sunlight during or after installation to prevent surface temperature to rise which may result in air bubbles and delamination.

.3 Cleaning:

.1 Immediately upon completion of installation, clean wall covering and accessories in accordance with manufacturer’s recommended cleaning method.

3.4 NON-SLIP STAIR NOSING

.1 Install non-slip stair nosings on each stair tread in accordance with manufacturer’s written instructions.

3.5 ADJUSTING

.1 Adjust miscellaneous specialty components and systems for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by miscellaneous specialties installation.

.3 Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB):
  .1 CAN/CGSB-44.40-01, Steel Clothing Locker.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
  .1 Provide manufacturer's printed product literature and data sheets for metal lockers and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
  .1 Indicate on drawings: type and class of locker, thicknesses of metal, fabricating and assembly methods, assembled banks of lockers, tops, rods, hooks, shelves, bases, trim, numbering, filler panels, end/back panels, doors, handles, locking method, ventilation method, finishes.

.4 Samples:
  .1 Submit duplicate 2” x 2” samples of colour and finish on actual base metal.
  .2 Samples will be returned for inclusion into work.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements:
  .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
  .1 Store materials off ground, indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  .2 Store and protect metal lockers from nicks, scratches, and blemishes.
  .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

.1 Lockers: to CAN/CGSB-44.40.
  .1 Double Tier: Class 2 - A bank of two or more lockers, freestanding tier: Class 2 - A bank of two or more lockers, freestanding.
  .2 Size: 305 mm / 12” wide x 455 mm / 18“ deep x 1830 mm / 72” high.
  .3 Steel thickness No. 14 MSG No. 20 MSG backs and sides.

.4 Assembly: welded.
.5 Top: 16 ga. sloped.
.6 Base: pre-manufactured 16 ga.
.7 Inside accessories (each compartment): one shelf and three hooks. Place shelf to provide 1” air space between shelf and back of locker for ventilation. Place shelf 12” from top..
.8 Doors: flush, one-piece double-wall envelope construction, steel thickness 20 ga. inner panel, 16 ga. outer panel, bonded to honeycomb core, enclosed on all edges.
.9 Accessories:
  .1 Rubber bumpers riveted to door to act as door stop
  .2 Clear anodized number plate on each locker, number as later directed by Consultant.
.10 Door handle: recessed handle stainless steel with brushed No 304 finish.
.11 Door Hinge: continuous piano hinge welded to frame and riveted to door.
.12 Filler panels / false fronts: 16 ga. thick, place where required, colour to match door.
.13 End Panels: where ends of lockers are exposed, provide 16 ga. end panels attached with concealed fasteners.
.14 Colour as later selected by Consultant from manufacturer's standard colour range, not more than two (2) colours.
.15 Acceptable products:
  .1 ‘Emperor’ by Hadrian, or approved alternate.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates and surfaces to receive metal lockers previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to metal locker installation.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Assemble and install lockers in accordance with manufacturer's written instructions.

.2 Securely fasten lockers to grounds and nailing strips.

.3 Install wall trim around recessed locker banks.

.4 Install filler panels (false fronts) where indicated and where obstructions occur.

.5 Install finished end panels to exposed ends of locker banks.

.6 Install locker numbers.

3.3 ADJUSTING

.1 Adjust metal lockers for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
  .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal locker installation.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Manually operated sunscreen roller shades (also referred to as roller blinds).

.2 Manually operated double-roller sunscreen and room-darkening shades (also referred to as roller blinds).

.3 Manually operated acoustic sound dampening shades (also referred to as acoustic blinds).

1.2 REFERENCES

.1 ASTM International
- .1 ASTM D 1784-11, Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
- .2 ASTM G 21-15 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's printed product literature and data sheets for roller blinds and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Fire-Performance Characteristics:
  - .1 Provide shade material tested in accordance with NFPA 701 - Vertical-Burn Test, rated “PASS”.

.3 Shop Drawings:
- .1 Indicate on drawings dimensions in relation to window jambs, operator details, head and sill anchorage details, hardware and accessories details.

.4 Samples:
- .1 Submit one representative working sample of each type roller blind.
- .2 Submit duplicate samples of manufacturer's standard colours for selection by Consultant.
- .3 After approval samples will be returned for incorporation into Work.

.5 Maintenance Data:
- .1 Submit methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.4 QUALITY ASSURANCE

.1 Obtain roller shades through one source from a single manufacturer with a minimum of 20 years experience in manufacturing products comparable to those specified in this section.

.2 Installer qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.

.3 Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

.4 Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

.5 Mock-Up: Provide a mock-up of one assembly of each type of blind for evaluation of mounting, appearance and accessories.

.1 Locate mock-up in window designated by Consultant.

.2 Do not proceed with remaining work until mock-up is approved in writing by Consultant.

.6 Acoustic Testing:

.1 Refer to Section 09 21 16 Gypsum Board Assemblies.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect roller blinds from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.6 WARRANTY

.1 Provide roller shade/acoustic shade hardware, chain and shade cloth with manufacturer's standard non-depreciating twenty-five year limited warranty.

.2 Roller Shade/Acoustic Shade Installation: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

.1 Design roller/acoustic blinds to following requirements:

.1 Allow wear susceptible parts to be replaceable by either user or manufacturer.

.2 Guarantee of at least five-years of available replacement parts following discontinue of products manufacture.

.3 Include instructions for replacing or repairing worn parts, including inventory numbers for parts and procedures for ordering replacement parts.

.4 Allow for refurbishing or return of used vertical louvre blinds.

.5 Permit effective disassembly of components in for recycling of materials.

.6 Include stamps on major plastic components indicating composition code to facilitate recycling efforts.

.2 Roller/Acoustic Shade Type:

.1 Shade Type 1: Manual operating, chain drive, sunscreen roller shades in all exterior windows of rooms and spaces shown on the Drawings.

.2 Shade Type 2: Manual operating interior, chain drive "double" solar and room darkening blackout roller shades, operating independently of each other, and related mounting systems and accessories.

.3 Shade Type 3: Manual operating interior, cord drive, acoustic honeycomb shades on both sides of all one-way mirror locations.

2.2 MANUFACTURER

.1 Roller Blinds Type 1 and 2 specified are manufactured by Sun Project Model. Equivalent products by the following manufacturer's will be acceptable:

.1 MechoShade Systems, Inc.

.2 Solarfective Products Limited.

.2 Acoustic Blinds: 'Duette FR Honeycomb Shades' by Hunter Douglas or approved alternate.

2.3 MATERIALS AND FABRICATION – ROLLER SHADES TYPE 1 AND TYPE 2

.1 Shade Cloth Roller:

.1 Visually Transparent Single-Fabric Shadecloth: single thickness non-raveling 0.030-inch thick vinyl fabric, woven from 0.018-inch diameter extruded vinyl yarn comprising of 21 percent polyester and 79 percent reinforced vinyl.

.1 Dense Linear Weave: 3 percent open, dense linear-weave pattern.

.2 Colour: As later selected by Consultant from manufacturer's complete colour range.

.2 Vinyl Room Darkening Shadecloth (Single-Fabric): blackout material, washable and colorfast laminated and embossed vinyl coated fabric, 0.012 inches thick blackout material, 0.81 lbs. per square yard, with a minimum of 62 threads per square inch.

.1 Colour: As later selected by Consultant from manufacturer's complete colour range.

.2 Shade Band:

.1 Shade Bands: Construction of shade band includes fabric, hem weight, hem-pocket, shade roller tube, and attachment of shade band to roller tube. Sewn hems and open hem pockets will not be accepted.

.1 Hem Pockets and Hem Weights: Provide fabric hem pocket and ends with RF-welded seams and concealed hem weights. Size continuous hem weights to suit shade band inside sealed hem pocket. Construct hem pocket and hem weights similar for all shades within one room.

.2 Shade band and Shade Roller Attachment:

.1 Size extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Minimum roller tube diameter:

.1 Manual shades: 1.55".

.2 Provide positive mechanical engagement with drive / brake mechanism.

.3 Provide positive mechanical attachment of removable / replaceable shade band to roller tube with "snap-on" snap-off" spline mounting, without removing shade roller from shade brackets.

.4 Use of adhesives, adhesive tapes, staples, and/or rivets to mounting spline will not be accepted.

.3 Shade Fabrication:

.1 Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.

.2 Fabricate unguided shadecloth with heat-sealed trimmed edges to:

.1 Hang flat without buckling or distortion.

.2 Hang straight without curling or raveling.

.3 Roll true and straight without shifting sideways more than 1/8 “ in either direction per 8’ of shade height due to warp distortion or weave design. Fabricate hem with:

.4 Bottom hem weights.

.1 Concealed hemtube.

.2 Exposed hemtube.

.3 Exposed blackout hembar with light seal.

.4 Exposed blackout hembar with polybond seal.

.3 Provide battens in standard shades from stainless steel or tempered steel as required to assure proper tracking and uniform rolling of the shadebands with width-to-height (W:H) ratios to manufacturer's recommendations.

.4 Railroaded shadebands: provide seams in railroaded multi-width shadebands with seam alignment to Consultant approval. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards.

.5 Provide battens for railroaded shades when width-to-height (W:H) ratios to meet or exceed manufacturer's to assure proper tracking and roll of shadebands.

.6 Blackout shadebands:

.1 Horizontally mounted, roll-formed stainless steel or tempered-steel battens not more than 3’ on centre, extending fully into side channels.

.2 Conceal battens with integrally-coloured fabric to match inside and outside colours of shadeband, in accordance with manufacturer's written recommendations.

.3 Batten pockets:

.1 Self-colored fabric front and back as required to eliminate any see through.

.2 RF welded into the shadecloth.

.3 Maximum 1 1/2" high, totally opaque.

.4 Components:

.1 Access and Material Requirements:

.1 Shade hardware to permit:

.1 Removal of shade roller tube from brackets without removing hardware and supports.

.2 Removal and re-mounting of the shade bands without removal of shade tube, drive or operating support brackets.

.2 Plastic components of shade hardware: Use only Delrin engineered plastics by DuPont, or approved alternate.

.2 Manual Operated Chain Drive Hardware and Brackets to provide:

.1 Universal, adjustable regular and offset drive capacity.

.2 Provide removable fascias complete with concealed fastening.

.3 Provide single chain for smooth operation of multiple shade bands to manufacturer's design criteria.

.4 Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors will not be accepted.

.5 Provide shade hardware constructed of minimum 1/8" minimum thick plated steel as required to support 150% of the full weight of each shade.

.6 Drive Bracket / Brake Assembly to provide:

.1 Fully integrated drive bracket with all accessories, including, but not limited to fascia, room darkening side / sill channels, centre supports and connectors for multi-banded shades.

.2 Rotating drive sprocket and brake assembly supported on a welded 3/8" minimum steel pin.

.3 Over-running clutch design brake during the raising and lowering of a shade and capable of withstanding a pull force of 50 lbs. in the stopped position.

.4 Permanently lubricated assembly for smooth operation in raising and lowering of shades.

.5 Fully independent of shade tube assembly and capable of removal and reinstallation without effecting roller shade limit adjustments.

.6 Acceptable product: 'Moduline' by Altex Sunproject.

.3 Drive Chain: #10 qualified stainless steel chain rated to 90 lb. minimum breaking strength.

.5 Accessories:

.1 Fascia (for Shade Type 1 and 2):

.1 Continuous removable extruded aluminum fascia of slim line design that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.

.2 Fascia capable of one-piece installation across two or more shade bands.

.3 Fascia to fully conceal brackets, shade roller and fabric on tube.

.4 Provide bracket / fascia end caps to conceal exposed roller shade and brackets.

.2 Room Darkening Side and / or Sill Channels (for Shade Type 2):

.1 Extruded aluminum with polybond edge seals and mounting brackets complete with concealed fastening and channels capable of accepting one-piece exposed blackout hembar with vinyl seal for side light and sill light control.

.2 Colour: Selected from manufacturer's standard colours.

.1 Colour: As later selected by Consultant from manufacturer's complete colour range.

2.4 MATERIALS AND FABRICATION – ACOUSTIC SHADES TYPE 3

.1 Shade Cloth:

.1 Opaque honeycomb construction to NFPA 701. Colour as later selected by consultant from manufacturers complete colour range.

.2 Spools:

.1 0.9 mm polyester cord on steel v-shaft and spools. Length to suit application.

.2 Spools spaced not more than 150 mm from end of slats and 550 mm on centre.

.3 Headrails:

.1 One piece steel channel with rolled edges, formed to provide sufficient strength to support blind without sagging, twisting or distorting; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats.

.2 Metal minimum 0.65 mm thick.

.4 Bottom rails:
- .1 Polyvinylchloride full-width section.
- .2 0.65 mm thick.
- .3 Colour to match slats.

.5 Bottom rail end caps:
- .1 Soft moulded plastic fitted snugly over ends of rails.
- .2 Colour to match slats.

.6 Clutch and gearbox: designed to permit ease of operation with minimum wear to cord.

.7 Valance: width as required to conceal headrail, same colour as slats.

.8 Cord locks: designed to provide smooth operation with feature to prevent accidental dropping of blinds.

.9 Installation brackets: end and centre type complete with safety locking caps to secure headrail and valance.

.10 Lift cords: continuous loop complete with universal chord tensioner, minimum tensile strength 689 kPa.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates and surfaces to receive roller blinds previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to roller blinds installation.
- .1 Visually inspect substrate.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

.1 Clean surfaces thoroughly prior to installation.

.2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

.1 Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2” to interior face of glass. Allow proper clearances for window operation hardware.

.2 Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

.3 Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

.4 Include centre brackets where necessary to prevent deflection of headrail.

.5 Adjust to provide for smooth operation without binding.

.6 Use non corrosive metal fasteners for installation, concealed in final assembly.

3.4 ADJUSTING

.1 Adjust roller blinds components for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

.3 Clean roller shade surfaces after installation, according to manufacturer's written instructions.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Touch-up, repair or replace damaged products before Substantial Completion.

.3 Repair damage to adjacent materials caused by roller blinds installation.

3.7 SCHEDULE

.1 Shade Type 1 – All exterior windows unless otherwise noted.

.2 Shade Type 2 – At exterior windows in the following rooms: Large Group Room 129, Large Group Room 233, Lounge 217, Viewing Rooms 214, and Viewing Room 228A.

.3 Shade Type 3 – Both sides at all interior one-way mirror locations.

END OF SECTION

University of Guelph Building #046

Guelph, Ontario

Vertical Transportation
specification
elevators

225882

August 2018

PART ONE - GENERAL

1.1 Summary

.1 Conform with requirements of Division 01, General Requirements, as it applies to the work of this Section.

.2 Provide labour, materials, products, equipment and services necessary for the following work at University of Guelph Building #046, Guelph, Ontario:

.1 Supply and installation of one machine-room-less traction passenger elevator as specified in Section 14 21 23.

1.2 Maintenance: warranty period

.1 Elevator maintenance shall commence upon Substantial Completion and shall be carried out in accordance with University of Guelph's Maintenance Agreement document, which is to be provided with the Bid and Contract Documents, for a period of twelve (12) months. Include all labour, materials, equipment, and services that are necessary to fulfill the requirements of preventive elevator maintenance in accordance with the requirements of ASME A17.1-2010/CSA B44-10 Safety Code for Elevators inclusive of Article 8.6.1.2, CSA B44.2-10, and the University of Guelph's maintenance requirements as provided in Section 14100, Maintenance Agreement.

.2 Make good any defect not resulting from vandalism or misuse, for a period of one year from the Date of Substantial Performance, or at any time during the maintenance contract. Warranty shall cover for both the labour and material associated with the replacement of such part(s).

.3 Costs for this maintenance to be included in the project costs.

1.3 Owner's General Terms and Conditions

.1 Abide by the Owner's General Terms and Conditions, including the University of Guelph Design Standard RD-02 Elevator.

.2 Where there is a conflict between the Owner's General Terms and Conditions and these specifications the Owner's Terms and Conditions take precedence.

1.4 Definitions of terms

.1 The term "Owner", as used herein, refers to University of Guelph.

.2 The term "Inspecting Authorities", as used herein, refers to authorized agents of governments and of insurance groups that are charged with the responsibility of carrying out periodic inspections and tests on vertical transportation equipment.

.3 The term "Consultant", as used herein, means KJA Consultants Inc. or such other entity selected by the Owner to fulfill the role of Consultant.

.4 The term "provide", as used herein, means to supply and install new equipment.

.5 The term "arrange", as used herein, means to provide the required features.

.6 The term "unit", as used herein, means any Elevator, Escalator, Dumbwaiter, Moving Walk, Material Lift or similar device mentioned in this Specification.

.7 The term "Code", as used herein, refers to the CAN/CSA-B44-10 Safety Code for Elevators and Escalators with updates and including Nonmandatory Appendices (which are deemed mandatory herein).

.8 The terms in the Specifications that are not otherwise defined shall have the definitions as given in the Code.

1.5 Singular and plural

.1 In all cases singular and plural shall be interchangeable and shall be applied as required to meet the sense and intent of the Specifications.

.2 Where the singular is employed it shall be interpreted as necessary, unless otherwise indicated, to apply to all equipment and devices required to produce a complete installation.

1.6 Pre-inspection check list

.1 Upon completion review each page of the specifications and initial each page at the bottom left to indicate that the work has been completed in compliance with the Specifications.

.2 Submit this initialled copy of the Specifications to the Consultant prior to requesting an inspection by the Consultant.

1.7 Inspection and acceptance

.1 When completed, carry out an inspection, witnessed by the Consultant, to see that the work is in compliance with the Specifications.

.2 Furnish a team of competent personnel, for one working day per unit, to assist in making these inspections.

.3 If the results of these inspections do not meet the requirements of the Specifications, make the appropriate corrections, and provide, as set out above, for another inspection.

.4 Give sufficient advance notice in writing so that the Consultant can arrange for his representative to witness these inspections.

1.8 Materials validity check

.1 Perform a general materials validity check of components and fastenings that under failure might create a dangerous situation, including, but not limited to, sheave bolts, welds, car slings, gears, worm shafts, sheave shafts, brakes, safeties, guide rails, car platform and any other retained component.

1.9 Acknowledgments

.1 The proposer acknowledges that the proposer has found no discrepancies nor any ambiguities in the specifications.

1.10 Submission of proposal

.1 Submission of a proposal will be considered presumptive evidence that the proposer is conversant with local facilities and conditions, requirements of the Contract Documents and of pertinent provincial and local codes, state of labour and material markets, and in the proposal has made due allowance for all contingencies.

1.11 Inability to complete contract

.1 Should there be a reasonable doubt that the work can be completed within the scheduled time because of labour disputes or any other cause, the Owner reserves the right, at the Owner's option, to cancel the contract.

.2 In the event this option is exercised, the payments for the work shall be made on a pro rata basis for materials and labour supplied to the time of cancellation and such material and work performed shall become the property of the Owner.

.3 Prior to exercising this option, the Owner shall give two weeks notice in writing of intention to cancel.

1.12 Materials and workmanship

.1 Provide all new materials and equipment.

.2 Install equipment in a neat, accurate, workmanlike manner.

1.13 Warranty of work

.1 Warrant that the materials, performance and workmanship are in accordance with the industry standard in every respect.

.2 Make good defects not due to improper use which may develop within one year from the date of Substantial Performance of the project.

.3 Warrant that the equipment performs to the standards set out herein.

.4 Neither the final payment nor any provision of the Contract Documents diminishes the responsibility for negligence or faulty materials or workmanship within the extent and period provided by law.

.5 Upon written notice remedy defects and pay expenses for damage to others resulting from defects.

1.14 Assignments

.1 Do not assign nor sublet the contract without the written consent of the Owner.

.2 Do not assign any payment due or to become due as a result of this contract without the written consent of the Owner.

1.15 Certificates of inspection

.1 Obtain and pay for certificates of approval and all other necessary permits and inspections.

.2 Prior to Substantial Performance, arrange for and pay for a safety inspection of the equipment by a government authority or, if that is not available, by a recognized independent private professional inspection organization.

.3 As a minimum, ensure that this inspection includes:

.1 Full load overspeed car safety tests if car safeties are provided;

.2 Empty car overspeed counterweight safety tests if counterweight safeties are provided;

.3 Pressure tests for hydraulic elevators;

.4 Full load full speed car buffer tests if oil buffers are provided;

.5 Empty car full speed counterweight buffer tests if counterweight oil buffers are provided;

.6 Full load full speed down direction brake tests if a traction machine is provided;

.7 Electrical safety circuit check;

.8 Door pressure tests;

.9 Tests of any other safety devices.

.4 Submit, prior to Substantial Performance inspection, the approved safety inspection report.

.5 Should more than one inspection for a licence or approval be required due to deficient work by others give sufficient advance notice of such deficient work to allow the Work to be completed prior to the time of the subsequent inspection.

.6 If sufficient advance notice of such deficient work has not been given, assume the cost of the additional inspections.

1.16 Changes in Work

.1 The Owner, without invalidating the contract, may order extra work or make changes by altering, adding to, or deducting from the Work, the contract sum being adjusted as agreed.

.2 Execute all such work under the conditions of the original contract except that any claim for extension of time caused thereby shall be adjusted at the time of ordering such change.

.3 The Consultant shall have authority to make minor changes in the Work, not involving extra cost and not inconsistent with the purpose of the contract.

.4 Otherwise do no extra work nor make any change unless in pursuance of written order from the Owner.

1.17 Equipment moving

.1 Provide floor protection and bracing so that equipment moving causes no damage to the building.

1.18 Claims for extra cost

.1 Give any claims for extra cost due to instructions or otherwise, to the Owner in writing within a reasonable time after the instructions and in any event before proceeding with the work.

.2 No such claim shall be valid unless so made and authorized in writing by the Owner.

1.19 Operating environment

.1 Provide material and equipment to function normally within the requirements of the specifications when the ambient temperature is between 3.5 and 36.0 degrees Celsius (38 and 97 degrees Fahrenheit).

.2 Provide material and equipment to function normally and within the requirements of the specifications when the ambient relative humidity is between 25% and 100%.

.3 Provide material and equipment to function normally and within the requirements of the specifications when the supply voltage is within minus 15% and plus 10% of the nominal voltage and the frequency is within 5% of the nominal frequency.

1.20 Acceleration of the Work

.1 If the Work falls behind the schedule, take action as necessary to meet the schedule, including, but not limited to, extra personnel and overtime work.

.2 Pay any costs associated with this action unless the delay is caused by acts of government, riot, civil commotion, war, malicious mischief, act of God or any cause beyond the control of the contractor.

1.21 Overtime provisions

.1 Include overtime labour for work necessary to complete the job, such as emergency power testing, fire alarm testing, wiring of hall stations into dispatchers, tasks requiring two or more elevators in a group to be out of service and work that will cause a major disruption of service to the building.

1.22 Overtime premium

.1 In the event that the Owner, for whatever reason, pays for overtime worked to complete the work as set out in the Specifications, the Owner will pay the added cost of the overtime plus twenty-one percent for all miscellaneous charges such as overhead, inefficiency, et cetera.

.2 The added cost shall be the difference between the actual overtime cost and actual straight time cost.

.3 The actual cost shall be that amount that the Contractor is required to pay to the Contractor's employees on the job site together with any amounts that the Contractor is required to pay on behalf of the employees in

contributions to various fringe benefits.

.4 Obtain from the Owner prior written authorization for overtime to be worked and chargeable, as described above, to the Owner, this authorization to be for specific amounts and for specific times.

.5 Submit time sheets for such overtime worked for approval to the Owner or the designated representative of the Owner within 48 hours of the time that such overtime is worked.

.6 If the procedures as set out above are not followed, assume the costs of the time worked.

1.23 Completion schedule

.1 Submit with the proposal, a detailed schedule including specific dates for equipment delivery times, start of site work, completion of each unit and resolution of all noted deficiencies.

.2 During the construction period give the following information to the Consultant:

.1 Revisions, if necessary, to the completion schedule;

.2 A progress report every month showing the progress being made and the percentage of the job completed;

.3 Two weeks advance notice for inspection by the Consultant.

.3 Schedule a job site meeting every two weeks during the construction period.

1.24 Drawing and sample submittals

.1 Drawing and sample submittals are required for exposed finishes and fixtures.

.2 Submit for review samples of metals, glass, paint colours, plastic laminates and finishes, of 200 mm (8") by 300 mm (12") approximate size, properly identified as to project, location and material.

.3 Submit for review, as a minimum, the following:

.1 General arrangements;

.2 Details of areas where the work joins the work of other trades;

.3 Machine room layouts showing the location of the

equipment;

.4 Hoistway layouts showing the location of the equipment, car platform dimensions, cab interior dimensions and net inside cab area;

.5 Hoistway sections showing overhead, pit equipment, car and frame and entrances;

.6 Cab details including the cab shell, platform, interior panels, ceiling, entrance, lighting and finishes;

.7 Details of control panels such as central control consoles or fire control panels showing the layout and detailing the design of switches and indicator lights;

.8 Details of intercom system station types detailing the controls;

.9 Details of any display devices complete with examples of proposed displays, symbols and layout;

.10 Fixture brochures.

.4 Show on the general arrangement or separately, details of frames, doors, sills and supports, lanterns and gongs, including views showing the relationship of hall stations, lanterns and entrances.

.5 Provide as built information at job completion prior to Substantial Performance.

.6 Reviews do not include the checking of measurements and do not imply approval of variations from the specifications.

1.25 Defective work and non-performance

.1 The Owner reserves the right to correct any defective work and to charge the cost to the contractor.

.2 Should the contractor fail to execute any of the Work set out in the contract the Owner reserves the right to do the Work and to charge the cost to the contractor.

.3 The Owner reserves the right to withhold payment in the event of non-performance or to pay only for that portion of the Work that has been executed.

.4 The Owner will give reasonable notice in writing prior to taking such action unless the defective work or non-performance prejudice the safety of

people or the installation.

1.26 Electrical diagrams

.1 Supply wiring diagrams and data as required for the execution of the Work including schematics for speed control, dispatching system, interfaces, printed circuit boards.

.2 Incorporate, as part of the schematic diagrams, a reference index ('road map') giving the location of electrical components and wiring interconnections for relay coils, relay contacts, field equipment, integrated circuits and other such devices, so that the position on the schematics of any of these items can be readily determined.

.3 Supply, prior to the Substantial Performance inspection, three prints and one reproducible of the wiring and schematic diagrams revised to show changes that have been made.

.4 Supply, prior to the Substantial Performance inspection, a set of plastic coated schematics mounted on a rack in the machine room so arranged that each sheet is readily accessible for trouble-shooting purposes, revised to show changes that have been made.

.5 Supply, prior to the Substantial Performance inspection, a PDF copy of the wiring and schematic diagrams revised to show changes that have been made.

.6 If changes are subsequently made to the wiring or control, supply an additional two sets of marked-up prints, a marked-up set of plastic coated schematics mounted on a rack in the machine room and an additional PDF copy of marked-up prints of the schematics and field wiring diagrams showing the changes.

1.27 Test data form: traction

.1 After completion of the Work, and prior to the inspection by the Consultant, submit a test data form certifying that the unit is complete and ready for inspection.

.2 Arrange that this form be signed by the person responsible for the performance of the Work.

.3 Include a check list of the items in the specifications as well as other performance data such as door times, operating times, brake-to-brake times, starting, running, stopping currents and voltages, slowdown and limit switch settings, governor settings, and, in general, settings of any adjustable devices.

.4 List on this form safety devices, together with their settings and indicate whether they have been checked and adjusted.

.5 Submit a soft copy of the data form in PDF (Acrobat Reader) format.

1.28 Patents

.1 Hold and save the Owner and its officers, agents, servants and employees harmless from liability due to patent or copyright infringement arising from the use of, in the performance of the work or in the completed installation, any invention, process, article, or appliance.

1.29 Liability insurance

.1 Provide, during the period this contract is in force, premises liability, including public liability insurance and property damage insurance in the amount of $5,000,000 inclusive, to be covered against any claims for damage to property or for personal injury, including death, which may arise from operation under this contract, whether such operation is by yourself or by any sub-contractor or anyone directly or indirectly employed by you.

.2 Upon completion of the contract, have in force a completed operations and products liability insurance, in the amount of $5,000,000 inclusive, to be covered against any claims for damages to property or for personal injury, including death, which may arise after the premises liability is terminated.

.3 Maintain the insurance in force for a minimum period of two years after completion of the contract.

.4 List the Owner as an additional insured.

.5 The certificates shall state that the insurance will not become ineffective without sufficient written notice to the Owner.

.6 Submit certificates of such insurance with the Owner before work is begun.

1.30 Equipment insurance

.1 The Owner's insurance policy covers equipment actually in place in the building and accepted by the Owner.

.2 All other material and equipment is not included in the Owner's policy and such material and equipment is stored at the Contractor's own risk.

1.31 Failure to perform

.1 If the contractor shall neglect to prosecute the work properly or fail to perform any provision of the contract, the Owner after ten days written notice to the contractor may, without prejudice to any other remedy the Owner may have, make good such deficiencies and may deduct the cost therefrom from payment due to the contractor.

1.32 Fixture type

.1 Provide, unless otherwise indicated in the Specifications or Drawings, all signal fixtures, such as push buttons, position indicators, et cetera, of the vandal resistant type.

.2 Provide Dupar US91 Optic C3 with BB push buttons with the following characteristics:

.1 Mirror chrome for surround finish.

.2 Mirrored steel on outer portion of button with stainless steel in the middle.

.3 Dual illumination whereby button and Braille are partially illuminated white when not pressed with the halo around the button turning red once pressed and the Braille having full white intensity when the button has been pressed.

.4 Braille to the left of each push button in black anodized aluminum. Braille tactile to be recessed and studded on the car station.

.3 Provide push buttons with a positive stop on the back of the button to prevent excessive force from transferring to the contact.

.4 Provide, unless otherwise indicated in the Specifications or Drawings, signal fixtures in an illumination colour selected by the Owner.

.5 Submit illustrations of those types available and provide at least one physical button sample of the type selected by the Owner for final approval.

1.33 Key switches

.1 Where key switches are specified supply switches and keys compatible with the vertical transportation equipment portfolio of the Owner, where possible, unless otherwise noted herein.

.2 Provide to the Owner, five copies of each key-switch key type defined in the Code as being Security Group 2, 3 and 4.

.3 Provide keys with engraved labels and group the keys by Security Group and key type.

1.34 Finishes: stainless steel

.1 Provide, unless otherwise indicated in the Specifications or Drawings, Rimex stainless steel 12LG number 2B finish for visible natural metal finishes.

.2 Arrange, unless otherwise indicated in the Specifications or Drawings, that the brush or grain direction of finishes of visible natural

metals be in the direction of the longer surface dimension.

1.35 Maintenance manual

.1 Supply to the Owner prior to the Substantial Performance inspection, a maintenance manual in PDF format.

.2 Incorporate in the manual a description of the controller user interface, fault and error codes, troubleshooting and diagnostic procedures, methods of use and the adjustment of programmable parameters together with their settings at the time of final adjustment.

1.36 Operation manual: elevator

.1 Supply to the Owner prior to the Substantial Performance inspection, a manual describing in detail the operation of the equipment including special features, dispatching sequences, and such items as intercom systems and security systems.

.2 Set out in step by step form the operation for special features such as Firefighters' Emergency Operation, Independent service and Emergency Power service.

.3 Supply, as part of the manual, as built diagrams and drawings of operating panels (e.g. car panels, central control consoles) with descriptions of the function of switches and indicators.

.4 Supply one copy of the manual in PDF format on digital media acceptable to the Owner.

1.37 Technical seminar

.1 At the time of Substantial Performance, arrange with the Owner to provide a seminar for the Owner's staff.

.2 Include in the seminar a complete review of the documentation, operation of the equipment and demonstration of any special features.

1.38 Trade marks

.1 Do not apply trade marks visible to the general public on any piece of equipment.

1.39 Parts

.1 Supply parts on request for a period of fifteen years subsequent to Substantial Performance of the project, at then prevailing prices.

.2 Where purchased components are used, ensure that the original manufacturer's name and component designation are clearly marked on the part or in the parts catalogue.

1.40 Dimensions

.1 Provide equipment to suit the existing hoistway, pit and overhead dimensions.

1.41 Measurements

.1 In the execution of the work, verify all dimensions with the actual conditions in order to do a perfect job.

1.42 Unit inspection by the Consultant

.1 Advise the Consultant in writing two weeks prior to the completion of a unit so as to arrange an inspection by the Consultant at a mutually convenient time.

.2 Assist the Consultant in the performance of this inspection to verify that performance figures, workmanship and equipment furnished are in compliance with the Specifications.

.3 Provide the necessary test weights to carry out full load tests and a team of competent persons to assist the Consultant in making the necessary tests and inspections.

1.43 System log error codes

.1 Provide to the Owner a PDF document listing system error codes complete with a full English description of the meaning of each code.

.2 Incorporate as part of the document a description of the procedure for accessing and resetting the codes and demonstrate this procedure to the Consultant.

1.44 Special tools and access codes

.1 If any special tools (i.e. tools that are not readily purchased from a hardware supplier) are used to maintain or adjust the equipment or are required for any aspect of the work on the equipment, list these tools with details on the proposal form and provide such tools to the Owner prior to Substantial Performance.

.2 If any access codes are used to maintain or adjust the equipment or are required for any aspect of the work on the equipment (including the reading and resetting of error codes and logs) list these access codes with details on the proposal form and provide such access codes to the Owner prior to Substantial Performance.

.3 Do not change the access codes without the written consent of the Owner and, when changed, provide to the Owner the new access codes.

1.45 Generic maintenance

.1 Arrange that the equipment can be maintained and adjusted by any competent elevator company without the use of proprietary tools, information or equipment or, if such tools, information or equipment are required, provide them (these shall become the property of the Owner).

.2 Provide a customer tool or such similar device if necessary to carry out full load overspeed safety tests or other similar tests (for temporarily bypassing the appropriate circuits).

.3 Offer to the Owner updates to the system software, from time to time as may be required to keep it current.

.4 Offer these updates to the Owner at standard market prices such as those charged to United States government agencies.

.5 Do not incorporate any running time, cycle counters or trip counters that would cause the equipment to shut down or alter its operation in any way.

1.46 Operation by persons with physical disabilities

.1 Ensure that controls and fixtures comply with Appendix E of the Code.

1.47 Codes and ordinances

.1 Supply equipment and do work in accordance with building codes, by-laws, regulations and requirements of the local, provincial and federal authorities in effect at the time of the execution of the work.

.2 Supply equipment and do work in accordance with the Code, and any other code which may govern the requirements of the installation.

.3 Provide labour and material, whether or not specifically mentioned in this specification, that may be necessary to provide an installation conforming to the applicable codes and regulations.

.4 Comply with the requirements of the Occupational Health and Safety Act and Workplace Hazardous Materials Information System (WHMIS) regarding employee safety, use, handling, storage and disposal of hazardous materials.

.5 Prior to submission of the proposal and throughout the duration of work, give prompt notification in writing of any regulations or requirements known to be in process which might affect the acceptability of the work.

.6 If changes in codes or regulations result in extra costs, those taking effect subsequent to the date of proposal submission shall be treated as an extra to the contract.

1.48 Subcontractors

.1 Bind subcontractors to all applicable portions of the Specifications.

.2 The contractor shall be responsible for all actions and all work performed by its subcontractors to the same extent as the contractor is itself responsible under the Specifications.

1.49 Preliminary information

.1 Submit, within 30 working days after awarding of contract, the information and details, including reactions, power requirements, ventilation requirements, cutouts, access requirements, light and outlet locations, quantity, location and size of external wires required to inter-connect the equipment, and all other information required to complete the work to be performed by others in conjunction with the installation of the equipment.

1.50 Information with proposal

.1 Provide the following information, where relevant, with the proposal:

.1 The model and manufacturer of such items as solid state drives, fixtures, control systems, door operators and other purchased material (with the exception of miscellaneous minor items);

.2 The current rating of the solid state drives;

.3 The KVA rating of the transformers feeding the solid state drives;

.4 Certification from an independent testing laboratory detailing the line pollution generated by the solid state drives;

.5 Certification from an independent testing laboratory detailing the extent to which the control systems are protected against external electromagnetic radiation;

.6 Brochures, descriptions and manuals (where applicable) for the major items;

.7 Renderings or samples of the fixtures and exposed materials;

.8 Detailed completion schedule for the work;

.9 A copy of your health and safety policy as issued to your employees;

.10 Mechanic and team regular and overtime hourly rates.

1.51 Withdrawal or rejection of proposals

.1 The Owner reserves the right to reject any or all proposals or to waive any conditions.

.2 Proposals may not be withdrawn until sixty days after the scheduled date for the receipt of the proposals.

1.52 Organization chart

.1 Provide to the Owner an organization chart from the local supervisory level up.

.2 Provide to the Owner the names, positions and experience of the field and supervisory personnel associated with this project.

.3 During the course of the work when organization changes are made, provide the Owner with updated information.

1.53 Regular hours of work

.1 Regular hours of work are from 07:00 to 17:00 Monday to Friday, excluding holidays.

.2 Carry out noisy work, work creating excessive odours or work that creates a disturbance to the building tenants outside of regular hours or at such other times as selected by the Owner and include in your submission the costs for such overtime work.

1.54 Progress payments

.1 Progress payments will be based on the percentage of the work complete as determined by the Consultant.

.2 A 10% holdback will apply to payments, this holdback to be released within one year of completion of all the work described in these specifications.

1.55 Request for payment

.1 Submit monthly applications for payment for work done at the end of each month together with the necessary data, information, waivers and affidavits.

1.56 Payment withheld

.1 Approval for payment may be withheld to such extent as may be necessary on account of:

.1 Defective work not remedied;

.2 Claims filed or reasonable evidence indicating probable filing of claims;

.3 Failure of contractor to make payments properly to

sub-contractors or for material and labour;

.4 Failure to work to schedule;

.5 A reasonable doubt that the contract can be completed for the balance then unpaid;

.6 Damage to the building or another contractor.

.2 When the above grounds are removed, payment will be made for amount withheld.

1.57 Liens and affidavits

.1 The final payment and any part of the retained percentage shall not become due until a complete release of liens arising out of this contract or receipts in full in lieu thereof have been delivered to the Owner.

.2 Furnish an affidavit to the Owner that the release or receipts include labour and materials for which a lien could be filed.

.3 If any lien remains unsatisfied after all payments are made, refund to the Owner monies that the Owner may be compelled to pay in discharging such a lien, including costs and reasonable legal fees.

1.58 Labour laws

.1 Comply with applicable provisions of federal, provincial and local labour laws and with applicable union regulations.

1.59 Personnel

.1 Supervise your personnel so that they present a neat appearance and their movement in the building is within the requirements of their work.

.2 Provide uniforms and photo identification for personnel.

.3 The Owner reserves the right to reject or refuse access to personnel or contractors at its sole discretion.

.4 Assign and maintain a dedicated service representative to the work, this representative to be responsible for liaison with the Owner and the Consultant.

.5 Assign and maintain a dedicated service supervisor to the work, this supervisor to be responsible for technical communications with the Owner and the Consultant.

1.60 Protection of the Work and property

.1 Maintain protection of the Work and protect the Owner's property from injury or loss arising out of the execution of this contract.

.2 Make good any injury or loss caused by your agents or employees.

.3 Take all necessary precautions to ensure that the Work is done in a manner that does not endanger any person.

1.61 Work site protection

.1 Provide, maintain and, after the work is complete, remove protective hoarding around the work site.

.2 Arrange the protective hoarding so as to prevent public access to the work site.

1.62 Hoistway protection

.1 Provide, maintain and, after the Work is complete, remove any partitions required in the hoistway.

.2 Provide, maintain and, after the Work is complete, remove protective hoarding required at openings into the hoistway.

.3 Submit the design and finish of the protective hoarding for review.

1.63 Removal of rubbish

.1 Remove rubbish, keep the building and premises clean during the progress of the work, and leave the premises at completion in perfect condition as far as the work under the specifications is concerned.

1.64 Taxes

.1 Include applicable local, provincial and federal taxes or assessments in effect at the time of the signing of the contract.

.2 Show on the proposal form the amount of each tax included.

.3 The Contractor is liable for the above mentioned taxes or assessments whether or not specifically mentioned in his proposal or in the final contract document.

.4 In the event new taxes or assessments, to become due on completion of the contract, are imposed after the signing of the contract these are to be paid, in addition to the original contract amount, by the Owner to the Contractor, who in turn is to pay them to the proper authorities.

.5 In the event taxes or assessments in effect at the signing of the contract should be revoked before consummation of the contract rebate to the Owner the amount of such taxes and assessments included in the original

contract.

1.65 Environmental considerations

.1 Where practicable recycle material replaced in the course of the work.

.2 Provide a list of materials to be removed from site and their proposed recycling or disposal location for approval prior to commencing work.

.3 Where practicable provide new materials manufactured by methods that do not adversely affect the environment by, for example, generating residual deposits of heavy elements and greenhouse gases.

.4 Use materials on site, such as low VOC (Volatile Organic Compound) adhesives and paint, that will not negatively affect the in-building environment.

.5 Use only adhesives that comply with the requirements of SCAQMD Rule #1168.

1.66 Coordination with other trades

.1 Where the work joins another trade, provide drawings showing the actual dimensions and the method of joining the work to the work of the other trade and information such as anchors, templates and details for cast-ins.

1.67 Work by other trades

.1 In the event that work by other trades is required and work by others as set out herein is in conflict with or inadequate for your equipment or design, so state on the proposal form with all necessary details.

.2 If no exceptions are noted on the proposal form, pay the costs of all modifications necessary to suit your equipment and design.

1.68 Work under division 02 (Site Preparation)

.1 A lockable storage space during the installation period.

1.69 Work under division 03 (Concrete)

.1 Properly framed hoistways with a variation from nominal well dimensions of not more than +25 mm (1").

.2 A structure designed for the following reactions (including a provision for impact) generated by each device:

Reactions at:	car buffer		counterweight buffer		overhead	
	kN	lb	kN	lb	kN	lb
Elevator	161	36,300	135	30,300	172	38,600

.3 Supports for the sill support angles, flush with the inside hoistway wall, a minimum of 150 mm (6") in depth, capable of sustaining a minimum unit load equivalent to the capacity of the elevator.

.4 Pockets, as required, to permit fastening of rail brackets to building structure. Pockets to be filled after brackets installed.

.5 Suitable pits.

.6 Fire-resistant control room with a concrete floor and access door.

.7 Gross openings for hoistway entrances exceeding the clear door dimensions by 250 mm (10") on each side and above.

1.70 Work under division 04 (Masonry)

.1 Grouting under hoistway sills.

1.71 Work under division 05 (Metals)

.1 Supports for the guide-rails at each floor and in the overhead.

.2 For hoistway walls not made of concrete, intermediate supports for the guide-rails where guide-rail reinforcement cannot be installed by the elevator contractor and where floor heights exceed 4300 mm (14' 0").

.3 A hoisting beam at the top of the hoistway parallel to the hoistway doors and located in the middle of the hoistway plan, and capable of sustaining a 34 kN (7500 lb) load.

.4 Pit access ladders as shown on the Drawings.

1.72 Work under division 07 (Thermal and Moisture Protection)

.1 Means to limit the presence of water, gases and odours in the pit.

.2 Waterproofing of the pit.

1.73 Work under division 08 (Doors and Windows)

.1 For the elevator control room, a full height self-locking and self-closing access door.

.2 If required, pit access doors as shown on the drawings, being self-locking and self-closing (required where any single or common pit has a depth of more than 3000 mm (10')).

1.74 Work under division 09 (Finishes)

.1 Initial painting of the control room floors.

.2 Sealing of the control room ceilings and walls to reduce dust.

.3 Painting of the hoistway entrances, if required.

.4 Elevator cab tile flooring.

.5 Cutting and patching of machine room walls and floors as needed.

.6 Cutting and patching of walls and floors around elevator entrances as needed.

.7 Cutting and patching of walls around elevator hall fixtures back boxes and conduits as needed.

1.75 Work under Division 15 (Mechanical)

.1 A pit drain with connection to the building drainage system, drains to have a capacity of 11.3 m3/h (3,000 gal/h) per elevator having a positive means to prevent water, gases and odours from entering the hoistway.

.2 A cover for the floor drains secured to and level with the pit floor.

.3 Any sprinkler systems employing water if installed in the machine rooms, control rooms or hoistway to be arranged to operate at a higher temperature (approximately 20% higher) than the fire alarm sensors.

.4 If required by the applicable regulations, means to limit the presence of smoke in the hoistway of the designated firefighters' elevator.

.5 Heating and cooling in order to maintain continuously (i.e. 24 hours a day) a temperature of greater than 13 degrees Celsius and less than 29 degrees Celsius based on the heat generated by the elevator equipment as follows:

Heat generated:	control room		hoistway	
	kW	BTU/h	kW	BTU/h
Elevator	0.7	2,500	0.2	750

1.76 Work under division 16 (Electrical)

.1 A grounded power supply sufficient to start and run each elevator at rated speed and capacity, and including the following:

.1 A disconnect means located in view of the elevator controller near the access to the control room.

.2 A disconnect means located in view of the elevator equipment at the top of the hoistway.

.3 The power supply should be capable of absorbing the regenerated power from the system.

.4 Wiring between the disconnect and the elevator power input point (elevator transformer or controller).

.5 Protection of the feeder cables.

.2 A power supply capable of supplying for each unit the following starting and running currents in amperes (based on a 600 V power supply):

Full load up currents	Power supply (V)	Starting current (amps)	Running current (amps)
Elevator	600	35	12

.3 In the elevator control room, an auxiliary disconnect contact with wiring to the controller for the traction elevator emergency power device, to indicate if the disconnect is on or off.

.4 In the elevator control room, one 15 A 120 V, single phase circuit breaker for each elevator, located adjacent to the lock side of the machine or control room door, to power cab ventilation and lighting equipment.

.5 In the elevator control room, one 15 A 120 V, single phase circuit breaker for each elevator, located adjacent to the lock side of the machine or control room door, to power the cab interior duplex GFCI receptacle and auxiliary equipment (e.g. camera).

.6 In the elevator control room, LED lights (with guards) controlled by a switch located adjacent to the lock side of the space access door, located at approximately 2500 mm (8') from floor level as required to give a minimum illumination of 200 lx at floor level and within the controller.

.7 In the elevator control room, duplex GFCI receptacles mounted on the wall and spaced at approximately 5000 mm (16') intervals.

.8 In the pit, duplex GFCI receptacles mounted on the wall, spaced at approximately 5000 mm (16') intervals and located clear of elevator

equipment.

.9 In the elevator pit, LED protected lights, controlled by a light switch located adjacent to the pit entrance, located clear of elevator equipment to give a minimum illumination of 160 lux at pit level, the lowest lamps to be within 500 mm (20") of the pit floor. The power for the lighting circuit to be derived from the emergency power supply if available.

.10 In the elevator overhead, LED lights (with guards), located in front of and behind the machine and associated equipment as required to give a minimum illumination of 200 lux on the equipment. The light switch to be located in the hoistway at the point of entry. The power for the lighting circuit to be derived from the emergency power supply if available.

.11 In the elevator overhead, duplex GFCI receptacles mounted on the wall and spaced at approximately 5000 mm (16') intervals.

.12 Smoke detectors and heat detectors on the recall floor.

.13 Smoke detectors and heat detectors on the alternate recall floor.

.14 Smoke detectors and heat detectors on all other floors.

.15 Smoke detectors and heat detectors at the top of the hoistway.

.16 Smoke detectors and heat detectors in the pit.

.17 Smoke detectors and heat detectors in the machine space.

.18 Smoke detectors and heat detectors in the control space.

.19 A connection from the smoke detectors and heat detectors on the recall floor to the elevator controller.

.20 A connection from the smoke detectors and heat detectors on the alternate recall floor to the elevator controller.

.21 A connection from the smoke detectors and heat detectors on all other floors to the elevator controller.

.22 A connection from the smoke detectors and heat detectors at the top of the hoistway to the elevator controller.

.23 A connection from the smoke detectors and heat detectors in the pit to the elevator controller.

.24 A connection from the smoke detectors and heat detectors in the

machine space to the elevator controller.

.25 A connection from the smoke detectors and heat detectors in the control space to the elevator controller.

.26 An active telephone line to the control room.

.27 Conduit between the elevator hoistway, control room and any remote equipment locations, terminated outside the hoistway at the basement level (or other level designated by the Owner) at a junction box (junction box to be provided by the elevator contractor).

.28 Pulling of wire between the elevator hoistway, control room and any other remote equipment locations.

.29 Electric power during erection, for illumination, operations of tools and hoist, starting, testing and adjusting.

**********END OF SECTION**********

Section 14 21 23 MRL Passenger Elevator

PART ONE - GENERAL

1.1 General requirements

.1 Conform to Section 14 20 00.

.2 Provide equipment to suit the control room (room D231), pit, hoistway, and overhead dimensions shown on the architectural drawings.

.3 Provide labour, materials, products, equipment and services necessary for the supply and installation of one machine-room-less traction passenger elevator.

.4 Provide products by Delta Elevator Co. Ltd. or approved equivalent.

1.2 Data

Building #046		
number of units	1	
designation	TBD	
application	passenger	
rated speed (m/s, fpm)	0.76	150
capacity (kg, lb)	1590	3500
motor power (kW, HP)	7.7	10
operation	simplex	
machine type	machine-room-less traction	
machine location	within hoistway	
drive type	solid state regenerative	
emergency brake	provide	
car governor	provide	
counterweight governor	none	
roping ratio	2:1	
control system	microprocessor	
control location	room D231	
front entrances	1, 2	
rear entrances	none	
door type	single speed side opening	
hoistway door fire resistance	1.5 hours	
lobby sill material	aluminum	
cab sill material	aluminum	
entrance width (mm, “)	1070	42
entrance height (mm, “)	2130	84
entrance markings	provide	

cab width (mm, “)	2030	80
cab depth (mm, “)	1600	63
cab height (mm, “)	2440	96
car door restrictor	provide	
door safety retainers	provide	
entrance protection	infrared multi-beam	
door operator	GAL MOVFE	
interlocks	provide	
main car station	provide, applied	
auxiliary car station	none	
verbal annunciation	provide	
car position indicator	digital	
cab emergency lighting	provide	
cab communication	hands-free telephone	
in-cab news monitor	none	
car call security	provisions	
hall call security	none	
hall stations (typical)	single riser	
hall stations (main floor)	single riser	
hoistway access switches	provide	
cab ventilation	2-speed fan	
cab finishes	provide	
hall door finish (typical)	Rimex stainless steel 12LG	
hall door finish (main floor)	Rimex stainless steel 12LG	
car door finish	Rimex stainless steel 12LG	
hall lanterns	provide	
in-car lanterns	none	
hall position indicator	dot matrix at floor 1	
lobby panel	none	
CACF panel	none	
central control monitor	none	
car top inspection station	provide	
load weighing device	none	
car guiding	provide	
counterweight guiding	provide	
guide rails	provide	
compensation	none	
emergency recall	automatic	
firefighter’s operation	provide	
emergency power	battery rescue device	
car top railing	provide	

operating time	13.0 seconds
acceleration rate	0.8 m/s/s

PART TWO - PRODUCTS

1.3 Prone stretcher requirement

.1 Arrange the elevator to meet the requirement for accommodating and providing adequate access for a patient stretcher 2010 mm (79") long by 610 mm (24") wide in the prone position.

1.4 Speed

.1 Arrange the elevators to run under any condition of loading, except the case of overload, within 1.5 percent of the rated speed.

1.5 Machine: MRL (Machine-Room-Less)

.1 Provide a machine of the single-wrap traction type including an AC motor, electromechanical brake, sheave shaft and traction sheave properly aligned.

.2 Mount the machine in the hoistway.

.3 Provide a machine with a proven record, over a period of at least seven years, of satisfactory operation on other installations of the same speed, capacity and counterweighting.

.4 Provide equipment which will deliver its rated output continuously with a temperature rise not to exceed 50 degrees C (122 degrees F).

.5 Provide, as a minimum, Class B insulation.

.6 Submit with the proposal the horsepower and torque ratings of the elevator motor.

.7 Provide a traction sheave to suit the suspension means.

.8 Provide a brake actuated switch to indicate to the control system the state of the brake: that is, lifted or applied.

.9 Design and adjust the machine so that, when running at full speed, it vibrates no more than 0.025 mm (0.001") as measured at the motor end.

.10 Arrange that the sound level in the hoistway at the machine location is not more than 60 dB during an elevator operating cycle, including brake lift and brake application.

.11 Provide sound and vibration isolation pads or springs arranged so that there is no solid contact between the machine and the building structure.

1.6 Solid state motor drive: regenerative

.1 Provide a regenerative solid state drive to control the speed of the elevator.

.2 Provide circuits to cause the elevator to regenerate power, under negative load conditions, to the building power supply with a minimum 0.95 power factor.

.3 Provide a drive system to meet the EN12015 standards and the recommended guidelines of IEEE-519 for generated harmonics and power factor measured at the disconnect switch.

.4 Provide pre-torquing.

.5 Arrange that the system in responding to a unit step function does not overshoot by more than 21 percent.

.6 Arrange that the error signal does not, in normal operation, exceed 2.5 percent.

.7 Provide means to shut down the unit in the event that the error signal exceeds 5.0 percent.

.8 Provide means to limit the increase in noise level during acceleration to less than 12 decibels (A scale) as measured in the centre of the machine room.

.9 Provide electronic feedback circuits to limit the current through the motor and the solid state power devices.

.10 Arrange that under low voltage conditions the unit does not exceed the current limits.

.11 Provide safety circuits to prevent runaway in the event of closed loop feedback circuit failure.

.12 Arrange these circuits so that:

.1 With a partial or complete loss of the feedback signal the elevator will come to a stop before the governor jaws are tripped;

.2 If the elevator is in the levelling zone with the door interlock circuit open, the elevator will come to a stop prior to leaving the levelling zone.

.13 Test these circuits by opening the feedback circuit while the elevator is running at contract speed no load up and while the elevator is levelling into

the floor no load up.

.14 Provide means for dissipating the heat generated by solid state devices.

.15 Provide safety circuits to shut down the unit in the event of overheating.

.16 Design the equipment so that power loss or power fade (brownout) does not cause fuses to blow.

.17 Provide means to protect the solid state power devices against surge currents.

.18 Provide filters and circuits to reduce the line pollution so that the distortion generated by the solid state power device is within the following limits as measured at the disconnect switch:

.1 The 5th harmonic voltage does not exceed 6 percent;

.2 The 5th harmonic current does not exceed 20 percent;

.3 The total harmonic voltage does not exceed 10 percent;

.4 The total harmonic current does not exceed 25 percent;

.5 Line voltage notching of duration greater than 1 millisecond is less than three per cent of the peak sine wave voltage measured from zero reference;

.6 The notch depth is less than 10 per cent;

.7 The notch duration is less than 2 milliseconds.

.19 Provide filters and circuits to reduce the electromagnetic noise level at any frequency with the elevator running, to not more than 0.1 db above the ambient electromagnetic noise level (with the elevator stopped), as measured in the centre of the machine room using a calibrated radio frequency receiver designed in accordance with CSA Standard C108.1.1 together with a calibrated rod or loop antenna.

.20 Provide filters and circuits to reduce the electromagnetic noise level at 10 KHz with the elevator running, to not more than 0.01 db above the ambient electromagnetic noise level (with the elevator stopped), as measured in the centre of the machine room using a calibrated radio frequency receiver designed in accordance with CSA Standard C108.1.1 together with a calibrated rod or loop antenna.

.21 Arrange the equipment so that any vibration generated is not transmitted directly to the building structure.

1.7 Speed control: regenerative

.1 Provide a closed loop negative feedback control system.

.2 Include in the system the following features:

.1 A pattern generator to give a velocity input signal modified by position with constant peak acceleration and constant peak change of acceleration;

.2 A digital or analog tachometer generator to provide a velocity feedback signal;

.3 A digital transducer to provide a position feedback signal;

.4 A current transformer to provide a current feedback signal.

.3 Provide the following safety devices:

.1 Means to stop the elevator in the event the error exceeds five percent of the signal;

.2 Means to stop the elevator in the event the acceleration exceeds the normal acceleration by more than fifteen percent;

.3 A circuit to cut off power in the event of excessive power module switching time;

.4 Means to cut off power in the event of overheating of the solid state components;

.5 A circuit to initiate a slowdown and stop at the next floor in the event of a disagreement between the position as derived from the digital transducer and the position as derived from the integration of the velocity feedback signal.

.4 Arrange the response of the system so that the elapsed time between the detection of a fault and the cut off of power does not exceed 100 milliseconds.

.5 Provide protective devices so arranged that any one fault will not cause risk of injury to the passengers.

.6 Arrange that, if a fault occurs such that a subsequent fault could cause an unsafe condition, the fault will be detected and the elevator shut down.

.7 Provide invertors and associated controls arranged to return to the electrical supply system the power produced by the machine under negative loads.

.8 Arrange the control system so that the power factor is not less than 96%.

1.8 Position transducer

.1 Provide a position transducer device to transmit to the control system the position of the elevator.

.2 Arrange that the device transmit a minimum of 10 counts per 25 mm (1") of travel.

.3 Provide a device having an overall precision within ±2.5 mm (±0.1").

.4 Arrange the elevator controls so that the output from this device is read at least every 5 ms.

.5 Transmit the signal from this device either in serial format using a standard protocol (e.g, CAN) or in parallel format using low impedance (less than 10 kilohms) inputs.

.6 If the transducer is a relative (pulse counter) type rather than an absolute encoder type:

.1 Provide gray encoding so as to indicate the direction of movement of the car and to offset 'false' counts caused by vibration;

.2 In the event of a counter error reset the position with an accuracy within ±2.5 mm (±0.1") by returning the car at low speed to a fixed point in the hoistway.

1.9 Emergency machine dual brake

.1 Provide an emergency braking device to prevent uncontrolled movement of the elevator.

.2 Provide a device separate from and independent of the normal elevator stopping devices.

.3 Provide a device combined with and integrated with the normal operating machine brake.

.4 Arrange that the braking device applies if:

.1 The elevator overspeeds;

.2 The elevator moves away from the floor with the doors open.

.5 Restrict the deceleration effected by the emergency braking device to between 25% and 75% of gravity.

.6 Arrange the device to restrict the distance the elevator is allowed to move away from the floor with the doors open to less than 400 mm (16").

.7 Arrange the device so that it is actuated at a sufficient distance from the buffer — relative to the speed of the elevator — so as to prevent the counterweight striking the buffer at a velocity in excess of the rated velocity of the buffer.

.8 Provide a manually reset electrical switch arranged to disconnect power to the elevator motor and brake when the emergency braking device is actuated.

.9 Provide a device capable of being applied for test purposes without damage to the device or to the other elevator equipment.

.10 Arrange the device so that it can be reset and the elevator put back into service only from the elevator machine room.

.11 Arrange that the device and its component parts are readily accessible for maintenance.

.12 After correctly adjusting the device, seal it with a numbered seal so as to prevent un-authorized re-adjustment.

1.10 Brake spring

.1 After the brake spring is adjusted for correct operation and prior to the performance of safety tests and checks by the inspecting authorities, provide means to positively define the length of the brake spring and minimize the possibility of future incorrect adjustment using one of the following methods:

.1 Measure the length of the brake spring and mark this length on a tag permanently affixed to the machine;

.2 Measure the number of exposed threads on the brake spring rod and mark this number on a tag permanently affixed to the machine.

.2 Record the details of the brake setting on the test data sheet.

1.11 Governor: automatic reset

.1 Provide an automatic reset governor located so that it can be maintained from the top of the elevator car and tested without special access arrangements.

.2 Arrange that the governor, once tripped, will be reset when the car is moved up off the car safeties.

1.12 Elevator suspension means

.1 Provide elevator suspension means such that the addition of 50 per cent of the rated load to the car cab will cause no more than a 0.04 per cent elongation in the suspension means.

.2 Where multiple suspension elements are used in parallel to share a load, ensure that the elements are all from one manufacturing run.

.3 Provide sufficient removable counterweight buffer blocking to allow adjustment for suspension means stretch without requiring shortening of the suspension means.

.4 Where the suspension means is such that measurements of wear cannot be readily made, provide a method to indicate wear of the suspension means such as a marking stripe that will be exposed when replacement is required.

1.13 Controller

.1 Provide a micro-processor based controller designed to give the required operation as herein specified.

.2 Mount panels securely on substantial, self supporting steel frames designed for floor or wall mounting.

.3 Provide completely enclosed controllers with covers.

.4 Do not mount equipment on the covers.

.5 Where relays are used, provide those having a design electrical life and mechanical life equivalent to thirty years operation in the given application, with their contacts designed for maximum conductivity and wiping action.

.6 Provide electronic time delay devices which employ stable capacitors or crystals as the time base.

.7 Install wiring on the controller, whether control or field wiring, in a neat workmanlike order and make connections to studs and terminals by means of solder or solderless lugs, or similar connecting devices.

.8 Mark relays, contactors, fuses, printed circuit boards and other components clearly and permanently with designations as shown on the

schematics.

.9 Mount the designations for plug in components on the controller adjacent to the component; do not mount the designation on the plug in component.

.10 Provide a written guarantee from the control manufacturer that over the life of the installation software and firmware updates will be provided at no charge to the Owner.

1.14 Computing devices

.1 Where computing devices are used, such as micro-processors or mini-computers, along with associated devices, design to the following requirements:

.1 Isolate the inputs from external devices (such as push-buttons) and isolate the outputs to external devices (such as indicators) by means of relays or optical devices;

.2 Provide the control program on read-only-memory with spare capacity to allow for future programming modifications and extensions;

.3 Provide crystal regulation of frequency;

.4 Provide for separate regulated power supplies to serve each micro-processor system.

1.15 Power interruption restart

.1 Provide means so that the elevator system will restart automatically in the event of power interruption.

.2 Where volatile memories are provided for position and other data necessary to the continuing operation of the elevators, provide means of preserving this data on power failure or fading ('brownout') for a minimum of four hours and means of automatic recovery upon restoration of normal power.

1.16 Control circuits grounding

.1 Arrange the control circuits so that one side of the control power supply for external circuits is grounded to facilitate testing and trouble shooting.

.2 An external circuit is defined as one wired outside micro-processors or solid-state devices, as for example, buttons, relays, lights, limits, locks and such similar devices.

.3 Arrange that accidental grounding in the control system will not

defeat the safety circuits.

1.17 Solid-state hardware

.1 Mount solid-state devices, except for high power silicon controlled rectifiers, on removable printed circuit boards.

.2 Gold plate the contact points of edge connectors.

.3 Use G10 glass epoxy with minimum equivalent 57 gram (2 ounce) copper.

.4 Coat the circuits with tin-lead.

.5 Provide a solder resist screen.

.6 Provide plated through holes for double sided boards.

.7 Make all connections to the printed circuits on the printed circuit boards by means of properly dimensioned pads.

.8 Do not provide "patched" connections.

.9 Design solid-state devices for a high level of noise immunity.

.10 Incorporate electrical noise suppression devices in the power supplies and the inputs and outputs associated with the solid-state circuits.

.11 Provide filters and circuits to limit the generated electromagnetic noise level at any frequency to not more than 0.1 db above the ambient electromagnetic noise level, as measured in the centre of the machine room using a calibrated radio frequency receiver designed in accordance with CSA Standard C108.1.1 together with a calibrated rod or loop antenna.

.12 Provide filters and circuits to limit the generated electromagnetic noise level at 10 KHz to not more than 0.01 db above the ambient electromagnetic noise level, as measured in the centre of the machine room using a calibrated radio frequency receiver designed in accordance with CSA Standard C108.1.1 together with a calibrated rod or loop antenna.

1.18 Auxiliary slowdown devices

.1 Provide auxiliary slowdown devices compatible with the solid state speed control and so arranged that, if the normal slowdown devices fail to operate correctly, the elevator will be brought to a controlled stop at the terminal landing with an acceleration not exceeding 0.3 g.

.2 Arrange the control circuits so that, if the auxiliary slowdown devices were required to act to stop the elevator, the elevator parks at the

terminal landing until the system is checked by a maintenance technician.

1.19 Entrances

.1 Provide entrances consisting of frames, jambs, sills, sill support angles and brackets, struts, headers, fascias, toe guards, and sight guards and doors of approved design and size complete with guides and bumpers and all other items necessary to provide a completed installation.

.2 Construct the doors of sheet steel a minimum of 1.3 mm (18 gauge) thick.

1.20 Entrance installation

.1 Assume undivided responsibility for the entire installation of the entrances.

.2 Handle, store, protect, install the entrances and associated equipment.

.3 Set door frames in perfect alignment with the elevator car platform.

.4 Fasten frames and headers to structural supports.

.5 Set frames and sills in place prior to building walls.

.6 Install frames within 1 mm (0.04") of plumb and sills within 2 mm (0.08") of level over the entrance width.

.7 Fasten frames securely at the sill and header.

.8 Fasten sills securely to the building structure by means of a support angle or substantial brackets.

.9 Install struts, fascias, toe guards and other associated equipment required to complete the installation of the entrances.

1.21 Entrances: door hardware

.1 Supply hoistway door hardware consisting of door hangers and tracks, interlocks, door closers, relating mechanism, operating linkages, gibs, and all other hardware necessary for the installation and operation of the hoistway doors.

.2 Supply, for each sliding panel, sheave type, two point suspension hangers.

.3 Supply sheaves not less than 75 mm (3") in diameter with ball bearings, properly sealed to retain grease lubrication, and mounted on stands arranged for direct attachment to the panels.

.4 Equip hangers with adjustable ball bearing rollers to take the

up-thrust of the doors.

.5 Arrange the tracks and sheaves so that there is no metal to metal contact, and so that the doors operate properly without any regular lubrication.

.6 Design all door hardware for a minimum of noise.

1.22 Door type: single speed side opening

.1 Provide car and hoistway doors of the single-speed side opening, horizontal sliding type.

1.23 Entrance: fire rating

.1 Provide entrances bearing a 1.5 hours fire rating approved by authorities having jurisdiction.

.2 Provide a closure, including interlock mechanism and associated wiring, capable of operating for a period of at least one hour when the assembly is subjected to the standard fire exposure tests.

1.24 Lobby and car sills: aluminum

.1 Provide aluminum sills.

1.25 Floor marking: hoistway

.1 Identify each landing by means of markings on the inside of the hoistway.

.2 Place these markings so that people in a stalled elevator will be able to readily see the floor marking upon opening the car doors.

.3 Use a stencil to ensure that the floor markings are neat and uniform in appearance.

.4 Provide numerals and letters approximately 100 mm (4") high and of a clearly contrasting colour to the colour of the doors and fascias.

1.26 Entrance floor markings

.1 Provide, on each hall entrance jamb, raised tactile and braille metallic markings to designate the floor.

.2 Provide markings as selected by the Owner.

.3 Provide samples for review.

1.27 Main floor elevator markings

.1 Provide at the main floor, for each elevator designated as a Firefighter's Elevator, a suitable symbol such as a Firefighter's Hat.

.2 Provide at the main floor for each elevator a numeral indicating the number of the elevator.

.3 Provide markings as selected by the Owner.

.4 Provide samples for review.

1.28 Fascias

.1 Provide fascias to meet, as a minimum, the requirements of the Code.

.2 Unless a car door interlock is provided and the strength of the car door meets the applicable requirements of the Code:

.1 Provide fascias from the header of one entrance to the sill of the entrance above for the complete travel of the elevator including any express zone;

.2 Provide fascias extending below the sill of the lowest landing and above the header of the highest landing.

.3 Provide fascia plates extending on each side at least 75 mm (3") beyond the clear openings.

.4 Provide fascia plates of sheet steel of minimum 1.5 mm (16 gauge) thickness.

.5 Reinforce fascia plates properly.

.6 Provide all necessary supports required to secure fascia plates in place.

1.29 Car frame

.1 Provide a car frame of steel channels and angles securely welded, bolted or riveted and substantially reinforced and braced so as to relieve the car enclosure of all strains.

1.30 Car platform

.1 Provide a car platform of sufficient size to accommodate the cab and to give the required inside net area assuming typical 50 mm (2") wall thickness and 180 mm (7") for doors, sill and return.

.2 Provide a car platform with a structural steel frame filled with wood, aluminum or steel flooring having a depression to receive the finished floor.

.3 Mount the car platform on isolating pads to prevent the transmission

of noise and vibration from the car frame to the car platform.

.4 Install the equipment in such a way that there is no direct metal connection between the car platform or the car cab and the car frame except metallic flex, where required, run in such a way as to provide vibration isolation.

1.31 Cab installation

.1 Assume undivided responsibility for the entire installation of the cab.

.2 Handle, store, protect and install the cab and all associated equipment.

.3 Install the elevator cab on the platform plumb and in alignment with the hoistway entrances.

.4 Sound isolate the cab from the car frame.

.5 Provide additional material and labour as required for handling, storing and installing the cab so as to provide a complete job.

1.32 Car door equipment

.1 Provide car door header, hangers and tracks, door closers, door electrical contacts, master door operators, and all incidental devices necessary for the correct operation of the doors.

.2 Provide, for each sliding car door panel, sheave type, two point suspension hangers.

.3 Provide sheaves not less than 80 mm (3.25") in diameter with ball bearings, properly sealed to retain grease lubrication, and mounted on stands directly attached to the panels.

.4 Equip hangers with adjustable ball bearing rollers to take the up-thrust of the doors.

.5 Arrange the tracks and sheaves so that there is no metal to metal contact, and so that the doors operate properly without any regular lubrication.

.6 Design all door equipment and associated components for a minimum of noise.

1.33 Door equipment dowelling

.1 After the hangers, interlocks, relating devices, door operating clutches, rollers and other door equipment have been correctly adjusted, install dowels or pins to prevent movement or unauthorized readjustment.

1.34 Car door restrictor

.1 Provide a car door restrictor to mechanically prevent the opening of the car door from inside the cab unless the elevator is in the door unlocking zone.

.2 Provide a device that does not require electrical or electronic components to function.

1.35 Car and hoistway door safety retainers

.1 Provide safety retainers at the top and bottom of horizontally sliding doors to retain the closed door panel in position if the primary guiding means fail.

.2 Provide retainers that will prevent the displacement of the door panel top and bottom by more than 20 mm (0.8") when the door panel is subjected to a force of 5 000 N (1130 lbf) applied towards the hoistway at right angles to the panel over an area of 300 mm by 300 mm (12" by 12") at the centre of the panel.

.3 Provide retainers that will withstand, without detachment or permanent deformation, a force of 1 000 N (225 lbf) applied upward at any point along the width of the door panel together with an additional concurrent force of 1 100 N (250 lbf) applied at right angles to the door at the centre of the panel over an area of 300 mm by 300 mm (12" by 12").

.4 Arrange that the retaining means are not involved in the guiding of the panel and are not subjected to wear or stress during normal door operation.

1.36 Door friction

.1 Adjust the doors so that with the door closing device disconnected, the doors can be started into motion, from any position, with a force of less than 25 newtons (six pounds) per door panel applied horizontally at the mid-point of the door in line with the direction of movement of the door.

1.37 Door detector: multiple beams

.1 Provide a multiple infra-red beam door detector device.

.2 Design and locate the receivers and emitters so that the active area of the door opening, i.e. the full width and from within 25 mm (1") of the floor to a height of 1800 mm (6'), is protected, such that a person or object passing through the car entrance causes the doors to re-open.

.3 Position the receivers and emitters at least 25 mm (1") back from the leading edge of the door.

.4 Provide logic control to ensure that each receiver receives light from every emitter.

.5 Arrange that if the system fails to provide protection over the active area of the door opening, the elevator will park at the current floor with its doors open and the lights off, or the system will go over to nudging operation.

.6 Provide a signal on the unit or in the machine room to indicate that a failure has occurred.

.7 Should a door protective device be operated continuously for more than 20 seconds after the elapse of the normal door open time, cause the doors to go over to nudging operation.

.8 Arrange the nudging operation as follows:

.1 Cause the doors to close slowly under reduced power;

.2 Operate a buzzer in the car panel as a warning to the person obstructing the door;

.3 Cause the 20 seconds to be reduced to 6 seconds until a normal door cycle is performed.

.9 Supply a device, reliable and consistent in operation, not affected by dust or temperature changes, and having inherent long term reliability with minimum maintenance.

1.38 Door operator

.1 Provide a heavy duty door operator to open and close the car and hoistway doors simultaneously.

.2 Mount the operator on the cab above the car doors.

.3 Provide either:

.1 An alternating current motor, either standard or linear induction type, with associated variable voltage and variable frequency solid state drive to control the speed and torque of the door operator, or;

.2 A direct current motor with associated solid state drive to control the speed and torque of the door operator.

.4 Provide as a minimum a 375 W (0.5 HP) motor.

.5 Provide dual drive arms for centre-opening doors.

.6 Provide GAL MOVFE or approved equivalent.

.7 Provide a solid state door operator control incorporating negative feedback circuits for position, acceleration, velocity and torque.

.8 Provide event logging with non-volatile memory so as to retain the event log under power-off conditions.

.9 Provide fully automatic installation algorithm profiles that self-adjust the motion profile for the relevant parameters.

.10 Provide an output from the door control for a pre-start command to the elevator speed control system.

.11 Provide optical isolation for input and output signals.

.12 Provide signal line short circuit protection.

.13 Provide a serial input to the door control to allow adjustment of speed, acceleration, torque and pre-start point using a notebook computer or keypad.

.14 Provide the keypad or software for a standard notebook computer.

.15 Arrange that the settings for the door operator can be uploaded to the keypad or notebook computer and then downloaded to another identical operator.

.16 Provide an average door closing speed of 300 mm (12") per second, respecting the parameters for door force and door inertia as set out in the elevator code.

.17 Provide an average door opening speed of 700 mm (28") per second.

.18 Provide, either in the door operator control or in the main elevator control, means to automatically recycle the doors in the event that they stall during the opening or closing operations.

.19 Design the door operator and associated components for a minimum of noise.

1.39 Hoistway entrance lunar key access

.1 Provide lunar key access for each hoistway entrance.

1.40 Car station

.1 Provide one car station on the right side of the cab (viewed from within the elevator cab facing the doors).

.2 Provide in the station the devices required for normal automatic operation, including the following:

.1 Floor push buttons;

.2 Door open button;

.3 Door close button.

.3 Number the car call buttons to correspond to the floor served.

.4 Provide in conjunction with the car buttons a call registered light for each button to be lighted when the button is pressed and extinguished when the car stops at the selected floor.

.5 Provide, only when required by the prevailing codes, a stop switch, arranged to stop the elevator and to duplicate the functions of the alarm button.

.6 Provide a locked service cabinet, located below the main car station, containing those devices, other than those used for normal automatic operation, required for the various control features, including the following:

.1 Light switch;

.2 Fan switch;

.3 GFI duplex receptacle for maintenance purposes (Run the wires for this receptacle separately from the wires for the other car light and ventilation equipment and connect it to a separate breaker in the machine room);

.4 Emergency lighting test switch.

.7 Engrave the car station with markings and signage such as car capacity, elevator number and other markings required by the prevailing codes and local regulations.

.8 Hinge the car station faceplate so that it can be swung open to allow access for servicing of the inner components of the car station.

.9 Provide a hinge capable of supporting without distortion a test weight of minimum 11 kg resting on the panel non-hinged edge with the panel

swung open.

1.41 Car position annunciator

.1 Provide automatic verbal announcement to announce the floors and to provide floor passing tones.

.2 Provide a unit to meet the requirements of the Code.

.3 Provide a key switch in the service cabinet to allow the option of having floor passing tones or verbal announcements or neither one.

.4 Provide means in the service cabinet to adjust the volume over a range from 55 and 70 decibels.

.5 Use a female voice for the announcements.

1.42 Car position indicator: digital readout

.1 Provide a digital car position indicator mounted in each car operating panel.

.2 Arrange the indicator to display a number or symbol at least 50 mm (2") high.

.3 Indicate the position of the car at all times, corresponding to the landing through which the car is passing or at which it is stopped.

.4 Provide a segmented display using light emitting diodes with a minimum of 16 segments per character.

.5 Arrange the circuits so as to provide continuous indication of car position.

.6 Overlapping dual indication, when the elevator is between floors, is acceptable.

1.43 Emergency lighting

.1 Provide a back-up battery power system for alarm bell operation and emergency cab lighting.

.2 Provide a lighting level of at least 11 lux of illumination at the car operating panels for a minimum period of four hours, using at least two lamps of equal rating.

.3 Cause the lamps to be immediately energized in the event of a power failure or electrical fault de-energizing the normal elevator lighting circuit.

.4 Provide for the automatic disconnection of the lamps and the automatic recharging of the lighting unit when normal power is restored to

the elevator lighting circuit.

.5 Provide a rechargeable battery of the hermetically sealed type, or of a type which provides a reserve of electrolyte, capable of operating unattended and requiring no addition of water or electrolyte for a period of not less than ten years, with provision for visual checking of the electrolyte level without opening the battery or removing caps or fittings.

.6 Arrange the battery charging to operate automatically upon restoration of normal power to the unit, to remain in operation until the battery is fully recharged and to maintain the battery at full rated capacity at all times when the unit is not in operation.

.7 Provide a pilot lamp to indicate that the normal power supply to the unit and battery charging is in operation.

.8 Arrange that the unit can be conveniently tested and operated manually.

.9 Install the unit as part of the car so that it is not readily removed.

.10 Do not provide portable equipment.

.11 Install the lamp fixture above the car station.

.12 Provide an emergency lighting test switch in the car service cabinet or behind the car swing return.

1.44 Signal lights

.1 Provide LED position indicators and call registered lights having a minimum contrast ratio of 8:1 throughout a life expectancy greater than 100,000 hours.

.2 The contrast ratio is to be determined by subtracting the brightness of the indicator background from the brightness of the marking and then dividing the result by the brightness of the background.

.3 Arrange that the variation in intensity and contrast ratio between position indicators does not exceed 5 percent.

.4 Arrange that the variation in intensity and contrast ratio between call registered lights does not exceed 5 percent.

.5 All measurements are to be made in ambient lighting conditions meeting Code requirements.

1.45 Cab fan and light 'Green Control'

.1 Provide a device in the cab to remove power from the cab lights and fan when there is no one in the elevator.

.2 Arrange that the cab lights and fan are turned off in five minutes when:

.1 No movement in the cab is sensed;

.2 The elevator is level at a floor;

.3 The elevator doors are closed;

.4 The elevator has not been selected to answer a call;

.5 The elevator is on automatic operation;

.6 The elevator safety circuit (including interlocks) is intact.

.3 Should any of the above conditions no longer obtain or when telephone communication is initiated, turn the car lights and fan on.

.4 Use a triaxial accelerometer to detect movement.

.5 Provide a Henning "Light Watcher" device or approved equivalent.

1.46 Telephone: hands-free operation

.1 Provide a hands-free telephone with automatic dialer capable of initiating and receiving calls.

.2 Integrate the telephone into the car station.

.3 Provide a push button to initiate the telephone connection.

.4 Arrange that the telephone connection can be initiated by an external call.

.5 Provide an indicator light to confirm that communication has been established.

.6 Pierce the car station for the push button and indicator light with the indicator light mounted flush with the panel.

.7 Provide a speaker/microphone for communication.

.8 Pierce the car station in front of the speaker with multiple holes 3 mm (1/8") in diameter to allow passage of sound to and from the speaker.

.9 Identify the telephone and the button with a raised symbol and Braille.

.10 Provide wiring for the telephone from the cab to the machine room.

.11 Provide a communication station in the machine room.

.12 Connect the wiring on the car to a terminal block mounted in or adjacent to the telephone box.

.13 Terminate the wiring in the machine room at a separate enclosed external terminal block mounted on the controller.

.14 Provide the terminal block and its enclosure and locate it so that personnel other than elevator mechanics can easily run their conduit and wiring to these terminals without interfering with or touching the elevator wiring or controls.

.15 Where more than one controller is in a common machine room bring wiring to one common terminal block.

.16 Clearly mark the terminal block.

.17 Provide wiring of the twin conductor shielded type with grounded shields.

.18 Provide equipment and wiring compatible with and acceptable to the telephone company providing service to the project.

.19 Provide material and labour as necessary so as to ensure that the communication system meets the requirements of the Code.

1.47 Security system

.1 Provide for the future installation of an elevator card reader security system.

.2 Provide accessible space, mounting supports and wiring for a security antenna and a security controller in the cab main front return panel.

.3 Provide a free space 100 mm (4") in height, 175 mm (7") in width and 75 mm (3") in depth centred behind the car panel insert for the security antenna installation.

.4 Provide, within 250 mm (10") of the security antenna, a free space 200 mm (8") in height, 200 mm (8") in width and 75 mm (3") in depth, for the security controller installation.

.5 Provide in front of the security antenna a translucent polycarbonate cover.

.6 Provide an elevator security interface box in the machine room mounted on the side of an elevator controller.

.7 Provide wiring from the car station card reader to the security interface box using standard connectors.

.8 Interface with the security system using serial data transfer.

.9 Provide a signal, unique for each car call, to the security system when a car call "request" (which could either be by means of a button or touch screen) is entered and enter the car call when a return signal is received from the security system validating the request.

.10 Arrange that the elevator system functions without restriction by the security system when Firefighters' Emergency Operation or independent service is operative.

.11 Until such time as the security system is installed, arrange that the elevator system functions without restriction by the security system.

.12 Provide any incidental elevator material and elevator work necessary to obtain a complete functioning elevator security system.

.13 Submit for review, interface box drawings, location drawings and electrical schematics.

1.48 Hall push button stations: single riser

.1 Provide a single riser of hall push button stations.

.2 Provide one station for each floor.

.3 Provide at the intermediate floors, for each station, up and down push buttons located one above the other and call registered lights.

.4 Provide at the upper terminal and lower terminal, for each station, a single button and call registered light.

.5 Illuminate the call registered light only when there is an elevator in service to respond to the call.

.6 Secure the hall push button stations to the wall using countersunk spanner head fasteners or approved equivalent.

1.49 Hoistway access switch

.1 Provide hoistway access switches in accordance with the Code.

.2 Locate the switches in the entrance frame or in the sight guard in an inconspicuous place.

1.50 Cab ventilation

.1 Provide an exhaust fan capable of developing 30 pascals (0.1" H_2O) static pressure differential with a minimum capacity of 165 litres per second (350 cfm).

.2 Provide a two speed motor for the fan with the speed control located in the car operating panel.

.3 Arrange that the increase in noise level caused by the fan, measured in the car with the fan running at maximum speed, does not exceed 3 decibels.

1.51 Cab: standard finishes

.1 Provide a cab including the following items:

.1 A reinforced metal cab shell allowing the use of the elevator without interior finishes;

.2 A ceiling finished in white baked enamel;

.3 Returns, transom, car door jamb, lintel and door finished in Rimex stainless steel 12LG;

.4 Aluminum car sill;

.5 A 3 mm (1/8") thick aluminum plate over a wooden sub-floor;

.6 For non-access walls above the handrail, 19 mm (3/4") thick plywood panels covered with plastic laminate chosen by the Owner among the standard products from Formica and Armstrong, with stainless steel reveals and binders;

.7 For non-access walls below the handrail, 19 mm (3/4") thick plywood panels covered with Rimex stainless steel 12LG, with stainless steel reveals and binders;

.8 A solid suspended ceiling made of #4 brushed stainless steel, with four equally spaced ceiling panels;

.9 One LED light fixture with a stainless steel trim in each suspended ceiling panel;

.10 A recess for tile flooring by others to be installed flush with

the car sill;

.11 For non-access walls, tubular stainless steel handrails of an exterior diameter of 38 mm (1.5") with their ends returned into the wall, securely fastened with 40 mm between the handrail and the wall and installed at a height of 812 mm as measured from the top of the handrail to the finished floor;

.12 On the back wall, a 6.3mm x 76mm flat bar bumper rail, installed at a height of 229mm as measured from the top of the bumper rail to the finished floor;

.13 Aluminum hooks for protective pads.

.2 Provide vandal-resistant finishes.

.3 Supply any other material and labour necessary to provide a completed, installed cab including mounting strips, stay plates, base and sound-deadening material.

.4 Provide cut-outs to accommodate the elevator equipment.

.5 Submit for review shop drawings showing the finishes and design.

1.52 Entrance finish: Rimex stainless steel 12LG

.1 Provide Rimex stainless steel 12LG entrances at all floors finished so that spot welds or other surface defects will not show under reflected light.

1.53 Protective pads

.1 Provide protective pads covering all exposed wall surface, attached to inconspicuous pad hooks at the top of the cab and reaching to within 100 mm (4") of the car floor.

.2 Provide pads to fit over the front return and transom areas with a cutout for the car station and locking service cabinet.

.3 Provide pads with diamond pattern stitching.

1.54 Hall lanterns and gongs

.1 Provide hall lanterns complete with electronic gongs at each entrance to indicate the future direction of the elevator.

.2 Provide a single light for the fixture at the upper terminal.

.3 Provide a single light for the fixture at the lower terminal.

.4 Provide separate up and down lights for the fixture at the

intermediate landing.

.5 Arrange the lanterns so that as soon as a car has reached a predetermined distance from the floor, and is going to stop at the floor, the corresponding hall lantern illuminates and the gong operates.

.6 Arrange the controls so that the hall lantern provides a minimum five second advance notice of the arrival of a car.

.7 Maintain the hall lantern illuminated until the car has stopped and the door open time has elapsed.

.8 Do not illuminate the hall lantern on a door re-open unless the re-open is caused by a reversal of direction of travel of the car.

.9 Arrange the operation of the lanterns and gongs to comply with requirements for the handicapped.

.10 Sound the tone once to indicate the up direction and twice to indicate the down direction.

.11 Provide LEDs for illumination.

.12 Design the fixture so that the lamps may be readily changed.

.13 Do not mount any equipment to the covers; arrange that the covers can be removed completely without disturbing the electric wiring.

.14 Locate the centre-line of the fixture a minimum of 1830 mm (72") above the floor.

.15 Provide lanterns of minimum 60 mm (2.4") size in the smallest direction.

.16 Provide means to adjust the gong volume in a range from 55 and 70 decibels.

1.55 Hall position indicator and lantern

.1 Provide a combined digital position indicator and hall lantern mounted above the main floor entrance.

.2 Arrange the indicator to display a number or symbol at least 50 mm (2") high.

.3 Indicate the position of the car at all times, corresponding to the

landing through which the car is passing or at which it is stopped.

.4 Provide a dot matrix display using light emitting diodes.

.5 Arrange the circuits so as to provide continuous indication of car position.

.6 Overlapping dual indication, when the elevator is between floors, is acceptable.

.7 Provide lanterns complete with electronic gongs to indicate the future direction of the elevator.

.8 Do not mount any equipment to the covers; arrange that the covers can be removed completely without disturbing the electric wiring.

.9 Provide lanterns of minimum 50 mm (2") size in the smallest direction.

.10 Provide means to adjust the gong volume in a range from 55 and 70 decibels.

1.56 Car inspection devices

.1 Provide, on the top of the car, a fixed lamp receptacle, with switch, outfitted with wire clamp guards, and a GFI duplex receptacle with safety ground connection.

.2 Provide, on the top of the car, an inspection station consisting of an emergency stop button, up, down and common inspection running buttons, on-off switch for the door operator and other devices necessary for top-of-car inspection operation.

1.57 Sliding guides

.1 Equip the car and counterweight with spring-loaded sliding guides mounted at both the top and the bottom of the car and counterweight frame.

.2 Provide guide shoes of the self-aligning, self lubricating, swivel type with metal body and removable non-metallic liners to ensure smooth and quiet operation.

1.58 Guide rails

.1 Provide standard section guide rails with tongued and grooved joints.

.2 Provide guide rails of structural strength and rigidity sufficient to limit the horizontal deflection of the guide at any point to less than 0.6 mm (0.025") under normal conditions of operation.

.3 Use substantial machined finished plates to form the rail joints.

.4 Erect guide rails with a variation of not more than 1.6 mm (0.06") over any 6 m (20') section and with a maximum variation of not more than 0.8 mm (0.03") in 25 mm (1").

.5 Install guide rails in a strong and substantial manner using brackets affixed to the building structure.

.6 Clamp the guides to the bracket with clips.

.7 Arrange each clip so as to resist a vertical force of less than 4500 N (1000 pounds) and so as to allow the rail to slide if the vertical force exceeds 9000 N (2000 pounds).

.8 Arrange the clips to prevent any horizontal movement of the rail.

.9 Extend rails to within less than 300 mm (12") and more than 150 mm (6") of the underside of the overhead slab.

.10 Use all standard length rails unless shorter lengths are required to avoid bracket locations or to complete the rail run at the top of the hoistway.

.11 Install and locate the rails so that joints do not interfere with the supporting brackets and clamps.

1.59 Traction elevator emergency power device

.1 Provide a device to automatically move the elevator to a floor in the event of power failure.

.2 Arrange that when normal power fails, sufficient power is provided by the device to lift the brake, cause the elevator to move to a floor, open the doors and then remove the elevator from service until normal power is restored.

.3 Provide batteries complete with charging system to power the unit.

.4 Provide batteries having a minimum life expectancy of ten years.

1.60 Car top guard

.1 For the safety of the technicians working on the top of the car, provide a car top guard consisting of the following.

.2 Provide car top guard to meet, as a minimum, the requirements of the Code.

.3 Provide a continuous guard around the sides and rear of the car top.

.4 Provide a solid kickplate at the bottom of the guard rail extending from the car top to a height of 150 mm to prevent objects on the car top from

falling over the side of the car.

.5 Bolt the car top guard components together so that, if necessary, the guard can be temporarily removed.

.6 Finish the guard with two coats of rust inhibiting primer and one finished coat of enamel.

.7 So as to preserve the cab isolation affix the car top guard either to the cab top or to the car sling and frame but not to both.

.8 If the car top guard is affixed to the car sling provide, where necessary, supports to the cab using vibration isolated mountings so arranged as to preserve the cab isolation.

.9 If the car top guard is affixed to the cab provide, where necessary, supports to the car sling and uprights using vibration isolated mountings so arranged as to preserve the cab isolation.

.10 Ensure that the installation of the car top guard does not reduce the overhead clearances to less than allowed by Code.

1.61 Counterweight

.1 Provide a counterweight to counterbalance the elevator for smooth and economical operation.

.2 Contain the weights in a structural steel frame.

.3 Make the counterweight equal to the weight of the complete elevator car plus between 40 percent and 50 percent of the rated load.

.4 Provide counterweight guards where required by Code.

1.62 Counterweight balance

.1 Statically balance the counterweight so that, at the centre of the travel, with the top guiding means removed, the counterweight hangs in the centre of the rails.

.2 Arrange the equipment so that there is, in this position, with the guiding means properly adjusted, no pressure upon the guides.

.3 Adjust the guiding means so that the pressure upon any guide at any point in the travel does not exceed 110 Newtons (25 pounds).

1.63 Car balance

.1 Statically balance the car so that, at the centre of the travel, with the top guiding means removed, the car hangs in the centre of the rails.

.2 Arrange the equipment so that there is, in this position, with the guiding means properly adjusted, no force upon the guides.

.3 Make this test with empty car and car doors closed.

.4 Locate and adjust devices such as the compensating devices, travelling cable hangers and cab balancing weights so that the force upon any guide at any point in the travel does not exceed 110 Newtons (25 pounds) with empty car and car doors closed.

1.64 Sheaves and supporting beams

.1 Provide sheaves, together with supporting beams or channels, necessary to obtain proper lead of the ropes to car and counterweight, accurately machined and grooved for the diameter of the ropes used.

.2 Design and arrange the sheaves so that they can be readily serviced or removed.

.3 Provide sound and vibration isolation pads or springs arranged so that there is no solid contact between the sheaves and the building structure.

1.65 Pit equipment

.1 Provide buffer extensions, support beams, work platform with ladder as necessary to accommodate the pit depth.

1.66 Limit switch dowelling

.1 After the final limit switches are adjusted and prior to the performance of safety tests and checks by the inspecting authorities, fasten, by throughbolting or dowelling, the final limit switches and final limit switch brackets so as to minimize the possibility of future incorrect adjustment.

1.67 Painting

.1 Ensure that machine room and hoistway equipment, except for machined surfaces and non-rusting surfaces, is protected with two coats of a rust inhibiting primer of a neutral colour, each coat of 25 micron minimum thickness.

1.68 External connections

.1 Provide a junction box on the external wall of the hoistway at a point to be designated later for connections for such items as telephones, CCTV, lobby panels, monitor systems, to external locations such as the CACF Room.

.2 Locate this box as instructed and provide clearly marked terminal

blocks for the wiring connections.

.3 Supply the required wiring for the connections from this box to the external locations (provision of external conduit and pulling of wiring by others).

1.69 Travelling cable

.1 Provide travelling cables with flame-retarding and moisture-resisting outer covers and stranded conductors.

.2 Supply cables approved for elevator use.

.3 Provide in the travelling cables:

.1 14 AWG (1.5 square mm) conductors for constant current-carrying circuits;

.2 Minimum of eight 18 AWG (0.75 square mm) conductors for signal circuits;

.3 20 AWG (0.5 square mm) shielded pair conductors with shielding for telecommunications circuits and data circuits;

.4 two RG-6U coaxial cables and one pair 18 gauge stranded conductor cable within an overall braided shield for closed-circuit television.

.4 Provide ten percent additional minimum spare signal and current-carrying wires in each cable.

.5 Terminate cables using terminal blocks or suitable connectors having identifying numbers to facilitate replacement and service.

.6 Suspend light weight cables using a wire mesh sleeve to relieve strain in the individual conductors and heavier cables using a steel supporting strand if the suspended weight exceeds 35 kg (seventy-five pounds).

1.70 Electric wiring

.1 Provide wiring required to interconnect the equipment.

.2 Provide copper wire.

.3 Provide insulated wiring having a flame retarding and moisture resisting outer cover.

.4 Where flexible conduit is used, supply it in aluminium.

.5 Provide travelling cable to connect car operating panels and other car

operating devices to the controller in the machine room.

.6 Where shielded wire is specified, provide wire of not less than 0.52 mm^2 area (20 gauge) having individually shielded pairs with 100% shielding.

.7 Provide colour or number coded wires in multiwire cables.

.8 Provide waterproof terminal labels.

.9 Provide stranded field wire except for the individual wires in multiwire cables which may be either stranded or solid.

PART THREE - EXECUTION

1.71 Operation: simplex collective

.1 Provide a micro-processor based simplex control for the elevator.

1.72 Operation: call initiation

.1 Control the elevator automatically by buttons in the car, marked to correspond with the respective landings served, and by the call buttons at the landing stations.

.2 Register a call by momentary pressure of a button.

1.73 Operation: call response

.1 Store all hall and car calls in the control memory until answered.

.2 Cancel a call when it is answered by a car.

.3 Stop a running car at the first landing for which a car call is registered.

.4 Stop a running car for a hall call registered for the same direction as the car is travelling, subject to higher priority assignments and to load in the car.

1.74 Operation: high & low call return

.1 Cause the car to proceed to the calls until it has come to the limit of calls placed in the direction in which it is travelling, and having done this, subject to the assignment of the dispatch system, to reverse direction.

.2 Do not stop the car, except in the case of high and low return, for hall

calls in the opposite direction to the direction of the car.

1.75 Operation: coincident calls

.1 Assign a hall call to an elevator with a car call at the same floor if the elevator is travelling in the same direction as the hall call.

1.76 Operation: fault recovery

.1 Provide a recovery circuit arranged to take the elevator at low speed to the next floor in the event of an overspeed condition, overload trip, or other similar fault condition.

.2 Do not implement the recovery circuit if the movement of the car would endanger the passengers in the car.

.3 Provide a circuit separate from the normal speed control circuits, with power derived through separate controls and limited in power by resistance or fixed devices to an appropriate low level.

.4 Do not use, in this circuit, any solid state or other device which could fail in a mode that would allow an increase in applied power.

.5 Upon arrival of the car level at the next floor, cause the doors to open and remain open, and turn off the car lights.

.6 Leave the elevator in this state until the fault is corrected and the car restored to service.

1.77 Operation: direction reversal

.1 Cause a car without registered car calls, arriving at a floor where both up and down hall calls are registered, to initially respond to the hall call in the direction that the car was travelling.

.2 If, subsequent to the stop at this landing, there are no car or hall calls registered such as to require immediate travel in the same direction as before stopping at that landing, cause the car to close its doors, immediately reopen them and respond to the hall call in the opposite direction.

1.78 Operation: independent service

.1 Provide independent service.

.2 On independent service:

.1 Remove the car from the automatic supervisory control system;

.2 Arrange the circuits so that the car does not respond to hall

calls;

.3 Render the hall lanterns (if provided) inoperative;

.4 Cause the car to park with its doors open;

.5 Arrange the controls so that the car responds to any car calls registered if a button is held until the doors are closed and the interlocks made-up;

.6 Cause the doors to reopen if the button is released at any time up to the point at which the elevator starts to move;

.7 Render inoperative the normal door protective devices;

.8 Arrange the controls so that the attendant can select direction of travel;

.9 Cancel all registered car calls when the direction reverses or a car call is answered.

.10 Arrange the independent service operation so that it does not override security features or security systems.

1.79 Operation: door protective device

.1 Arrange the door protective device so that, should it detect a person or any object in its path, at any point during the door closing operation, it will cause the doors to return to the open position.

.2 Adjust both the detection device and the door operation so that an object or person in the way of the door will cause the doors to reverse without the door panel of either hall or car doors actually striking the object or person.

1.80 Operation: car call anti-nuisance feature

.1 Arrange the control circuits to cancel all car calls when an unreasonable number of car calls has been registered relative to the number of passengers in the car.

.2 Prevent nuisance car calls by:

.1 Not allowing car calls to be registered below the current position of an up travelling car;

.2 Not allowing car calls to be registered above the current position of a down travelling car;

.3 Or, by cancelling car calls when the car reverses direction.

1.81 System clock

.1 Where operations or functions are subject to clock control or require clock input, provide a solid state clock.

.2 Provide, in the machine room or at the central control console, means to indicate the current clock time.

.3 Provide, in the machine room or at the central control console, means to readily reset the clock time.

.4 Provide crystal regulation of frequency and voltage control adequate to maintain the time within an accuracy of plus or minus five seconds per month.

.5 Provide software to automatically adjust the time for changes from standard to daylight saving time and from daylight saving time to standard time.

.6 Provide battery back-up to maintain for a period of at least 24 hours accurate clock time in the event of power loss.

1.82 Door protective device by-pass (nudging)

.1 Should a door protective device be operated continuously for more than 20 seconds after the elapse of the normal door open time, cause the doors to close slowly under reduced power and operate a buzzer in the car panel as a warning to the person obstructing the door.

.2 Cause the 20 seconds to be reduced to 6 seconds until a normal door cycle is performed.

1.83 Door open pause time

.1 Arrange the circuits so that when the car is stopped in response to a hall call the doors remain open a predetermined length [approximately 3 seconds for an elevator whose entrances are within 3 metres (10') of the hall push button and approximately 4 seconds for an elevator whose entrances are further than 3 metres (10') from the hall push button].

.2 Arrange that this predetermined length of time is reduced to approximately 0.7 seconds if a person moves through the entrance (as indicated by the actuation of the door protective device).

.3 Unless otherwise specified (e.g. to allow for advance hall lantern warning), arrange the circuits so that when the car is stopped in response to a car registered call the doors remain open a predetermined length of time (approximately 1 second).

.4 Make the times separately adjustable over a range from 0.25 seconds

to 15 seconds.

.5 Arrange the circuits so that the door open pause time is cancelled if a car call button is pressed or the door close button is pressed.

1.84 Car call registration tones

.1 Provide an audible tone, arranged to sound when a car call is registered, having an adjustable volume level of between 55 and 70 decibels, as measured from within the elevator cab.

1.85 Noise level: door operation

.1 Arrange the equipment so that the noise level, as measured within the cab, does not exceed 60 decibels at any time during a full door open, door close and door reversal cycle.

.2 Initiate the door reversal by triggering the door protective device.

.3 Measure the noise level using an ANSI type 2 sound level meter on the "A" scale with an "F" response.

1.86 Noise level: cab

.1 Arrange that, with the elevator travelling from one end of the hoistway to the other, the noise level as measured within the elevator cab does not vary by more than 3 decibels.

.2 Measure this noise level with an ANSI type 2 sound level meter on the "A" scale with an "F" response.

1.87 Cab fan: operation

.1 Arrange that there is no discernible vibration in the car with the fan operating.

.2 Arrange that the noise level developed by the fan, measured in the car with the fan running, does not exceed 55 db.

1.88 Noise level: machine room

.1 Design the equipment so that the noise level with the elevator running, as measured by a meter positioned in the centre of the machine room, does not exceed 80 decibels.

.2 Measure this noise level using an ANSI type 2 sound level meter on the "A" scale with an "S" response.

1.89 Car ride

.1 Arrange that the horizontal acceleration front to rear or side to side measured in the car with the elevator travelling, with a load of less than 10 per cent of capacity, from top to bottom and bottom to top does not exceed 150 mm per second per second (0.5 fpsps) measured between two consecutive points of opposite value.

.2 Arrange that the vertical acceleration measured in the car with the elevator travelling, with a load of less than 10 per cent of capacity, from top to bottom and bottom to top at contract speed, does not exceed 100 mm per second per second (0.3 fpsps) measured between two consecutive points of opposite value.

1.90 Levelling

.1 Cause the car to stop automatically at floor level, without overshoot, regardless of load or direction of travel so that the car sill is level, within 6 mm (1/4"), with respect to the hoistway sill.

.2 When the elevator cab is stopped at a floor, correct for over travel or under travel or movement of the cab away from the floor, by returning the car imperceptibly to floor level.

1.91 Transmitted vibration

.1 Arrange that the dose value of the transmitted vibration generated by the machine and associated sheaves in the frequency range from 0 to 100 Hz is less than 0.2 in any single axis and that the average of the dose values of the three axes is less than 0.15.

.2 Measure the vibration over a period of ten seconds in both directions of travel at contract speed with empty car.

.3 Record the vibration using an accelerometer transducer mounted on the machine beam adjacent to the machine.

.4 Process the accelerometer output through a low pass digital or analogue filter to delete frequencies above 100 Hz.

.5 Record the accelerations from 0 Hz to a minimum 200 Hz in the vertical axis and the two horizontal axes.

.6 Calculate the vibration dose value by integrating the fourth power of the acceleration in m/s/s over the ten second period, dividing by the number of samples, and taking the fourth root of the result.

1.92 Speed control

.1 Design and adjust the equipment so that the average acceleration over the period of constant acceleration is 0.8 metres per second per second (2.6 f/s/s) plus or minus 10%.

.2 Design and adjust the equipment so that the average change in acceleration (jerk) is 1.8 metres per second per second per second (6.0 f/s/s/s) plus or minus 10%.

.3 Design and adjust the equipment so that the rated speed is maintained with an accuracy of 1.5 percent.

1.93 Operating time

.1 Adjust the equipment so that the elapsed time to travel one typical floor does not exceed the time shown in the data table.

.2 Measure this time under the following conditions:

.1 A typical floor height of less than 4000 mm (13');

.2 Floor levelling accuracy of ± 6 mm (1/4");

.3 Start time when the fully opened doors begin to close;

.4 Stop time when the car is stopped level with the next floor and the car and hall doors are 800 mm (32") open;

.5 Time measured with full load in the car and in both directions of travel;

.6 Power door operation for the hall and car doors conforms to the elevator code requirements.

.3 Adjust the equipment so that the operating time is compatible with dependable, consistent operation without undue wear or excessive maintenance and so that this operating time can be readily maintained over the life of the elevator installation.

.4 Adjust the equipment so that, with the control functioning so as to give the required time, the elevator operates under smooth acceleration and retardation and provides a comfortable and agreeable ride.

1.94 Firefighters' Emergency Operation: automatic recall

.1 Provide Firefighters' Emergency Operation including:

.1 Phase I automatic Emergency Recall Operation;

.2 Phase II Emergency In-Car Operation.

.2 Provide control "handshaking" compatible with the building interconnections.

.3 Provide switches and indicators in the hall and car stations as required by Code.

**********END OF SECTION**********

Appendix 'A'

Designated Substances Survey and Perchlorate Detection in Fume Hoods, OVC – Former VMI Building

Prepared by LEX Scientific Inc., June 2018 (LEX Project No. 01180066)

LEX Project No. 01180066

SOLUTIONS
FOR A WORKING WORLD

University of Guelph – Physical Resource Dept.

Designated Substance Survey and Perchlorate Detection in Fume Hoods

OVC - Former VMI Building

June 2018

Prepared by:
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June 26, 2018
LEX Project No. 01180066

Mr. Peter Ibrajev
University of Guelph – Physical Resource Dept.
J.C. Hersey Building, 117 College Avenue East, Guelph ON, N1G 2W1

Re: Designated Substance Survey and Perchlorate Detection in Fume Hoods
OVC - Former VMI Building

Dear Mr. Ibrajev:

LEX Scientific Inc. (LEX) was retained by University of Guelph – Physical Resource Dept.to conduct a Designated Substances Survey (DSS) for the Ontario Veterinary College OVC - Former VMI Building located at 50 College Ave, West, Guelph ON. The survey was conducted in support of planned renovations and included the inspection of asbestos-containing materials (ACMs), the investigation of potential lead and mercury-containing materials within the building, and the inspection for other designated substances. In addition to the DSS, LEX tested the interior of fume hoods located in the facility for potential perchlorate residues.

This designated substance survey was conducted to ensure compliance with Section 30(1) of the Occupational Health and Safety Act which states:

"*Before beginning a project, the owner shall determine whether any designated substances are present at the project site and shall prepare a list of all designated substances that are present at the site.*"

On behalf of LEX, we would like to thank you for the opportunity to serve you. If you have any questions regarding this report or any health and safety issue, please call us at (519).824.7082.

Yours truly,

LEX Scientific Inc.

Daniel Humphrey, B.B.R.M.
Environmental Technologist

Eric Hoffbauer, P.Eng.
Project Manager – Consulting Services

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Executive Summary

University of Guelph – Physical Resource Dept. retained LEX to conduct a DSS of the OVC - Former VMI Building. The survey was requested to quantify the designated substances on the premises before renovations are scheduled to begin. In addition, fume hoods in the facility were tested for perchlorate residues.

Summary of Designated Substances and Hazardous Materials

Designated Substance Observed	Material	Location	Approximate Quantity
Asbestos	Black mastic	Black mastic was found throughout the building **except** where there is terrazzo flooring, concrete flooring or beneath LEX samples 07, 27, 29. **Note LEX samples 07, 27, 29 may have areas within the building where black mastic is present that was not observed by LEX.*	18,000 sq. ft.
Asbestos	Vinyl Flooring Tile (VFT) – Olive with white streaks 9x9	138A, 138B, 215, 215A, 215B, 215C, 215D, 216, 112, C201	256 sq. ft.
Asbestos	VFT – Brown with white streaks 9x9	132A, 221, Penthouse Mechanical Room 222 (Bottom of stairs), 209, 209A, 210, 210A, 210B, 210C,	612 sq. ft.
Asbestos	VFT – Grey with white streaks 9x9	128, 117A, 117B, 125B, 125A, 125, 126B, 126D, 214A, 214B, 215, 215A, 215B, 111, 203, 203A, 206A, 206B, 206C	2223 sq. ft.
Asbestos	VFT – Green/Blue	126	270 sq. ft.
Asbestos	VFT – White with green streaks 9x9	132B, 126D	160 sq. ft.
Asbestos	VFT – Teal with white 9x9	119	96 sq. ft.
Asbestos	VFT – Grey with black 9x9	123, 124	432 sq. ft.

Designated Substance Observed	Material	Location	Approximate Quantity
Asbestos	VFT – Black with white streaks	204B	40 sq. ft.
Asbestos	VFT – Brown with multicolour streaks 9x9	203, 208, 210, 210A, 210B, 210C	912 sq. ft.
Asbestos	VFT – Blue with white streaks 9x9	215, 215A, 215B, 215C, 215D, 216, 223, 204B, 213, 213A, 213B, 213C	839 sq. ft.
Asbestos	VFT – White with brown streaks 9x9	215C, 215D, 216, 219A, 219B, 220, 102, 203B, 207, 207B	1489 sq. ft.
Asbestos	VFT – Red with white streaks 9x9	219, 219A, 219B, 219C, 128, 209, 209A, C201	700 sq. ft.
Asbestos	VFT – Army green with white streaks	213, 213A, 213B, 213C	170 sq. ft.
Presumed Asbestos	Sink undercoating - Gold	209, 209A	2 units
Asbestos	Parged pipe fittings	128, 130, 132, 133, 135, 138, 138A, 138B, 139, 139A, 140, 140A Washroom 130, Washroom 117, 117A, 117B, 119, Sewage Room 120A, 123, 125A, 125B, 126, 126A, 126E, 127, Washroom 116, 116, 109, 109A, 109B, 102, 128, 124, 113A, Corridor 102, Corridor 103, 203, 204B, 206B, 206C, 209, 209A, 223, Corridor 201, Penthouse Mechanical Room 222	411 fittings
Presumed Asbestos	Parged pipe wrapping	Penthouse Mechanical Room 222, Sewage Room 120A	6000 sq. ft.
Presumed Asbestos	Transite Board	138	70 sq. ft.
Asbestos	Parged pipe fittings – **Inaccessible** ceiling hatch	129, 132A, 132B, 132C, 117A, 117B, 121, 126D, Washroom 202, 201, Atrium 202,	Unknown

Designated Substance Observed	Material	Location	Approximate Quantity
		Corridor 100, all stairwells	
Mercury	Fluorescent light bulbs	Throughout Entire Building	1137 units
Polychlorinated Biphenyls (PCB)	Light ballasts	Throughout Entire Building	578 units
Lead	Copper and cast-iron pipe solder	Found in ceiling spaces, beneath laboratory work benches, and in corridors	Throughout Entire Building
Lead	Lead containing paint	Throughout Entire Building	N/A

No perchlorate residues were detected by LEX on the interior surfaces of the fume hoods.

Summary of Recommendations

- Any ACM that may be disturbed during the renovation should be removed by a qualified abatement contractor prior to initiation of renovations.
- Any lead containing materials disturbed during the renovations should be completed using the Ontario Ministry of Labour guideline *Lead on Construction Projects.*
- It is recommended that a copy of this DSS should be kept on-site during any renovation or demolition activities. It should also be provided to all contractors who may disturb any of the designated substances mentioned in this report.
- Coring, sawing or breaking of materials such as concrete, brick and mortar should be considered silica-containing and should be done with appropriate dust suppression methods and proper respiratory protection and following Guideline - Silica on Construction Projects (published September 2004 and revised April 2011).
- Any fluorescent light tubes that will be removed should be collected and disposed of by being sent to an appropriate recycling facility. Fluorescent tubes should be packed in a rigid container to mitigate any circumstances that may result in breaking of light tubes and release of mercury vapour. Broken light tubes should also be packed in the same container for disposal.
- Any light ballasts that will be removed should be collected from the site, checked for PCB content and disposed of by sending to an appropriate facility. LEX has a directory of ballast types and manufacturers and has staff that can assist in sorting any light ballasts removed during renovations as PCB and non-PCB containing for appropriate disposal.

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1 Introduction

The University of Guelph – Physical Resource Dept. retained LEX to conduct a DSS at the OVC - Former VMI Building. In addition, LEX preformed perchlorate detection testing in fume hoods that were located within the scope of work to determine if there were any perchlorate residues present. This building is a multi-use, multi-storey building and was used by the Ontario Veterinary College (OVC) as their Veterinary Microbiology and Immunology facility.

The DSS assessment was performed by Dan Humphrey, B.B.R.M (Env Mgmt.)., Environmental Technologist and Jarrett Deneau, B.Sc. Environmental Technologist between May 14-18, 2018. The survey included the inspection of asbestos-containing materials (ACMs), the investigation of potential lead and mercury-containing materials within the building and the inspection for other designated substances. It is understood that the survey was requested to quantify the designated substances on the premises prior to initiation of planned renovations.

The survey included the inspection of asbestos-containing materials (ACMs), the investigation of potential lead and mercury-containing materials within the building and the inspection for other designated substances. The scope of work encompassed all floors, walls, ceilings, and interior finishes of the building. LEX conducted semi-invasive sampling and visual identification during the survey.

Within the limitations presented, the survey has been completed and the results are contained in this report. All work was performed according to the Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations (Ontario Regulation 278/05); Designated Substances in the Workplace (Ontario Regulation 490/09) - made under the Occupational Health and Safety Act.

2 Definition of Designated Substances and Applicable Guidelines

2.1 Asbestos Containing Material (ACM)

Ontario Regulation 278/05 Section 1 and 3 (4) defines an ACM as being a material that contains 0.5 percent or more asbestos by dry weight. ACMs have been proven to cause diseases like mesothelioma, asbestosis and lung cancer. Health Canada states that asbestos fibres pose significantly less health risks if they are in tightly bound or in enclosed form. Any form of alteration or renovation to the ACM needs to be performed by certified professional.

Ontario Regulation 278/05 requires that final clearance air monitoring be conducted following all Type III Asbestos Removal Operations to ensure the work enclosure is clean and is suitable for worker/tenant re-occupancy. The Type III work enclosure "passes the clearance test only if every air sample collected has a concentration of fibres that does not exceed 0.01 fibres per cubic centimetre of air[1]".

2.2 Lead

Lead is used in a wide variety of products including the manufacture of storage batteries, plastic stabilizers and paints, ammunition, cable coverings in the power and communication industries, and lead sheet for roofing.

Acute exposure to lead by inhalation or ingestion may cause headache, fatigue, nausea, abdominal cramps, and joint pain and bloody diarrhoea. Chronic (long term) exposure to lead by inhalation or ingestion can cause reduced haemoglobin production, reduced life span, disturbances to vision and kidney damage. Lead exposure may also cause harmful effects on pregnancy and reproduction, is mutagenic and possibly carcinogenic to humans.

O. Reg. 490/09 limits occupational exposure to elemental lead to 0.05 mg/m^3 TWA (8 hour) for workers, but excludes construction projects. However, the Ministry of Labour Guideline - *Lead On Construction Projects* (published September 2004 and revised April 2011) requires an equivalent level of protection to be implemented. Adopting the exposure limit value for workers on construction projects would be a prudent practice.

Lead was also historically used in solder for interior plumbing. However, lead has been banned for use in solder since approximately 1990. Lead piping was also used in plumbing for buildings constructed before 1975. Building age can be used to determine the presence of lead piping or lead containing solder in plumbing systems.

2.3 Mercury

Mercury and mercury compounds are known to cause central nervous system impairment as well as kidney damage. Mercury in the elemental form was historically used in various applications including in buildings as part of thermostat switches and light switches. Mercury is also used in fluorescent lighting tubes.

Ontario Regulation 490/09 – Designated Substances limits worker exposure to mercury and mercury compounds to 0.01 mg/m^3. O*ntario Regulation 347 - General Waste Management*, encourages the recycling of "common mercury wastes" including mercury-containing lamps and thermostats.

2.4 Silica

Silica, or silicon dioxide (SiO_2), is a mineral constituting about 60% of the earth's crust. The regulated forms of crystalline silica are quartz, cristobalite, tridymite, and tripoli.

Silica sand and gravel are commonly used in road construction, buildings (concrete), ceramic and refractory materials. Respiratory impairment and disease among workers exposed to mineral dusts have been historically documented. Silicosis (or silica-induced pneumoconiosis) is the result of deposition of crystalline silica particles in the lung tissue. Prolonged and continued exposure to silica dust may cause progressive silicosis resulting in respiratory failure.

O. Reg. 490/09 limits occupational exposure limit for crystalline silica, quartz/ tripoli at 0.1 mg/m^3 TWA (8-hour) and cristobalite at 0.05 mg/m^3 TWA (8 hour).

2.5 Other Designated Substances

The other designated substances are:

- Acrylonitrile;
- Arsenic;
- Benzene;
- Ethylene Oxide;
- Isocyanates; and
- Vinyl Chloride.

- Coke Oven Emissions;

2.6 Perchlorate Compounds

Perchlorate is a naturally occurring and man-made material commonly used as an oxidizer in solid propellants, munitions, fireworks, airbag initiators, matches and signal flares. It is also used in some electroplating operations and found in some disinfectants and herbicides (United States Environmental Protection Agency [EPA], 2014). The presence of perchlorates inside a fume hood may present an explosion hazard under certain conditions if the fume hood is exposed to a physical shock.

2.7 Semi-invasive Sampling

For the purpose of this report semi-invasive sampling included visual inspections of building materials, sampling of wall finishes and pulling up corners of carpet tiles to exam flooring underneath without leaving evidence of extensive of disturbances. Since LEX staff were able to access and inspect the wall spaces from areas above the ceiling, coring was not required to identify if loose fill insulation was present in wall cavities. LEX was able to see into wall cavities at three different locations across the two wings.

3 Survey Methodology

3.1 Building Surveyed

Table 1 summarizes the rooms and building(s) surveyed as part of this DSS.

Table 1 Inspection Location Summary

Building Address	Areas Surveyed	Areas Excluded from Survey
50 College Ave, West, Guelph ON – Wing B and C	First Floor Second Floor Penthouse (Mechanical Room) Basement rooms 120A (Mechanical Room) and 120B (Sewage Room) Corridors C100, C101, C102, C103, C201, C202, AT202 Stairwells ST101, ST102, ST103, ST201, ST202, ST203, ST205	Rooms 109D (Cooler), 109E (Freezer), 207A (Cold Room), 202 (Cold Room), 204A (Storage), EL200

3.2 Survey Methodology

A walk-through visual inspection and non-invasive sampling was performed to determine the condition of asbestos containing materials **(ACM)** and the presence of all other Designated Substances. In addition, areas of the building where flooring carpet tile were present LEX pulled up corners of carpet tiles to examine flooring materials below. The materials of interest included, but were not limited to:

1. Thermal System Insulation **(TSI)** including pipe insulation, pipe fittings, boiler insulation, and duct insulation.
2. Surfacing materials including spray-on fireproofing, troweled-on material and decorative coatings.
3. Miscellaneous materials including vibration cloth, transite board or pipes, asbestos cement composite, ceiling tiles, and floor tiles.
4. Deteriorating paint coatings on walls, ceilings, pipes etc.
5. Mercury-containing electrical switches, lights and thermostats.

Representative bulk samples were collected of suspect ACM present in the building. Two representative paint samples were taken from surfaces with deteriorating/peeling paint in the areas inspected and were analysed for lead content. Visual identification of mercury-containing materials such as electrical switches and thermostats was conducted during the survey.

Details of fume hood usage by staff and students is not known. Since historical perchloric acid usage can result in perchlorate residues present in the fume hoods which can present an explosive hazard, testing for perchlorates was conducted in response to anticipated renovation plans for the building. Perchlorate testing was conducted in the fume hoods located to the following rooms:

- 209 (1 fume hood identified)
- 206B (1 fume hood identified)
- 213A (1 fume hood identified)
- 123 (1 fume hood identified)

Three tests were completed per fume hood following stated methodology. Test locations included interior left paneling, interior right paneling, and interior top paneling of each fume hood. The perchlorate testing in the fume hoods was conducted using a testing method involving methyl blue dye solution. Distilled water was sprayed on the interior surfaces of the fume hood and allowed to wash down the sides. A cotton tipped swab was then moistened with the water from the side of the fume hood and placed on a sterile piece of filter paper. A small amount of methyl blue dye solution was then dropped onto the swab and filter paper. When perchlorate is present, the methyl blue reacts to form violet precipitates.

3.3 Survey Impediments

The following impediments were encountered during the survey:

- Inaccessible locks on rooms 109D (Cooler), 109E (Freezer), 207A (Cold Room), 202 (Cold Room), 204A (Storage).
- Limited view, or inaccessible ceiling hatches in some rooms throughout the survey. For room by room notes refer to Appendix E.
- Inaccessible elevator shaft (EL 200).

*Note: LEX was able to gain access to cold room 136B. It was reported to LEX by Mr. Peter Ibrajev that this cold room is representative of the other cold/freezer rooms within the building that were inaccessible during the investigation.

3.4 Laboratory Analysis

Each bulk sample submitted to the LEX Laboratory was analysed as per EPA method 600/R-93/116 and was performed in compliance with the Code for the Determination of Asbestos from Bulk Samples found in the Regulation regarding Asbestos on Construction Projects and in Buildings and Repair Operations - made under the Occupational Health and Safety Act, Ontario Regulation 278/05.

LEX is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) and by the National Institute of Standards and Technology. The National Voluntary Laboratory Accreditation Program is a United States based laboratory accreditation for analyzing bulk materials for asbestos content. Our NVLAP Lab Code number is 101949.

Paint chip samples were analyzed by Maxxam Analytics for lead content.

4 Results and Discussion

4.1 Survey Visual Observations

The following observations were made during the investigation:

- LEX observed cast iron and copper piping throughout the building.
- LEX observed fluorescent light bulbs throughout the building.
- LEX observed a water leak in room 125B. In addition, water damage was observed on ceiling tiles in 125A.
- LEX observed some parged pipe fitting/insulation remediation efforts in basement room 120, the Penthouse Mechanical Room, and corridor C102.
- Invasive coring of exterior walls was avoided by LEX since there were multiple locations where wall cinder blocking was damaged and visual inspections of the wall cavity could be made. No suspect ACM materials where observed by LEX in these areas.

4.2 Asbestos Containing Materials

4.2.1 Bulk Sampling Results

Table 2 below, summarizes the analytical laboratory results of homogeneous materials collected from OVC - Former VMI Building. Note that the locations listed below pertain only to the physical samples submitted for lab analysis.

Table 2 Summary of Homogenous Materials Collected

Sample ID	Sample Location	Description	Friability	% Fibrous Asbestos Content
01	C100, 140, 138A, ST101, ST103, 110, 101	Plaster (Scratch and Finish Layers)	No	Non-containing
02	C100	Ceiling Tile (CT) – Large/Small Pinholes	Yes	Non-containing
03	C100	CT – Glue Pucks 9x9	Yes	Non-containing
04	C100	CT – Rough	Yes	Non-containing
05	140, 139, 135	Window Caulking (White)	No	Non-containing
06	135, 140, 132	Baseboard Mastic #1 (BBM)	No	Non-containing
07	140, 132	VFT – Brown with Grey and Mastic - Orange	No	Non-containing
08	128	Parged Pipe Fitting	Yes	50% Chrysotile
09*	139, 135	Tar Duct Insulation	Yes	<0.5 Chrysotile -- Considered non-ACM
10	139A	Sink Undercoat – Blue	No	Non-containing
11	138, 125B, 125A	BBM #2	No	Non-containing
12	138, 127	VFT – White with Black	No	Non-containing
		Black mastic	No	1% Chrysotile
13	138A, 138B	VFT – Olive with White Streaks 9x9	No	0.5% Chrysotile
		Black mastic	No	1% Chrysotile
14	138	VFT – White with Grey	No	Non-containing
		Black mastic	No	1% Chrysotile
15	136, 133, 206, 204, 113	Drywall Joint Filling Compound (DWJFC)	No	Non-containing
16	132, 132B	Carpet Tile Mastic (Yellow)	No	Non-containing
17	132A	VFT – Brown with White Streaks 9x9	No	0.5% Chrysotile
		Black mastic	No	1% Chrysotile
18	128	VFT – Grey with White Streaks 9x9	No	0.5% Chrysotile

Sample ID	Sample Location	Description	Friability	% Fibrous Asbestos Content
		Black mastic	No	1% Chrysotile
19	126	VFT – Green/Blue	No	0.5% Chrysotile
		Black mastic	No	1% Chrysotile
20	126D	VFT – White with Green Streaks 9x9	No	2% Chrysotile
		Black mastic	No	1% Chrysotile
21	126E, 126, 126D	Leveling Compound - Grey	No	Non-containing
22	126	Flexible Pipe Insulation	No	Non-containing
23	119	VFT – Teal with White 9x9	No	1% Chrysotile
		Black mastic	No	1% Chrysotile
24	123	VFT – Beige with Brown	No	Non-containing
		Black mastic	No	1% Chrysotile
25	123, 124	VFT – Grey with Black 9x9	No	1% Chrysotile
		Black mastic	No	1% Chrysotile
26	123, 124	VFT – Oatmeal Pattern	No	Non-containing
		Black mastic	No	1% Chrysotile
27	203	VFT – Purple with White Speckles	No	Non-containing
28	125A	Sink Undercoat - White	No	Non-containing
29	203	VFT – Cream	No	Non-containing
30	203	VFT – Brown with Multi-Colour Streaks 9x9	No	0.5% Chrysotile
		Black mastic	No	1% Chrysotile
31	203B	VFT – White with Brown Streaks 9x9	No	1% Chrysotile
		Black mastic	No	1% Chrysotile
32	204B	VFT – Blue with White Streaks 9x9	No	0.5% Chrysotile
		Black mastic	No	1% Chrysotile
33	204B	VFT – Black with White Streaks	No	6% Chrysotile
		Black mastic	No	1% Chrysotile
34	204B	VFT – Grey with Black Streaks	No	Non-containing
		Black mastic	No	1% Chrysotile

Sample ID	Sample Location	Description	Friability	% Fibrous Asbestos Content
35	206	CT – Bumps with Pinholes 2x4	Yes	Non-containing
36	209	VFT – Red with White Streaks 9x9	No	1% Chrysotile
		Black mastic	No	1% Chrysotile
37	209	VFT – Red/Orange	No	Non-containing
		Black mastic	No	1% Chrysotile
38	213	VFT – Dark Multi-Coloured Red	No	Non-containing
		Black mastic	No	1% Chrysotile
39	101	VFT – Army Green with White	No	1% Chrysotile
		Black mastic	No	1% Chrysotile
40	105	CT – Texture with Pinholes and Fissures 2x2	Yes	Non-containing
41	105	Black Pipe Insulation	No	Non-containing
42	112	VFT – Multi-Grey	No	Non-containing
		Black mastic	No	1% Chrysotile
43	113	Vinyl Flooring Sheet (VFS) – Dark Grey	No	Non-containing
44	111	VFT – Tan and Brown	No	Non-containing
		Black mastic	No	1% Chrysotile

Notes:
1. Shaded samples are asbestos containing.
2. Containing black mastic was sampled under LEX sample ID 12. Black mastic was observed by LEX under all VFT's within scope of work **except** for VFT LEX samples 07, 27, 29. However, the extent to which black mastic was observed was limited to only the areas where LEX sampled VFT. (Observable extent of black mastic in each room was restricted due to our inability to look under every VFT in each room.)
3. * - samples found with <0.5% asbestos content are **not** considered to be asbestos containing per O.Reg. 278/05.

Appendix A contains the summary photolog of sampled and noteworthy materials. Refer to **Appendix B** for the Laboratory Certificates of Analysis for bulk asbestos materials sampled.

4.2.2 Asbestos Containing Materials Quantification

Appendix D contains a listing and quantification of all ACM observed in the OVC - Former VMI Building.

4.3 Lead Containing Materials

4.3.1 Lead Based Paint and Mortar

Table 3 below, summarizes the results of the paint coat sampling. The lead concentrations are expressed in milligram lead per kilogram of paint (mg/kg) as well as in percent lead. Paint samples are to be considered lead-based, if they contain greater than 0.5% lead on a mass basis. Paint samples are considered lead-containing if they consist of less than 0.5% lead on a mass basis.

Table 3 Summary of Paint Sample Laboratory Analysis

Sample ID	Sample Location	Description and Colour	Lead Content (mg/kg)	Lead Content (%)
L-01	138	Grey Paint	2600	0.260
L-02	223	Beige Paint	290	0.029

Beige paint was present in the majority of the window frame areas and some walls throughout the building. Grey paint was located throughout the building on the interior of exterior walls. Both paint samples collected were found to be lead-containing rather than lead based. The samples collected would be considered representative of the paint encountered within the building. Refer to **Appendix C** for the Laboratory Certificates of Analysis of lead in paint chip samples.

4.3.2 Other Lead-Containing Materials

Lead-Containing Solder - All solder if present, are to be presumed lead-containing. All joints on cast iron sewer pipes are also to be presumed lead-containing. Disturbance of any lead-containing materials should only be done according to the *Guideline Lead On Construction Projects* (April 2011).

4.4 Mercury

Mercury-containing thermostats were not observed in the building. All fluorescent light tubes present should be considered to contain mercury.

4.5 Silica

No samples were collected for silica during the survey. Coring, sawing or breaking of materials such as concrete, brick and mortar should be considered silica-containing and should be done with appropriate dust suppression methods and proper respiratory protection and following *Guideline - Silica on Construction Projects* (published September 2004 and revised April 2011).

4.6 Other Designated Substances

The following designated substances were not observed at the building:

- Acrylonitrile;
- Arsenic;
- Benzene;
- Coke Oven Emissions;
- Ethylene Oxide;
- Isocyanates; and
- Vinyl Chloride.

4.7 Perchlorate

Table 4 below summarizes the results of the testing for the presence of perchlorates in the fume hoods.

Table 4 Perchlorate Presence in Fume Hoods

Room Number	Violet Precipitate Formed
123	No
206B	No
209	No
213A	No

No violet colouring or precipitates were observed on any of the filter papers or swabs. A total of three test were completed at each fume hood. Refer to **Appendix A** for representative perchlorate test results.

Based on these results, perchlorates were not detected on any of the interior surfaces of the fume hoods tested.

It should be noted, that only the accessible interior surfaces of the fume hood were tested. No tests were conducted inside the fume hood ducting. Exhaust ducting for the fume hood may still pose an explosion hazard upon physical shock, due to presence of perchlorates. Even though perchlorates were not detected, precautionary work procedures should be used.

5 Conclusions

1. LEX sample 08 (Parged Pipe Fitting), found throughout the building, was determined to be an asbestos containing material. Some parged pipe fitting remediation efforts were observed by LEX throughout the building.
2. Parged pipe wrapping found in the Sewage Room 120A and the Penthouse Mechanical room 222 were presumed to be asbestos containing. Some parged pipe wrapping remediation efforts were observed within these rooms.
3. Transite bench boards found in room 138 were presumed to be asbestos containing.
4. Lex sample 12, black VFT mastic, found under most of the flooring tiles throughout the building, was found to be an asbestos containing material.
5. Lex VFT sample 13 (Olive with White Streaks 9x9) was found to be an asbestos containing material.
6. Lex VFT sample 17 (Brown with White Streaks 9x9) was found to be an asbestos containing material.
7. Lex VFT sample 18 (Grey with White Streaks 9x9) was found to be an asbestos containing material.
8. Lex VFT sample 19 (Green/Blue) was found to be an asbestos containing material.

9. Lex VFT sample 20 (White with Green Streaks 9x9) was found to be an asbestos containing material.
10. Lex VFT sample 23 (Teal with White 9x9) was found to be an asbestos containing material.
11. Lex VFT sample 25 (Grey with Black 9x9) was found to be an asbestos containing material.
12. Lex VFT sample 30 (Brown with Multi-coloured Streaks 9x9) was found to be an asbestos containing material.
13. Lex VFT sample 31(White with Brown Streaks 9x9) was found to be an asbestos containing material.
14. Lex VFT sample 32 (Blue with White 9x9) was found to be an asbestos containing material.
15. Lex VFT sample 33 (Black with White Streaks) was found to be an asbestos containing material.
16. Lex VFT sample 36 (Red with White 9x9) was found to be an asbestos containing material.
17. Lex VFT sample 39 (Army Green with White) was found to be an asbestos containing material.
18. Gold sink undercoating's were observed in rooms 209 and 209B and are presumed to be asbestos containing.
19. Fluorescent light bulbs were observed throughout the building and are presumed to be mercury containing.
20. No presence of perchlorates was found on the interior surfaces of the fume hoods.

6 Recommendations

1. Any ACM that may be disturbed during the renovation should be removed by a qualified abatement contractor prior to initiation of renovations.
2. Any lead containing materials disturbed during the renovations should be completed using the Ontario Ministry of Labour guideline *Lead on Construction Projects.*
3. It is recommended that a copy of Designated Substances Survey should be kept on-site during any renovation or demolition activities. It should also be provided to all contractors who may disturb any of the designated substances mentioned in this report.
4. Coring, sawing or breaking of materials such as concrete, brick and mortar should be considered silica-containing and should be done with appropriate dust suppression methods and proper respiratory protection and following Guideline - Silica on Construction Projects (published September 2004 and revised April 2011).
5. Any fluorescent light tubes that will be removed should be collected and disposed of by being sent to an appropriate recycling facility. Fluorescent tubes should be packed in a rigid container to mitigate any circumstances that may result in breaking of light tubes and

release of mercury vapour. Broken light tubes should also be packed in the same container for disposal.

6. Any light ballasts that will be removed should be collected from the site, checked for PCB content and disposed of by sending to an appropriate facility. LEX has a directory of ballast types and manufacturers and has staff that can assist in sorting any light ballasts removed during renovations as PCB and non-PCB containing for appropriate disposal.

7 References

1 Occupational Health and Safety Act, O. Reg 278/05 Section 18 (6) 5

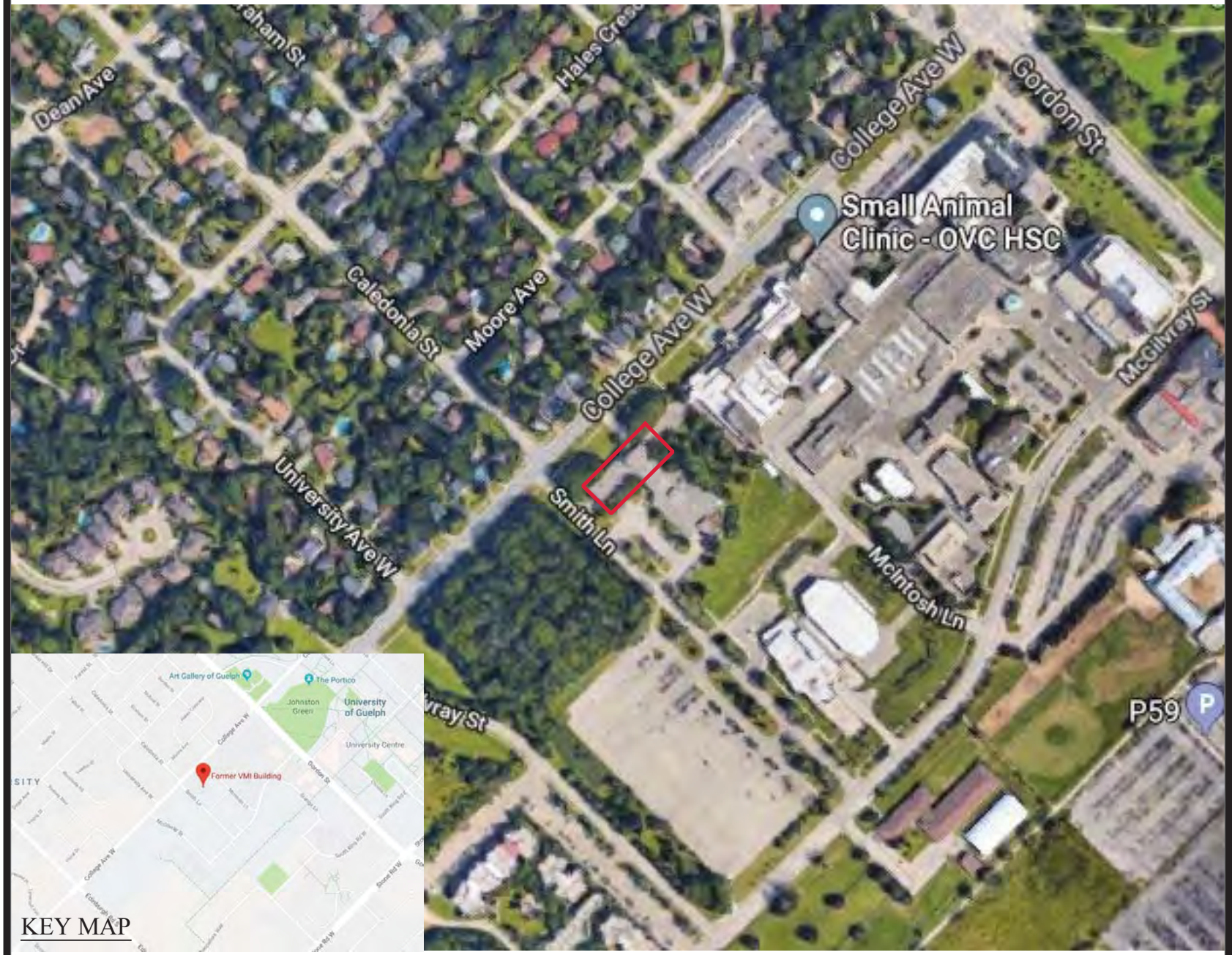
8 Disclaimer

This report is prepared exclusively for the purposes, project and site location outlined in the report. The report is based on information provided to, or collected and/or obtained by LEX as indicated in the report, and applies solely to site conditions existing at the time of sampling. LEX's report represents a reasonable analysis and interpretation of available information within an agreed scope of work, schedule and budget.

LEX's liability to the Client and all claimants not party to this agreement shall be limited to injury or loss caused by negligence of LEX and/ or sub-consultants for which it is responsible. The total amount of LEX's liability for said negligence shall be limited to the lesser of the fees paid for or actual damages incurred by the Client and the Client hereby waives all claims in excess of this amount howsoever arising including any claim for contribution and indemnity which the Client may have against LEX. The Client irrevocably and unconditionally agrees to defend, indemnify and hold LEX harmless from all claims and expenses associated therewith resulting from claims brought by other parties in excess of the aforesaid limit.

LEX prepared this report for the sole benefit of University of Guelph – Physical Resource Dept.; it reflects LEX's best judgment in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. LEX accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

Figures



KEY MAP

LEX SCIENTIFIC INC.
291 Woodlawn Road W Unit B 12
Guelph, Ontario N1H 7L6
Phone: (519) 824-7082
www.lexscientific.com

NORTH

Site Location

Not To Scale

Figure 1

Site Location Plan

Prepared By: DH

Date: June 19, 2018

Project:

Designated Substances

Survey - 01180066

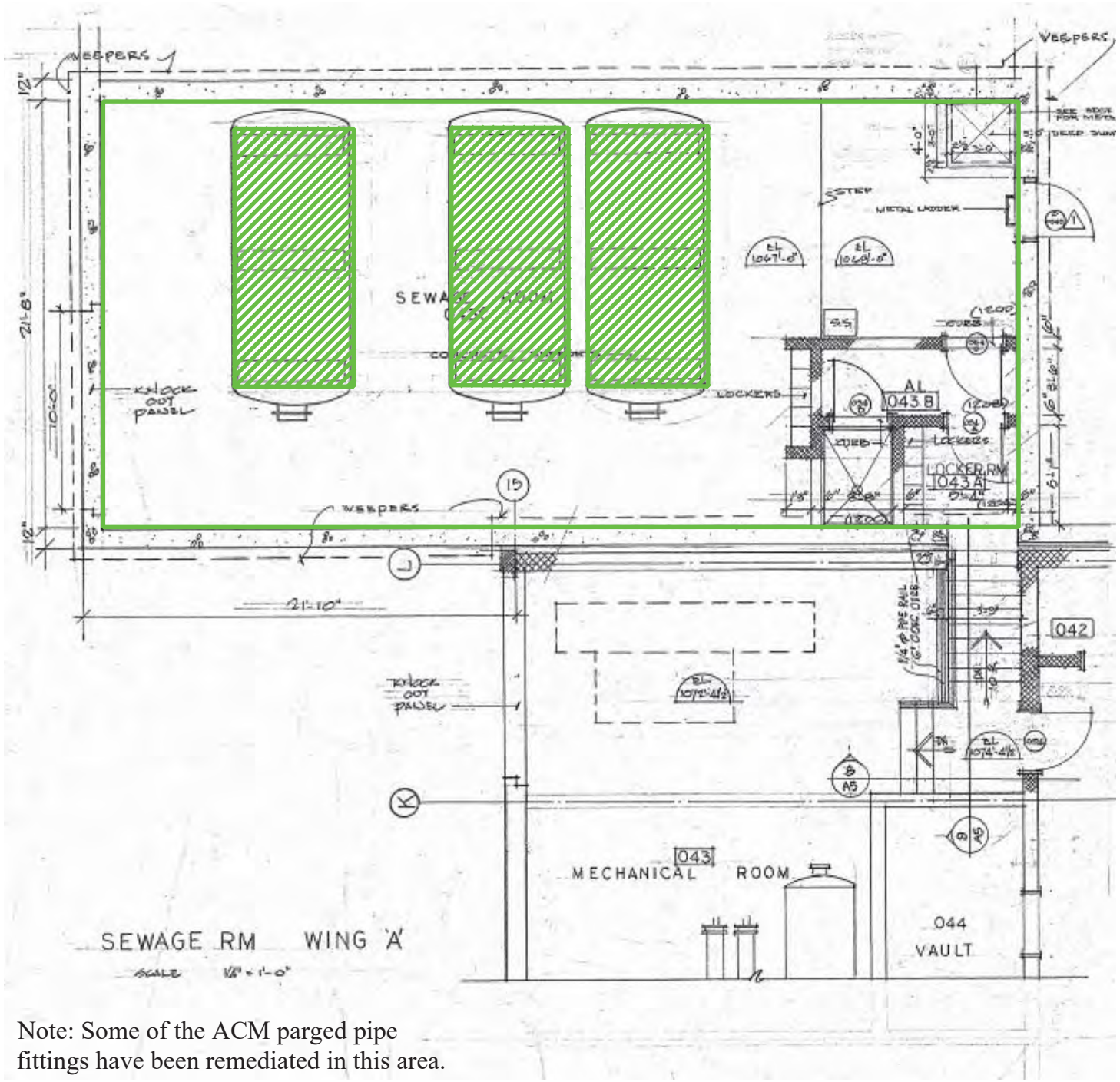
Location:

Former VMI Building

Guelph Ontario

Prepared For:

University of Guelph



NORTH

Note: Some of the ACM parged pipe fittings have been remediated in this area.

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Legend

- Parged Boiler Tank Wrapping
- Parged Pipe Fittings Present

Not To Scale

Firgure 2

Sewage Room 120A

Asbestos Containing Materials

Prepared By: DH

Date: June 19, 2018

Project:

Designated Substances

Survey - 01180066

Location:

Former VMI Building

Guelph Ontario

Prepared For:

University of Guelph

Note: All observed VFT present within the scope of work contains ACM black mastic **except** rooms 140, and126A. For VFT sample ID refer to Appendix E.

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Legend

- Scope of Work
- Parged Pipe Fittings Present
- Transite Bench Board Present
- ACM 9x9 VFT
- ACM 12x12 VFT

Not To Scale

Figure 3

First Floor

Asbestos Containing Materials

Prepared By: DH

Date: June 19, 2018

Project:

Designated Substances

Survey - 01180066

Location:

Fromer VMI Building

Guelph Ontario

Prepared For:

University of Guelph

Note: All observed VFT present within the scope of work contains ACM black mastic **except** room 203. For VFT sample ID refer to Appendix E.

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Legend

- Scope of Work
- Parged Pipe Fittings Present
- ACM 9x9 VFT
- ACM 12x12 VFT

Not To Scale

Figure 4

Second Floor

Asbestos Containing Materials

Prepared By: DH

Date: June 19, 2018

Project:

Designated Substances

Survey - 01180066

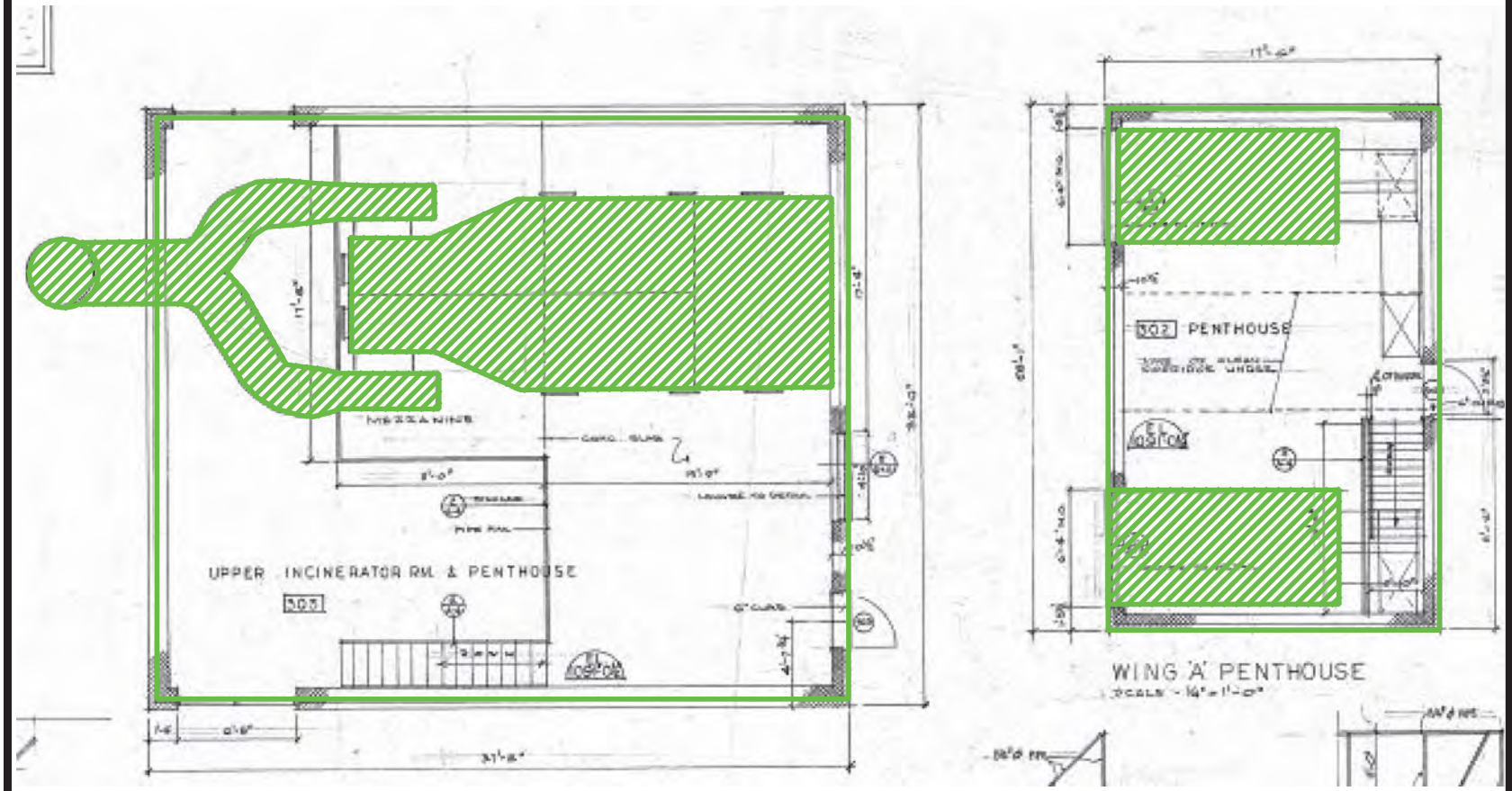
Location:

Former VMI Building

Guelph Ontario

Prepared For:

University of Guelph



Note: Additonal parged duct/insulation wrapping is present that is **not** represented in this drawing. Some of the parged pipe fittings and wrapping have been remediated in this area.

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www.lexscientific.com

Legend

- Parged Duct/Insulation Wrapping
- Parged Pipe Fittings Present

Not To Scale

Figure 5

Penthouse (Mechanical Room)

Asbestos Containing Materials

Prepared By: DH

Date: June 19, 2018

Project:

Designated Substances

Survey - 01180066

Location:

Former VMI Building

Guelph Ontario

Prepared For:

University of Guelph

Appendices

Appendix A – Summary Photolog of Sampled and Noteworthy Materials

Appendix A - Summary Photolog of Sampled and Noteworthy Materials

Photo 1: Parged pipe fitting found throughout the building. **50% Chrysotile.**

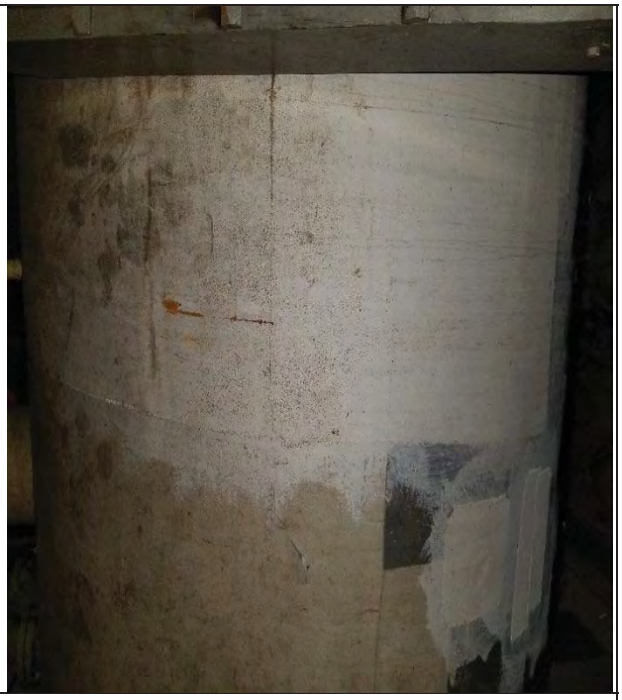


Photo 2: Parged pipe wrapping located in the Sewage Room 120A. **Presumed asbestos containing.**

Photo 3: Parged pipe wrapping located in Penthouse 222. **Presumed asbestos containing.**

Photo 4: Black VFT mastic found throughout the building. **1% Chrysotile.**

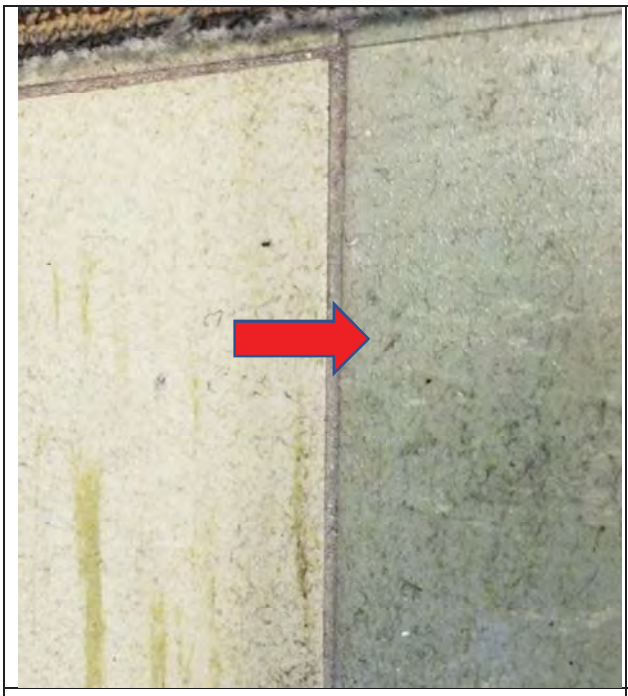


Photo 5: VFT – Teal with white streaks (Right tile, LEX sample 23). **1% Chrysotile.**

Photo 6: White with green streaks (Left tile, LEX sample 20). **2% Chrysotile.**

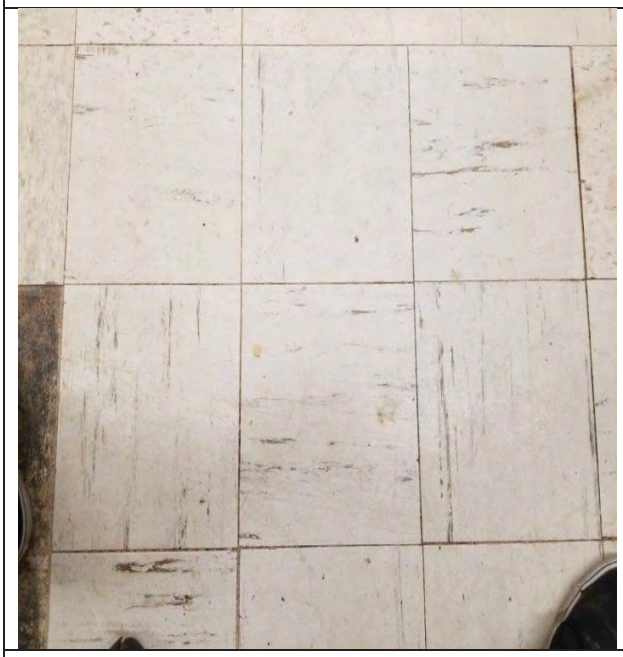


Photo 7: VFT – Grey with black streaks 9x9 (LEX sample 25). **1% Chrysotile.**

Photo 8: VFT – Brown with multi-colour streaks 9x9 (LEX sample 30). **0.5% Chrysotile.**

Photo 9: VFT – White with brown streaks 9x9 (LEX sample 31). **1% Chrysotile.**

Photo 10: VFT – Blue with white streaks 9x9 (LEX sample 32). **1% Chrysotile.**

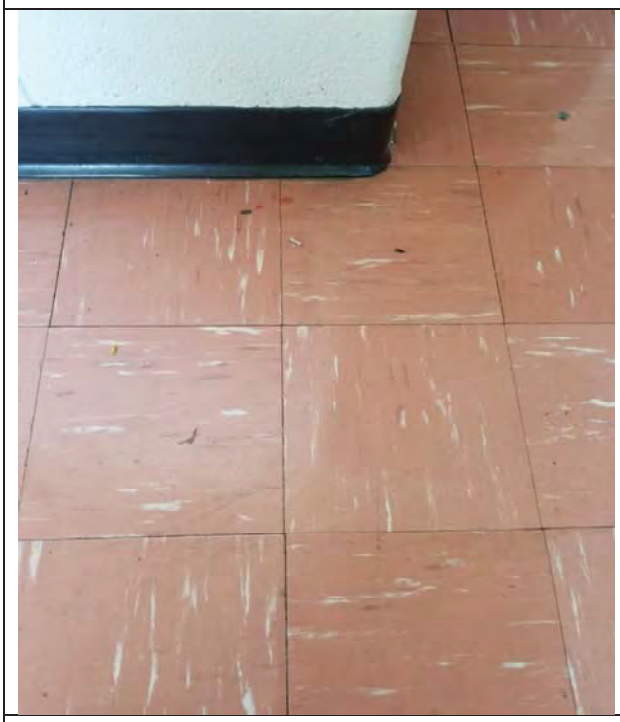


Photo 11: VFT – Red with white streaks 9x9 (LEX sample 36). **1% Chrysotile.**

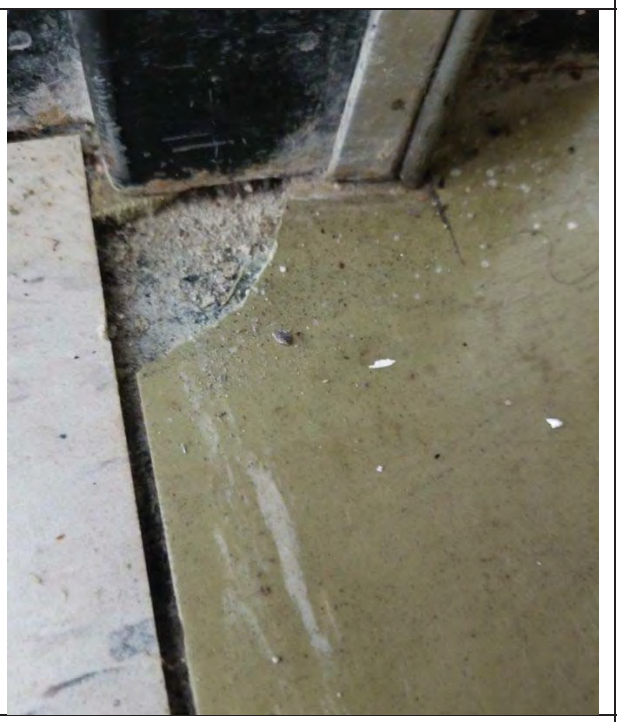


Photo 12 - VFT – Olive with white streaks 9x9 (LEX sample 13). **0.5% Chrysotile.**

Photo 13: VFT – Brown with white streaks 9x9 (LEX sample 17). **0.5% Chrysotile.**

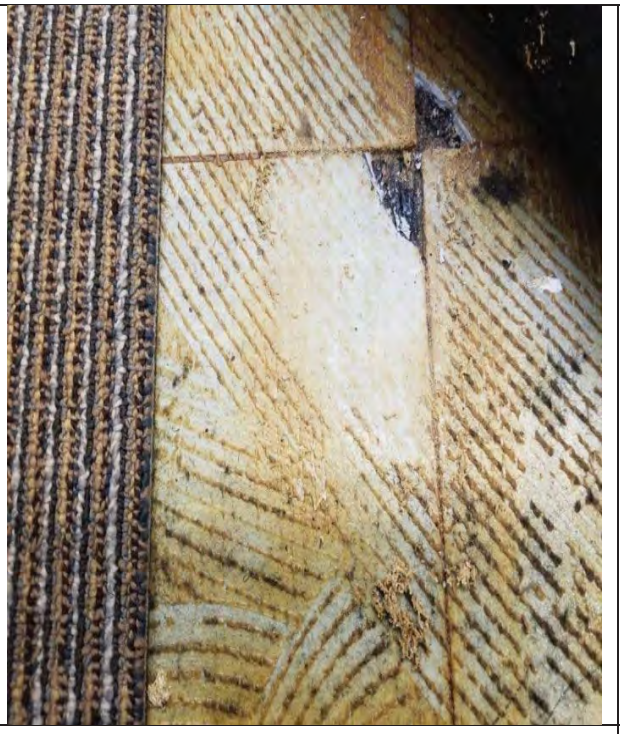


Photo 14: VFT – Grey with white 9x9 (LEX sample 18). **0.5% Chrysotile.**

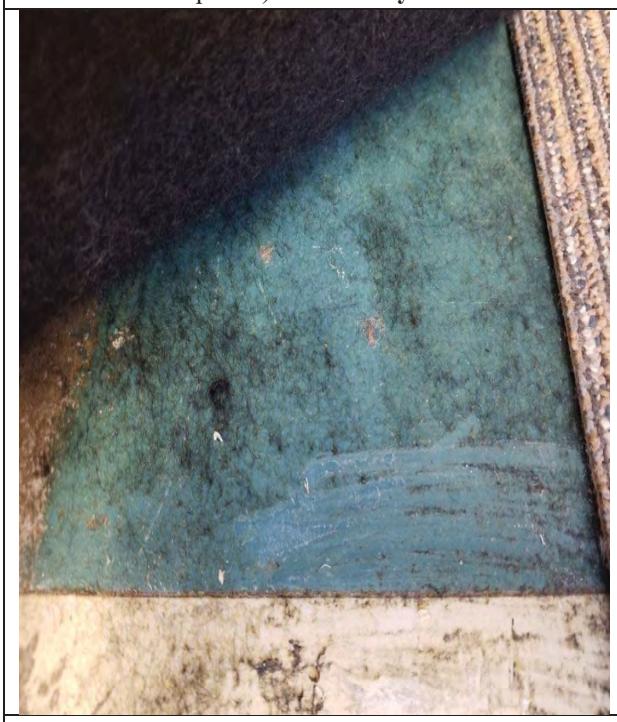


Photo 15: VFT – Green/Blue (LEX sample 19). **0.5% Chrysotile.**

Photo 16: VFT – Black with white streaks (LEX sample 33). **6% Chrysotile**

Photo 17: VFT – Army green with white (LEX sample 39). **1% Chrysotile.**

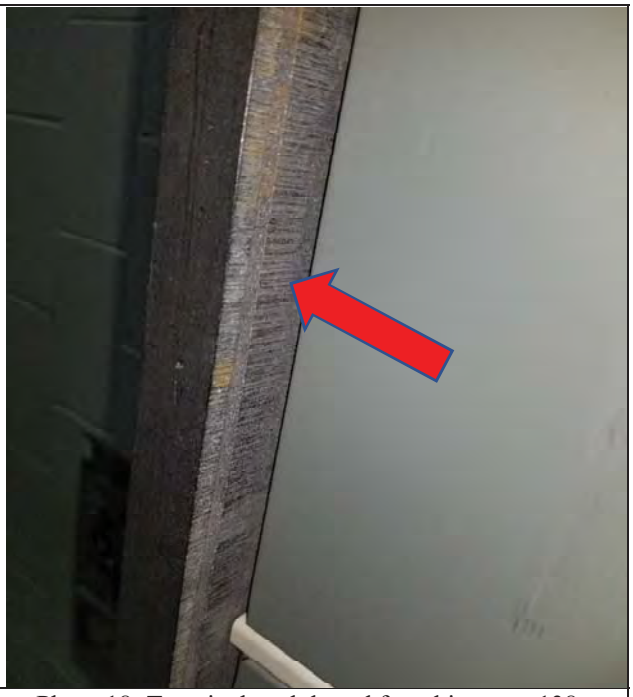


Photo 18: Transite bench board found in room 138. **Presumed asbestos containing.**

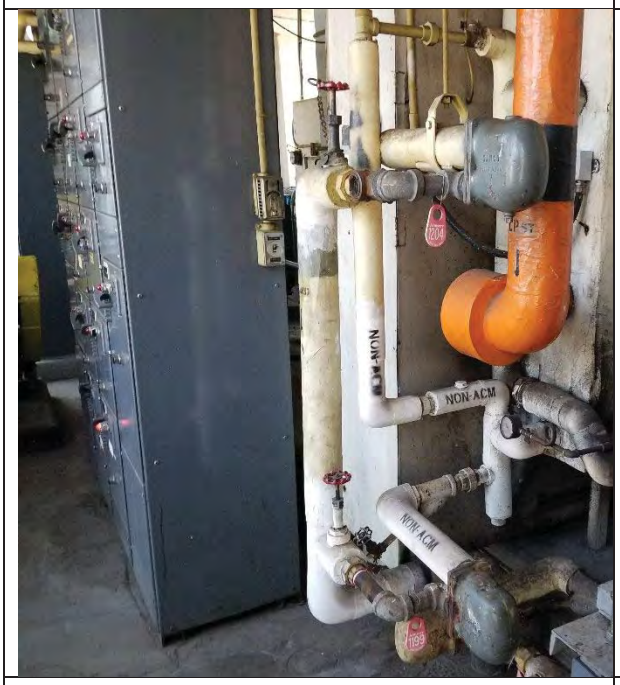


Photo 19: Parged wrapping remediation efforts observed in Penthouse 222.

Photo 20: Representative perchlorate test result completed in room 213A's fume hood. **No purple precipitates detected.**

Photo 21: Representative perchlorate test results completed in room 123's fume hood. **No purple precipitates detected.**

Appendix B – Laboratory Certificate of Analysis – Asbestos in Bulk Samples

LEX SCIENTIFIC INC.

SOLUTIONS
FOR A WORKING WORLD

CERTIFICATE OF ANALYSIS

Company:	LEX Scientific Inc.	**Report Date:**	28-May-18
Contact:	Mr. Dan Humphrey	**Analysis Date:**	24-May-18
Client Address:	291 Woodlawn Road West, Unit B-12, Guelph, ON	**Received Date:**	24-May-18
Client Reference:	01180066 University of Guelph - Physical Resource	**LEX Project Number:**	09180912
Sampling Date:	18-May-18	**Number of Analyses:**	121

Analysis Requested **Bulk Asbestos by PLM**

Analysis was performed in accordance with the method EPA/600/R-93/116, Method for the Determination of Asbestos in Bulk Building Materials adopted in Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations - made under the Occupational Health and Safety Act Ontario Regulation 278/05. LEX Scientific Inc. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP 101949) by the National Institute of Standards and Technology for analysis of bulk materials for asbestos.

German Leal, B.Sc.
Laboratory Manager

			Fibrous Asbestos Content %	Other Materials Content %
Client Sample:	01-A	**Asbestos Detected?**	**No**	
LEX Sample:	001.1	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed:	Scratch Coat	**Amosite:**	None Detected	**MMVF:** None Detected
Colour:	Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description:	Plaster (Two Layer)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
		Comments:	N/A	

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst

291 Woodlawn Road West, Unit B-12, Guelph, Ontario N1H 7L6
Phone: 519.824.7082 Toll Free: 1.800.824.7082
e-mail: lab@lexscientific.com Website: www.lexscientific.com

		Fibrous Asbestos Content %	Other Materials Content %
Client Sample: 01-A	**Asbestos Detected?**	**No**	
LEX Sample: 001.2	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Finish Coat	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Plaster (Two Layer)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 01-B	**Asbestos Detected?**	**No**	
LEX Sample: 002.1	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Scratch Coat	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Plaster (Two Layer)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 01-B	**Asbestos Detected?**	**No**	
LEX Sample: 002.2	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Finish Coat	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Plaster (Two Layer)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 01-C	**Asbestos Detected?**	**No**	
LEX Sample: 003.1	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Scratch Coat	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Plaster (Two Layer)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 01-C	**Asbestos Detected?**	**No**	
LEX Sample: 003.2	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Finish Coat	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Plaster (Two Layer)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 01-D	**Asbestos Detected?**	**No**	
LEX Sample: 004.1	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Scratch Coat	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Plaster (Two Layer)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst

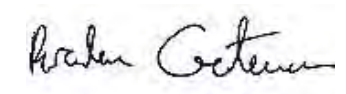
		Fibrous Asbestos Content %	Other Materials Content %
Client Sample: 01-D	**Asbestos Detected?**	**No**	
LEX Sample: 004.2	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Finish Coat	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Plaster (Two Layer)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 01-E	**Asbestos Detected?**	**No**	
LEX Sample: 005.1	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Scratch Coat	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Plaster (Two Layer)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 01-E	**Asbestos Detected?**	**No**	
LEX Sample: 005.2	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Finish Coat	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Plaster (Two Layer)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 01-F	**Asbestos Detected?**	**No**	
LEX Sample: 006.1	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Scratch Coat	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Plaster (Two Layer)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 01-F	**Asbestos Detected?**	**No**	
LEX Sample: 006.2	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Finish Coat	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Plaster (Two Layer)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 01-G	**Asbestos Detected?**	**No**	
LEX Sample: 007.1	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Scratch Coat	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Plaster (Two Layer)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst

		Fibrous Asbestos Content %	Other Materials Content %
Client Sample: 01-G	**Asbestos Detected?**	**No**	
LEX Sample: 007.2	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Finish Coat	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Plaster (Two Layer)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 02-A	**Asbestos Detected?**	**No**	
LEX Sample: 008	**Chrysotile:**	None Detected	**Cellulose:** 50
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** 50
Colour: Grey/White	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Ceiling Tile - Large/Small Pinhole	**Other Amphiboles:**	None Detected	**Non Fibrous:** None Detected
	Comments:	N/A	
Client Sample: 02-B	**Asbestos Detected?**	**No**	
LEX Sample: 009	**Chrysotile:**	None Detected	**Cellulose:** 50
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** 50
Colour: Grey/White	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Ceiling Tile - Large/Small Pinhole	**Other Amphiboles:**	None Detected	**Non Fibrous:** None Detected
	Comments:	N/A	
Client Sample: 02-C	**Asbestos Detected?**	**No**	
LEX Sample: 010	**Chrysotile:**	None Detected	**Cellulose:** 50
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** 50
Colour: Grey/White	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Ceiling Tile - Large/Small Pinhole	**Other Amphiboles:**	None Detected	**Non Fibrous:** None Detected
	Comments:	N/A	
Client Sample: 03-A	**Asbestos Detected?**	**No**	
LEX Sample: 011	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Brown	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Ceiling Tile Pucks - 9x9 Glue	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 03-B	**Asbestos Detected?**	**No**	
LEX Sample: 012	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Brown	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Ceiling Tile Pucks - 9x9 Glue	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst 

		Fibrous Asbestos Content %		Other Materials Content %	
Client Sample:	03-C	**Asbestos Detected?**	**No**		
LEX Sample:	013	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Brown	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Ceiling Tile Pucks - 9x9 Glue	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	04-A	**Asbestos Detected?**	**No**		
LEX Sample:	014	**Chrysotile:**	None Detected	**Cellulose:**	60
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	40
Colour:	Grey/White	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Ceiling Tile - Rough	**Other Amphiboles:**	None Detected	**Non Fibrous:**	None Detected
		Comments:	N/A		
Client Sample:	04-B	**Asbestos Detected?**	**No**		
LEX Sample:	015	**Chrysotile:**	None Detected	**Cellulose:**	60
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	40
Colour:	Grey/White	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Ceiling Tile - Rough	**Other Amphiboles:**	None Detected	**Non Fibrous:**	None Detected
		Comments:	N/A		
Client Sample:	04-C	**Asbestos Detected?**	**No**		
LEX Sample:	016	**Chrysotile:**	None Detected	**Cellulose:**	60
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	40
Colour:	Grey/White	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Ceiling Tile - Rough	**Other Amphiboles:**	None Detected	**Non Fibrous:**	None Detected
		Comments:	N/A		
Client Sample:	05-A	**Asbestos Detected?**	**No**		
LEX Sample:	017	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Grey/White	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Window Caulking - White	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	05-B	**Asbestos Detected?**	**No**		
LEX Sample:	018	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Grey/White	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Window Caulking - White	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst

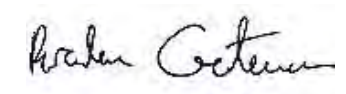
		Fibrous Asbestos Content %		Other Materials Content %	
Client Sample:	05-C	**Asbestos Detected?**	**No**		
LEX Sample:	019	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Grey/White	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Window Caulking - White	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	06-A	**Asbestos Detected?**	**No**		
LEX Sample:	020	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Mastic	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Orange	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Baseboard Mastic #1 (yellow)	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	06-B	**Asbestos Detected?**	**No**		
LEX Sample:	021	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Mastic	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Orange	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Baseboard Mastic #1 (yellow)	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	06-C	**Asbestos Detected?**	**No**		
LEX Sample:	022	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Mastic	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Orange	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Baseboard Mastic #1 (yellow)	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	07-A	**Asbestos Detected?**	**No**		
LEX Sample:	023.1	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Floor Tile	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Brown	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Vinyl Flooring Tile - Brown with Grey + Mastic	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst

		Fibrous Asbestos Content %	Other Materials Content %
Client Sample: 07-A	**Asbestos Detected?**	**No**	
LEX Sample: 023.2	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Mastic	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Orange	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Brown with Grey + Mastic	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 07-B	**Asbestos Detected?**	**No**	
LEX Sample: 024.1	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Floor Tile	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Brown	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Brown with Grey + Mastic	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 07-B	**Asbestos Detected?**	**No**	
LEX Sample: 024.2	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Mastic	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Orange	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Brown with Grey + Mastic	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 07-C	**Asbestos Detected?**	**No**	
LEX Sample: 025.1	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Floor Tile	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Brown	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Brown with Grey + Mastic	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 07-C	**Asbestos Detected?**	**No**	
LEX Sample: 025.2	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Mastic	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Orange	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Brown with Grey + Mastic	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst 

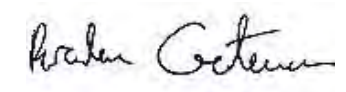
		Fibrous Asbestos Content %	Other Materials Content %
Client Sample: 08-A	**Asbestos Detected?**	**Yes**	
LEX Sample: 026	**Chrysotile:**	50	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Parged Pipe Fitting	**Other Amphiboles:**	None Detected	**Non Fibrous:** 50
	Comments:	This sample meets the definition of "asbestos containing material" according to Ontario Regulation 278/05.	
Client Sample: 09-A	**Asbestos Detected?**	**Yes**	
LEX Sample: 027	**Chrysotile:**	< 0.5	**Cellulose:** 100
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Tar Duct Insulation	**Other Amphiboles:**	None Detected	**Non Fibrous:** None Detected
	Comments:	Not asbestos containing material under Ontario Regulation 278/05.	
Client Sample: 09-B	**Asbestos Detected?**	**Yes**	
LEX Sample: 028	**Chrysotile:**	< 0.5	**Cellulose:** 100
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Tar Duct Insulation	**Other Amphiboles:**	None Detected	**Non Fibrous:** None Detected
	Comments:	Not asbestos containing material under Ontario Regulation 278/05.	
Client Sample: 09-C	**Asbestos Detected?**	**Yes**	
LEX Sample: 029	**Chrysotile:**	< 0.5	**Cellulose:** 100
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Tar Duct Insulation	**Other Amphiboles:**	None Detected	**Non Fibrous:** None Detected
	Comments:	Not asbestos containing material under Ontario Regulation 278/05.	
Client Sample: 10-A	**Asbestos Detected?**	**No**	
LEX Sample: 030	**Chrysotile:**	None Detected	**Cellulose:** 5
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Blue/Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Sink Undercoat	**Other Amphiboles:**	None Detected	**Non Fibrous:** 95
	Comments:	N/A	

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst

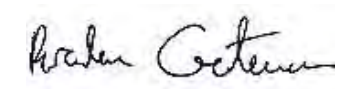
		Fibrous Asbestos Content %	Other Materials Content %
Client Sample: 10-B	**Asbestos Detected?**	**No**	
LEX Sample: 031	**Chrysotile:**	None Detected	**Cellulose:** 5
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Blue/Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Sink Undercoat	**Other Amphiboles:**	None Detected	**Non Fibrous:** 95
	Comments:	N/A	
Client Sample: 10-C	**Asbestos Detected?**	**No**	
LEX Sample: 032	**Chrysotile:**	None Detected	**Cellulose:** 5
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Blue/Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Sink Undercoat	**Other Amphiboles:**	None Detected	**Non Fibrous:** 95
	Comments:	N/A	
Client Sample: 11-A	**Asbestos Detected?**	**No**	
LEX Sample: 033	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Mastic	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Orange	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Baseboard Mastic #2	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 11-B	**Asbestos Detected?**	**No**	
LEX Sample: 034	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Mastic	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Orange	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Baseboard Mastic #2	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 11-C	**Asbestos Detected?**	**No**	
LEX Sample: 035	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Mastic	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Orange	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Baseboard Mastic #2	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst 

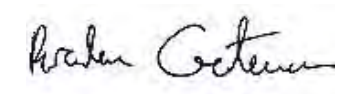
		Fibrous Asbestos Content %	Other Materials Content %
Client Sample: 12-A	**Asbestos Detected?**	**No**	
LEX Sample: 036.1	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Floor Tile	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - White and Black and Mastic (Black)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 12-A	**Asbestos Detected?**	**Yes**	
LEX Sample: 036.2	**Chrysotile:**	1	**Cellulose:** None Detected
Layers Analyzed: Mastic	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - White and Black and Mastic (Black)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 99
	Comments:	This sample meets the definition of "asbestos containing material" according to Ontario Regulation 278/05.	
Client Sample: 12-B	**Asbestos Detected?**	**No**	
LEX Sample: 037.1	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Floor Tile	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - White and Black and Mastic (Black)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 12-C	**Asbestos Detected?**	**No**	
LEX Sample: 038.1	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Floor Tile	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - White and Black and Mastic (Black)	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 13-A	**Asbestos Detected?**	**Yes**	
LEX Sample: 039	**Chrysotile:**	0.5	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Green/Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Olive with White Streaks 9x9	**Other Amphiboles:**	None Detected	**Non Fibrous:** 99.5
	Comments:	This sample meets the definition of "asbestos containing material" according to Ontario Regulation 278/05.	

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst 

		Fibrous Asbestos Content %	Other Materials Content %
Client Sample: 14-A	**Asbestos Detected?**	**No**	
LEX Sample: 042	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White/Orange	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - White with Grey	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 14-B	**Asbestos Detected?**	**No**	
LEX Sample: 043	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White/Orange	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - White with Grey	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 14-C	**Asbestos Detected?**	**No**	
LEX Sample: 044	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White/Orange	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - White with Grey	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 15-A	**Asbestos Detected?**	**No**	
LEX Sample: 045	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Drywall Joint Filling Compound	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 15-B	**Asbestos Detected?**	**No**	
LEX Sample: 046	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Drywall Joint Filling Compound	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 15-C	**Asbestos Detected?**	**No**	
LEX Sample: 047	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Drywall Joint Filling Compound	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst 

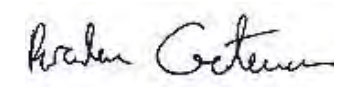
		Fibrous Asbestos Content %		Other Materials Content %	
Client Sample: 15-D	**Asbestos Detected?**	**No**			
LEX Sample: 048	**Chrysotile:**	None Detected		**Cellulose:**	None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected		**MMVF:**	None Detected
Colour: White	**Crocidolite:**	None Detected		**Other Fibres:**	None Detected
Description: Drywall Joint Filling Compound	**Other Amphiboles:**	None Detected		**Non Fibrous:**	100
	Comments:	N/A			
Client Sample: 15-E	**Asbestos Detected?**	**No**			
LEX Sample: 049	**Chrysotile:**	None Detected		**Cellulose:**	None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected		**MMVF:**	None Detected
Colour: White	**Crocidolite:**	None Detected		**Other Fibres:**	None Detected
Description: Drywall Joint Filling Compound	**Other Amphiboles:**	None Detected		**Non Fibrous:**	100
	Comments:	N/A			
Client Sample: 16-A	**Asbestos Detected?**	**No**			
LEX Sample: 050	**Chrysotile:**	None Detected		**Cellulose:**	None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected		**MMVF:**	None Detected
Colour: Orange	**Crocidolite:**	None Detected		**Other Fibres:**	None Detected
Description: Carpet Tile Mastic (Yellow)	**Other Amphiboles:**	None Detected		**Non Fibrous:**	100
	Comments:	N/A			
Client Sample: 16-B	**Asbestos Detected?**	**No**			
LEX Sample: 051	**Chrysotile:**	None Detected		**Cellulose:**	None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected		**MMVF:**	None Detected
Colour: Orange	**Crocidolite:**	None Detected		**Other Fibres:**	None Detected
Description: Carpet Tile Mastic (Yellow)	**Other Amphiboles:**	None Detected		**Non Fibrous:**	100
	Comments:	N/A			
Client Sample: 16-C	**Asbestos Detected?**	**No**			
LEX Sample: 052	**Chrysotile:**	None Detected		**Cellulose:**	None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected		**MMVF:**	None Detected
Colour: Orange	**Crocidolite:**	None Detected		**Other Fibres:**	None Detected
Description: Carpet Tile Mastic (Yellow)	**Other Amphiboles:**	None Detected		**Non Fibrous:**	100
	Comments:	N/A			

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst

		Fibrous Asbestos Content %	Other Materials Content %
Client Sample: 17-A	**Asbestos Detected?**	**Yes**	
LEX Sample: 053	**Chrysotile:**	0.5	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Brown	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Brown with White Streaks 9x9	**Other Amphiboles:**	None Detected	**Non Fibrous:** 99.5
	Comments:	This sample meets the definition of "asbestos containing material" according to Ontario Regulation 278/05.	
Client Sample: 18-A	**Asbestos Detected?**	**Yes**	
LEX Sample: 056	**Chrysotile:**	0.5	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey/Black/Orange	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile Grey with White Streaks 9x9	**Other Amphiboles:**	None Detected	**Non Fibrous:** 99.5
	Comments:	This sample meets the definition of "asbestos containing material" according to Ontario Regulation 278/05.	
Client Sample: 19-A	**Asbestos Detected?**	**Yes**	
LEX Sample: 059	**Chrysotile:**	0.5	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Blue/Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Green/Blue	**Other Amphiboles:**	None Detected	**Non Fibrous:** 99.5
	Comments:	This sample meets the definition of "asbestos containing material" according to Ontario Regulation 278/05.	
Client Sample: 20-A	**Asbestos Detected?**	**Yes**	
LEX Sample: 062	**Chrysotile:**	2	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: White/Brown	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - White with Green Streaks	**Other Amphiboles:**	None Detected	**Non Fibrous:** 98
	Comments:	This sample meets the definition of "asbestos containing material" according to Ontario Regulation 278/05.	
Client Sample: 21-A	**Asbestos Detected?**	**No**	
LEX Sample: 065	**Chrysotile:**	None Detected	**Cellulose:** 10
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Leveling Compound - Grey	**Other Amphiboles:**	None Detected	**Non Fibrous:** 90
	Comments:	N/A	

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst 

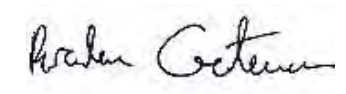
			Fibrous Asbestos Content %		Other Materials Content %
Client Sample:	21-B	**Asbestos Detected?**	**No**		
LEX Sample:	066	**Chrysotile:**	None Detected	**Cellulose:**	10
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Grey	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Leveling Compound - Grey	**Other Amphiboles:**	None Detected	**Non Fibrous:**	90
		Comments:	N/A		
Client Sample:	21-C	**Asbestos Detected?**	**No**		
LEX Sample:	067	**Chrysotile:**	None Detected	**Cellulose:**	10
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Grey	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Leveling Compound - Grey	**Other Amphiboles:**	None Detected	**Non Fibrous:**	90
		Comments:	N/A		
Client Sample:	22-A	**Asbestos Detected?**	**No**		
LEX Sample:	068	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	White/Orange	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Flexible Pipe Insulation	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	22-B	**Asbestos Detected?**	**No**		
LEX Sample:	069	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	White/Orange	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Flexible Pipe Insulation	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	22-C	**Asbestos Detected?**	**No**		
LEX Sample:	070	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	White/Orange	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Flexible Pipe Insulation	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst

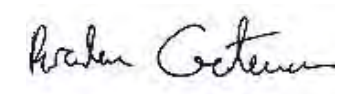
		Fibrous Asbestos Content %	Other Materials Content %
Client Sample: 23-A	**Asbestos Detected?**	**Yes**	
LEX Sample: 071	**Chrysotile:**	1	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Blue/Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - red with White 9x9	**Other Amphiboles:**	None Detected	**Non Fibrous:** 99
	Comments:	This sample meets the definition of "asbestos containing material" according to Ontario Regulation 278/05.	
Client Sample: 24-A	**Asbestos Detected?**	**No**	
LEX Sample: 074	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Beige/Brown	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile Beige with Brown	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 24-B	**Asbestos Detected?**	**No**	
LEX Sample: 075	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Beige/Brown	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile Beige with Brown	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 24-C	**Asbestos Detected?**	**No**	
LEX Sample: 076	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Beige/Brown	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile Beige with Brown	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 25-A	**Asbestos Detected?**	**Yes**	
LEX Sample: 077	**Chrysotile:**	1	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey/Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Grey with Black 9x9	**Other Amphiboles:**	None Detected	**Non Fibrous:** 99
	Comments:	This sample meets the definition of "asbestos containing material" according to Ontario Regulation 278/05.	

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst 

			Fibrous Asbestos Content %		Other Materials Content %
Client Sample:	26-A	**Asbestos Detected?**	**No**		
LEX Sample:	080	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Beige/Black	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Vinyl Flooring Tile - Oatmeal Pattern	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	26-B	**Asbestos Detected?**	**No**		
LEX Sample:	081	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Beige/Black	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Vinyl Flooring Tile - Oatmeal Pattern	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	26-C	**Asbestos Detected?**	**No**		
LEX Sample:	082	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Beige/Black	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Vinyl Flooring Tile - Oatmeal Pattern	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	27-A	**Asbestos Detected?**	**No**		
LEX Sample:	083	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Purple	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Vinyl Flooring Tile - Purple with White speckles	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	27-B	**Asbestos Detected?**	**No**		
LEX Sample:	084	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Purple	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Vinyl Flooring Tile - Purple with White speckles	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst 

		Fibrous Asbestos Content %		Other Materials Content %	
Client Sample:	27-C	**Asbestos Detected?**	**No**		
LEX Sample:	085	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Purple	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Vinyl Flooring Tile - Purple with White speckles	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	28-A	**Asbestos Detected?**	**No**		
LEX Sample:	086	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Beige	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Undersink Coating - White	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	28-B	**Asbestos Detected?**	**No**		
LEX Sample:	087	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Beige	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Undersink Coating - White	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	28-C	**Asbestos Detected?**	**No**		
LEX Sample:	088	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Beige	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Undersink Coating - White	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	29-A	**Asbestos Detected?**	**No**		
LEX Sample:	089	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Beige	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Vinyl Flooring Tile - Cream	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst

		Fibrous Asbestos Content %	Other Materials Content %

Client Sample: 29-B
LEX Sample: 090
Layers Analyzed: Sample Homogenized
Colour: Beige
Description: Vinyl Flooring Tile - Cream

Asbestos Detected? No

Chrysotile:	None Detected	**Cellulose:**	None Detected
Amosite:	None Detected	**MMVF:**	None Detected
Crocidolite:	None Detected	**Other Fibres:**	None Detected
Other Amphiboles:	None Detected	**Non Fibrous:**	100

Comments: N/A

Client Sample: 29-C
LEX Sample: 091
Layers Analyzed: Sample Homogenized
Colour: Beige
Description: Vinyl Flooring Tile - Cream

Asbestos Detected? No

Chrysotile:	None Detected	**Cellulose:**	None Detected
Amosite:	None Detected	**MMVF:**	None Detected
Crocidolite:	None Detected	**Other Fibres:**	None Detected
Other Amphiboles:	None Detected	**Non Fibrous:**	100

Comments: N/A

Client Sample: 30-A
LEX Sample: 092
Layers Analyzed: Sample Homogenized
Colour: Brown
Description: Vinyl Flooring Tile - Brown with Multicolour Streaks 9x9

Asbestos Detected? Yes

Chrysotile:	0.5	**Cellulose:**	None Detected
Amosite:	None Detected	**MMVF:**	None Detected
Crocidolite:	None Detected	**Other Fibres:**	None Detected
Other Amphiboles:	None Detected	**Non Fibrous:**	99.5

Comments: This sample meets the definition of "asbestos containing material" according to Ontario Regulation 278/05.

Client Sample: 31-A
LEX Sample: 095
Layers Analyzed: Sample Homogenized
Colour: Grey
Description: Vinyl Flooring Tile - White with Brown Streaks 9x9

Asbestos Detected? Yes

Chrysotile:	1	**Cellulose:**	None Detected
Amosite:	None Detected	**MMVF:**	None Detected
Crocidolite:	None Detected	**Other Fibres:**	None Detected
Other Amphiboles:	None Detected	**Non Fibrous:**	99

Comments: This sample meets the definition of "asbestos containing material" according to Ontario Regulation 278/05.

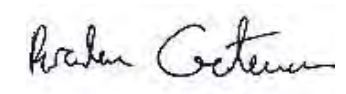
Client Sample: 32-A
LEX Sample: 098
Layers Analyzed: Sample Homogenized
Colour: Blue/White
Description: Vinyl Flooring Tile - Blue with White Streaks 9x9

Asbestos Detected? Yes

Chrysotile:	0.5	**Cellulose:**	None Detected
Amosite:	None Detected	**MMVF:**	None Detected
Crocidolite:	None Detected	**Other Fibres:**	None Detected
Other Amphiboles:	None Detected	**Non Fibrous:**	99.5

Comments: This sample meets the definition of "asbestos containing material" according to Ontario Regulation 278/05.

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst 

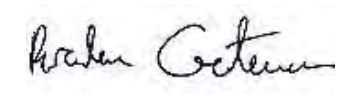
		Fibrous Asbestos Content %	Other Materials Content %
Client Sample: 33-A	**Asbestos Detected?**	**Yes**	
LEX Sample: 101	**Chrysotile:**	6	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Black with Black Streaks 9x9	**Other Amphiboles:**	None Detected	**Non Fibrous:** 94
	Comments:	This sample meets the definition of "asbestos containing material" according to Ontario Regulation 278/05.	
Client Sample: 34-A	**Asbestos Detected?**	**No**	
LEX Sample: 104	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey/Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Grey with Black Streaks	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 34-B	**Asbestos Detected?**	**No**	
LEX Sample: 105	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey/Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Grey with Black Streaks	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 34-C	**Asbestos Detected?**	**No**	
LEX Sample: 106	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey/Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Grey with Black Streaks	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 35-A	**Asbestos Detected?**	**No**	
LEX Sample: 107	**Chrysotile:**	None Detected	**Cellulose:** 60
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** 40
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Ceiling Tile - Bumps with Pinholes 2x4	**Other Amphiboles:**	None Detected	**Non Fibrous:** None Detected
	Comments:	N/A	

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst

		Fibrous Asbestos Content %	Other Materials Content %
Client Sample: 35-B	**Asbestos Detected?**	**No**	
LEX Sample: 108	**Chrysotile:**	None Detected	**Cellulose:** 60
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** 40
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Ceiling Tile - Bumps with Pinholes 2x4	**Other Amphiboles:**	None Detected	**Non Fibrous:** None Detected
	Comments:	N/A	
Client Sample: 35-C	**Asbestos Detected?**	**No**	
LEX Sample: 109	**Chrysotile:**	None Detected	**Cellulose:** 60
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** 40
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Ceiling Tile - Bumps with Pinholes 2x4	**Other Amphiboles:**	None Detected	**Non Fibrous:** None Detected
	Comments:	N/A	
Client Sample: 36-A	**Asbestos Detected?**	**Yes**	
LEX Sample: 110	**Chrysotile:**	1	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Red/Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Red with White Streaks 9x9	**Other Amphiboles:**	None Detected	**Non Fibrous:** 99
	Comments:	This sample meets the definition of "asbestos containing material" according to Ontario Regulation 278/05.	
Client Sample: 37-A	**Asbestos Detected?**	**No**	
LEX Sample: 113	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Red/Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Orange/Red	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 37-B	**Asbestos Detected?**	**No**	
LEX Sample: 114	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Red/Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Orange/Red	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst 

		Fibrous Asbestos Content %	Other Materials Content %
Client Sample: 37-C	**Asbestos Detected?**	**No**	
LEX Sample: 115	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Red/Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Orange/Red	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 38-A	**Asbestos Detected?**	**No**	
LEX Sample: 116	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Red/Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Dark Multicolour Red	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 38-B	**Asbestos Detected?**	**No**	
LEX Sample: 117	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Red/Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Dark Multicolour Red	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 38-C	**Asbestos Detected?**	**No**	
LEX Sample: 118	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Red/Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Dark Multicolour Red	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 39-A	**Asbestos Detected?**	**Yes**	
LEX Sample: 119	**Chrysotile:**	1	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Green/Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Army Green with White	**Other Amphiboles:**	None Detected	**Non Fibrous:** 99
	Comments:	This sample meets the definition of "asbestos containing material" according to Ontario Regulation 278/05.	

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst

		Fibrous Asbestos Content %	Other Materials Content %
Client Sample: 40-A	**Asbestos Detected?**	**No**	
LEX Sample: 122	**Chrysotile:**	None Detected	**Cellulose:** 60
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** 40
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Ceiling Tile - Texture with pinholes + fissures 2x2	**Other Amphiboles:**	None Detected	**Non Fibrous:** None Detected
	Comments:	N/A	
Client Sample: 40-B	**Asbestos Detected?**	**No**	
LEX Sample: 123	**Chrysotile:**	None Detected	**Cellulose:** 60
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** 40
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Ceiling Tile - Texture with pinholes + fissures 2x2	**Other Amphiboles:**	None Detected	**Non Fibrous:** None Detected
	Comments:	N/A	
Client Sample: 40-C	**Asbestos Detected?**	**No**	
LEX Sample: 124	**Chrysotile:**	None Detected	**Cellulose:** 60
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** 40
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Ceiling Tile - Texture with pinholes + fissures 2x2	**Other Amphiboles:**	None Detected	**Non Fibrous:** None Detected
	Comments:	N/A	
Client Sample: 41-A	**Asbestos Detected?**	**No**	
LEX Sample: 125	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Black Pipe Insulation	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 41-B	**Asbestos Detected?**	**No**	
LEX Sample: 126	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Black Pipe Insulation	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst

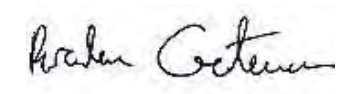
		Fibrous Asbestos Content %	Other Materials Content %
Client Sample: 41-C	**Asbestos Detected?**	**No**	
LEX Sample: 127	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Black	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Black Pipe Insulation	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 42-A	**Asbestos Detected?**	**No**	
LEX Sample: 128	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Multi-Grey	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 42-B	**Asbestos Detected?**	**No**	
LEX Sample: 129	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Multi-Grey	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 42-C	**Asbestos Detected?**	**No**	
LEX Sample: 130	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Tile - Multi-Grey	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 43-A	**Asbestos Detected?**	**No**	
LEX Sample: 131	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey/Orange	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Sheet - Dark Grey	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	
Client Sample: 43-B	**Asbestos Detected?**	**No**	
LEX Sample: 132	**Chrysotile:**	None Detected	**Cellulose:** None Detected
Layers Analyzed: Sample Homogenized	**Amosite:**	None Detected	**MMVF:** None Detected
Colour: Grey/Orange	**Crocidolite:**	None Detected	**Other Fibres:** None Detected
Description: Vinyl Flooring Sheet - Dark Grey	**Other Amphiboles:**	None Detected	**Non Fibrous:** 100
	Comments:	N/A	

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst

		Fibrous Asbestos Content %		Other Materials Content %	
Client Sample:	43-C	**Asbestos Detected?**	**No**		
LEX Sample:	133	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Grey/Orange	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Vinyl Flooring Sheet - Dark Grey	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	44-A	**Asbestos Detected?**	**No**		
LEX Sample:	134	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Brown	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Vinyl Flooring Tile - Tan + Brown	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	44-B	**Asbestos Detected?**	**No**		
LEX Sample:	135	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Brown	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Vinyl Flooring Tile - Tan + Brown	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		
Client Sample:	44-C	**Asbestos Detected?**	**No**		
LEX Sample:	136	**Chrysotile:**	None Detected	**Cellulose:**	None Detected
Layers Analyzed:	Sample Homogenized	**Amosite:**	None Detected	**MMVF:**	None Detected
Colour:	Brown	**Crocidolite:**	None Detected	**Other Fibres:**	None Detected
Description:	Vinyl Flooring Tile - Tan + Brown	**Other Amphiboles:**	None Detected	**Non Fibrous:**	100
		Comments:	N/A		

Other Amphiboles: ac=actinolite, a=anthophyllite, t-tremolite, u=unidentified
MMVF: Man Made Vitreous Fibres: Fibreglass, Min. Wool, Rockwool, Glasswool
PLM - method detection limit is 0.1%

Analyst 

Appendix C – Laboratory Certificate of Analysis – Lead in Paint Chip Samples

Your P.O. #: 530472
Your Project #: 01180066
Your C.O.C. #: nz

Attention: Dan Humphrey

Lex Scientific Inc
291 Woodlawn Rd W
Unit B12
Guelph, ON
CANADA N1H 7L6

Report Date: 2018/05/30
Report #: R5184076
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8C2991
Received: 2018/05/24, 15:30

Sample Matrix: Paint
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Metals in Paint	2	2018/05/25	2018/05/25	CAM SOP-00408	EPA 6010D m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Your P.O. #: 530472
Your Project #: 01180066
Your C.O.C. #: nz

Attention: Dan Humphrey

Lex Scientific Inc
291 Woodlawn Rd W
Unit B12
Guelph, ON
CANADA N1H 7L6

Report Date: 2018/05/30
Report #: R5184076
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8C2991
Received: 2018/05/24, 15:30

Encryption Key

Maxxam
30 May 2018 11:47:40

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Nazeema Rahaman, Project Manager
Email: NRahaman@maxxam.ca
Phone# (905) 817-5700
==========
This report has been generated and distributed using a secure automated process.
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B8C2991
Report Date: 2018/05/30

Lex Scientific Inc
Client Project #: 01180066
Your P.O. #: 530472
Sampler Initials: LEX

ELEMENTS BY ATOMIC SPECTROSCOPY (PAINT)

Maxxam ID		GTU598		GTU599		
Sampling Date		2018/05/18		2018/05/18		
COC Number		nz		nz		
	UNITS	L-01 GREY PAINT	RDL	L-02 BEIGE PAINT	RDL	QC Batch
Metals						
Lead (Pb)	mg/kg	2600	11	290	10	5547822

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8C2991
Report Date: 2018/05/30

Lex Scientific Inc
Client Project #: 01180066
Your P.O. #: 530472
Sampler Initials: LEX

TEST SUMMARY

Maxxam ID: GTU598
Sample ID: L-01 GREY PAINT
Matrix: Paint

Collected: 2018/05/18
Shipped:
Received: 2018/05/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Paint	ICP	5547822	2018/05/25	2018/05/25	Suban Kanapathippllai

Maxxam ID: GTU599
Sample ID: L-02 BEIGE PAINT
Matrix: Paint

Collected: 2018/05/18
Shipped:
Received: 2018/05/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Paint	ICP	5547822	2018/05/25	2018/05/25	Suban Kanapathippllai

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Maxxam Job #: B8C2991
Report Date: 2018/05/30

Lex Scientific Inc
Client Project #: 01180066
Your P.O. #: 530472
Sampler Initials: LEX

GENERAL COMMENTS

Sample GTU598 [L-01 GREY PAINT] : Metals Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample GTU599 [L-02 BEIGE PAINT] : Metals Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Results relate only to the items tested.

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Maxxam Job #: B8C2991
Report Date: 2018/05/30

Lex Scientific Inc
Client Project #: 01180066
Your P.O. #: 530472
Sampler Initials: LEX

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5547822	SUK	Matrix Spike	Lead (Pb)	2018/05/25		NC	%	75 - 125
5547822	SUK	QC Standard	Lead (Pb)	2018/05/25		100	%	75 - 125
5547822	SUK	Method Blank	Lead (Pb)	2018/05/25	ND, RDL=1.0		mg/kg	
5547822	SUK	RPD	Lead (Pb)	2018/05/25	3.7		%	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

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Maxxam Job #: B8C2991
Report Date: 2018/05/30

Lex Scientific Inc
Client Project #: 01180066
Your P.O. #: 530472
Sampler Initials: LEX

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Brad Newman, Scientific Service Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/3

CHAIN OF CUSTODY RECORD

Page 1 of 1

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)	
Company Name	LEX Scientific Inc.	Company Name	LEX	Quotation #	
Contact Name	Berni Hosking	Contact Name	Dan Humphrey	P.O. #/ AFE#	530472
Address	291 Woodlawn Road West, Unit B-12 Guelph, ON N1H 7L6	Address		Project #	01180066
Phone	519-824-7082 Fax	Phone	Fax	Site Location	
Email	ar@lexscientific.com	Email	dhumphrey@lexscientific.com	Site #	
				Sampled By	LEX

Turnaround Time (TAT) Required
- [x] Regular TAT (5-7 days) Most analyses

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Rush TAT (Surcharges will be applied)
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3-4 Days

Date Required:

Rush Confirmation #:

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153
- [ ] Table 1
- [ ] Res/Park
- [ ] Med/ Fine
- [ ] Table 2
- [ ] Ind/Comm
- [ ] Coarse
- [ ] Table 3
- [ ] Agri/ Other
- [ ] Table ____

FOR RSC (PLEASE CIRCLE) Y / N

Other Regulations
- [ ] CCME
- [ ] Sanitary Sewer Bylaw
- [ ] MISA
- [ ] Storm Sewer Bylaw
- [ ] PWQO
- Region
- [ ] Other (Specify)
- [ ] REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)	Lead In Paint									HOLD- DO NOT ANALYZE
1	L-01 Grey Paint	2018/05/18		Paint									X									
2	L-02 Beige Paint	2018/05/18		Paint									X									
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						

24-May-18 15:30
Nazeema Rahaman
B8C2991
GK1 ENV-602

LABORATORY USE ONLY

CUSTODY SEAL Y / N		COOLER TEMPERATURES
Present	Intact	

COOLING MEDIA PRESENT: Y / N

COMMENTS

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
D. HUMPHREY	2018/05/22		[illegible]	2018/05/24	15:30	

Appendix D – Asbestos Quantification and Management Form

Floor	Room Name	Room #	Structure	Designated Substance	Material	Sample ID	Quantity	Units	Condition	Friability	Comments
1		128	Insulation	Asbestos	Parged pipe fitting	08	3	units	Good	Yes	Limited view. Likely more above ceiling
1		129	Insulation	Asbestos	Parged pipe fitting	08		units		Yes	Unable to view above ceiling
1		130	Insulation	Asbestos	Parged pipe fitting	08	2	units	Good	Yes	Limited view. Likely more above ceiling
1	132	132	Insulation	Asbestos	Parged pipe fitting	08	6	units	Good	Yes	Limited view. Likely more above ceiling
1	132A	132	Insulation	Asbestos	Parged pipe fitting	08		units	Good	Yes	Unable to view above ceiling
1	132B	132	Insulation	Asbestos	Parged pipe fitting	08		units		Yes	Unable to view above ceiling
1	132C	132	Insulation	Asbestos	Parged pipe fitting	08		units		Yes	Unable to view above ceiling
1		133	Insulation	Asbestos	Parged pipe fitting	08	23	units	Good	Yes	Limited view. Likely more above ceiling
1		135	Insulation	Asbestos	Parged pipe fitting	08	10	units	Good	No	Limited view. Likely more above ceiling
1		138	Insulation	Asbestos	Parged pipe fitting	08	2	units	Good	Yes	Limited view. Likely more above ceiling
1	138A	138	Insulation	Asbestos	Parged pipe fitting	08	6	units	Good	Yes	Limited view. Likely more above ceiling
1	138B	138	Insulation	Asbestos	Parged pipe fitting	08	7	units	Good	Yes	Limited view. Likely more above ceiling
1		139	Insulation	Asbestos	Parged pipe fitting	08	2	units	Good	Yes	Limited view. Likely more above ceiling
1	139A	139	Insulation	Asbestos	Parged pipe fitting	08	7	units	Good	Yes	
1	140A	140	Insulation	Asbestos	Parged pipe fitting	08	22	units	Good	Yes	
1	Washroom		Insulation	Asbestos	Parged pipe fitting	08	6	units	Good	Yes	
1	Washroom	116	Insulation	Asbestos	Parged pipe fitting	08	22	units	Good	Yes	Above room and inside wall cavity
1	Washroom	117	Insulation	Asbestos	Parged pipe fitting	08	9	units	Good	Yes	Limited view. Likely more above ceiling
1	117A, 117B	117	Insulation	Asbestos	Parged pipe fitting	08		units		Yes	Limited view. Likely more above ceiling
1		119	Insulation	Asbestos	Parged pipe fitting	08	2	units	Good	Yes	Unable to view above ceiling.

Note: Green cells indicate ACM VFT and black mastic/ Orange cells indicate non-ACM VFT but ACM containing black mastic

Floor	Room Name	Room #	Structure	Designated Substance	Material	Sample ID	Quantity	Units	Condition	Friability	Comments
1	120A	120	Insulation	Asbestos	Parged pipe fitting	08	80	units	Good	Yes	Some remediation observed
1	120A	120	Insulation	Asbestos	Parged pipe fitting	08	10	units	Fair	Yes	
1	120A	120	Insulation	Asbestos	Parged boiler tanks	08	3	units	Fair	Yes	Some remediation observed
1		121	Insulation	Asbestos	Parged pipe fitting	08		units		Yes	Unable to view above ceiling
1		123	Insulation	Asbestos	Parged pipe fitting	08	11	units	Good	Yes	Limited view. Likely more above ceiling
1	125B	125	Insulation	Asbestos	Parged pipe fitting	08	2	units	Good	Yes	Behind sink (room 125A)
1	125A	125	Insulation	Asbestos	Parged pipe fitting	08	2	units	Good	Yes	
1		126	Insulation	Asbestos	Parged pipe fitting	08	15	units	Good	Yes	Limited view. Likely more above ceiling
1	126D	126	Insulation	Asbestos	Parged pipe fitting	08		units		Yes	Limited view. Likely more above ceiling
1	126E	126	Insulation	Asbestos	Parged pipe fitting	08	9	units	Good	No	
1	126A	126	Insulation	Asbestos	Parged pipe fitting	08	5	units	Good	Yes	
1		127	Insulation	Asbestos	Parged pipe fitting	08	10	units	Good	Yes	Limited view. Likely more above ceiling
1	MW116		Insulation	Asbestos	Parged pipe fitting	08	7	units	Good	Yes	Limited view. Likely more above ceiling
1	101	101	Insulation	Asbestos	Parged pipe fitting	08	10	units	Good	Yes	
1	109, 109A, 109B	109	Insulation	Asbestos	Parged pipe fitting	08	10	units	Good	Yes	Limited view. Likely more above ceiling
3	Penthouse mechanical room	222	Insulation	Asbestos	Parged pipe wrapping	08	1200	sq ft	Good	Yes	Found on circular ducting
3	Penthouse mechanical room	222	Insulation	Asbestos	Parged pipe fitting	08	20	units	Good	Yes	Part of ducting systems has not been remediated
3	Penthouse mechanical room	222	Insulation	Asbestos	Parged pipe wrapping	08	1100	sq ft	Good	Yes	Wrapped around rectangular ducting
3	Penthouse mechanical room	222	Insulation	Asbestos	Parged pipe wrapping	08	1300	sq ft	Good	Yes	Wrapped around air handling units
2		223	Insulation	Asbestos	Parged pipe fitting	08	7	units	Good	Yes	
1		102	Insulation	Asbestos	Parged pipe fitting	08	4	units	Good	Yes	Limited view behind sink area

Note: Green cells indicate ACM VFT and black mastic/ Orange cells indicate non-ACM VFT but ACM containing black mastic

Floor	Room Name	Room #	Structure	Designated Substance	Material	Sample ID	Quantity	Units	Condition	Friability	Comments
1	C102	102	Insulation	Asbestos	Parged pipe fitting	08	16	units	Good	Yes	Limited view. Count approx. Evidence of some elbows mitigated (approx. 10)
1	C103	103	Insulation	Asbestos	Parged pipe fitting	08	30	units	Good	No	Limited view. Likely more above ceiling
1	113A	113	Insulation	Asbestos	Parged pipe fitting	08	2	units	Good	Yes	Limited view behind sink area
1		128	Insulation	Asbestos	Parged pipe fitting	08	2	units	Good	Yes	Limited view behind sink area
1	124	124	Ceiling	Asbestos	Parged pipe fitting	08	9	units	Good	Yes	Limited view above ceiling and behind sink area
2	Men's washroom	202	Insulation	Asbestos	Parged pipe fitting	08		units		Yes	Unable to view above ceiling
2		201	Insulation	Asbestos	Parged pipe fitting	08		units		Yes	Unable to view above ceiling
2		203	Insulation	Asbestos	Parged pipe fitting	08	6	units	Good	Yes	
2	204B	204	Insulation	Asbestos	Parged pipe fitting	08	10	units	Good	Yes	
2	206B, 206C	206	Insulation	Asbestos	Parged pipe fitting	08	3	units	Good	Yes	Limited view. Likely more above ceiling
2	209, 209A	209	Insulation	Asbestos	Parged pipe fitting	08	8	units	Good	Yes	Limited view behind sink area
2	C201		Insulation	Asbestos	Parged pipe fitting	08	14	units	Good	Yes	Limited view. Likely more above ceiling
1		130	Floor	Asbestos	Mastic - black	12	150	sq ft	Good	No	Beneath carpet tiles
1		137	Floor	Asbestos	Mastic - black	12	35	sq ft	Fair	No	No tile present, same mastic
1		138	Floor	Asbestos	VFT - white with black + mastic - black	12	220	sq ft	Good	No	
1		127	Floor	Asbestos	VFT - white with black + mastic - black	12	540	sq ft	Good	No	Beneath carpet tiles
1	106, 106A, 106B	106	Floor	Asbestos	Mastic - black	12	300	sq ft	Good	No	No tile present, same mastic
1		107	Floor	Asbestos	Mastic - black	12	170	sq ft	Good	No	No tile present, same mastic
1		115	Floor	Asbestos	VFT - white with black + mastic - black	12	126	sq ft	Good	No	
2	204	204	Floor	Asbestos	Mastic - black	12	300	sq ft	Good	No	No tile present, same mastic

Note: Green cells indicate ACM VFT and black mastic/ Orange cells indicate non-ACM VFT but ACM containing black mastic

Floor	Room Name	Room #	Structure	Designated Substance	Material	Sample ID	Quantity	Units	Condition	Friability	Comments
2	205A, 205B	205	Floor	Asbestos	Mastic - black	12	472	sq ft	Good	No	No tile present, same mastic
2	206B, 206C	206	Floor	Asbestos	Mastic - black	12	104	sq ft	Good	No	No tile present, same mastic
1	138-A	138	Floor	Asbestos	VFT - 9x9 olive with white streaks + mastic - black	13	30	sq ft	Good	No	
1	138-B	138	Floor	Asbestos	VFT - 9x9 olive with white streaks + mastic - black	13	32	sq ft	Good	No	
2	215,215A,215B	215	Floor	Asbestos	VFT - 9x9 olive with white streaks + mastic - black	13	192	sq ft	Good	No	Beneath carpet tiles
2	215D,215C,216	216	Floor	Asbestos	VFT - 9x9 olive with white streaks + mastic - black	13	230	sq ft	Good	No	Beneath carpet tiles
2	218, 218A, 218B, 218C	218	Floor	Asbestos	VFT - 9x9 olive with white streaks + mastic - black	13	256	sq ft	Good	No	
1		112	Floor	Asbestos	VFT - 9x9 olive with white streaks + mastic - black	13	36	sq ft	Good	No	
2	C201		Floor	Asbestos	VFT - 9x9 olive with white streaks + mastic - black	13	80	sq ft	Good	No	
1	138-B	138	Floor	Asbestos	VFT -white with grey + mastic - black	14	18	sq ft	Good	No	
1		126	Floor	Asbestos	VFT -white with grey + mastic - black	14	270	sq ft	Good	No	Beneath carpet tiles
1	126E	126	Floor	Asbestos	VFT -white with grey + mastic - black	14	121	sq ft	Good	No	Beneath carpet tiles
1	Staff washroom	109	Floor	Asbestos	VFT -white with grey + mastic - black	14	28	sq ft	Good	No	
1	113A	113	Floor	Asbestos	VFT -white with grey + mastic - black	14	30	sq ft	Good	No	
1		128	Floor	Asbestos	VFT -white with grey + mastic - black	14	10	sq ft	Good	No	Any other flooring not quantified due to large proportional differences
2	204B	204	Floor	Asbestos	VFT -white with grey + mastic - black	14	15	sq ft	Good	No	

Note: Green cells indicate ACM VFT and black mastic/ Orange cells indicate non-ACM VFT but ACM containing black mastic

Floor	Room Name	Room #	Structure	Designated Substance	Material	Sample ID	Quantity	Units	Condition	Friability	Comments
2	207, 207B	207	Floor	Asbestos	VFT -white with grey + mastic - black	14	15	sq ft	Good	No	
1	132A	132	Floor	Asbestos	VFT - 9x9 brown with white streaks + mastic - black	17	144	sq ft	Good	No	Beneath carpet tiles
2		221	Floor	Asbestos	VFT - 9x9 brown with white streaks + mastic - black	17	276	sq ft	Good	No	Beneath carpet tiles
3	Penthouse mechanical room	222	Floor	Asbestos	VFT - 9x9 brown with white streaks + mastic - black	17	16	sq ft	Good	No	
2	209, 209A	209	Floor	Asbestos	VFT - 9x9 brown with white streaks + mastic - black	17	96	sq ft	Good	No	
2	210, 210A, 210B, 210C	210	Floor	Asbestos	VFT - 9x9 brown with white streaks + mastic - black	17	80	sq ft	Good	No	
1		128	Floor	Asbestos	VFT - 9x9 grey with white streaks + mastic - black	18	200	sq ft	Good	No	
1	117A	117	Floor	Asbestos	VFT - 9x9 grey with white streaks + mastic - black	18	143	sq ft	Good	No	Beneath carpet tiles
1	117B	117	Floor	Asbestos	VFT - 9x9 grey with white streaks + mastic - black	18	121	sq ft	Good	No	
1	125B	125	Floor	Asbestos	VFT - 9x9 grey with white streaks + mastic - black	18	60	sq ft	Good	No	Pooling water
1	125A	125	Floor	Asbestos	VFT - 9x9 grey with white streaks + mastic - black	18	216	sq ft	Fair	No	
1		125	Floor	Asbestos	VFT - 9x9 grey with white streaks + mastic - black	18	24	sq ft	Good	No	
1	126D	126	Floor	Asbestos	VFT - 9x9 grey with white streaks + mastic - black	18	60	sq ft	Good	No	Beneath carpet tiles
1	126B	126	Floor	Asbestos	VFT - 9x9 grey with white streaks + mastic - black	18	143	sq ft	Good	No	Beneath carpet tiles
2	214A,B	214	Floor	Asbestos	VFT - 9x9 grey with white streaks + mastic - black	18	242	sq ft	Good	No	Beneath carpet tiles
2	215, 215A, 215B	215	Floor	Asbestos	VFT - 9x9 grey with white streaks + mastic - black	18	121	sq ft	Good	No	Beneath carpet tiles

Note: Green cells indicate ACM VFT and black mastic/ Orange cells indicate non-ACM VFT but ACM containing black mastic

Floor	Room Name	Room #	Structure	Designated Substance	Material	Sample ID	Quantity	Units	Condition	Friability	Comments
1		111	Floor	Asbestos	VFT - 9x9 grey with white streaks + mastic - black	18	300	sq ft	Good	No	
2		203	Floor	Asbestos	VFT - 9x9 grey with white streaks + mastic - black	18	215	sq ft	Good	No	Beneath carpet tiles.
2	203A	203	Floor	Asbestos	VFT - 9x9 grey with white streaks + mastic - black	18	88	sq ft	Good	No	Beneath carpet tiles
2	206B, 206C	206	Floor	Asbestos	VFT - 9x9 grey with white streaks + mastic - black	18	10	sq ft	Good	No	
2	206A	206	Floor	Asbestos	VFT - 9x9 grey with white streaks + mastic - black	18	280	sq ft	Good	No	
1		126	Floor	Asbestos	VFT - green/blue + mastic - black	19	270	sq ft	Good	No	Beneath carpet tiles
1	132B	132	Floor	Asbestos	VFT - 9x9 white with green + mastic - black	20	130	sq ft	Good	No	Beneath carpet tiles
1	126D	126	Floor	Asbestos	VFT - 9x9 white with green + mastic - black	20	60	sq ft	Good	No	Beneath carpet tiles
1		119	Floor	Asbestos	VFT - 9x9 teal with white + mastic - black	23	96	sq ft	Good	No	
1		123	Floor	Asbestos	VFT - beige with brown + mastic - black	24	300	sq ft	Good	No	
1		123	Floor	Asbestos	VFT - 9x9 grey with black + mastic - black	25	300	sq ft	Good	No	
1	124	124	Floor	Asbestos	VFT-9x9 grey with black + mastic - black	25	132	sq ft	Good	No	
1		123	Floor	Asbestos	VFT - oatmeal pattern + mastic - black	26	300	sq ft	Good	No	
2	215, 215A, 215B	215	Floor	Asbestos	VFT - oatmeal pattern + mastic - black	26	12	sq ft	Good	No	
1	124	124	Floor	Asbestos	VFT- oatmeal pattern + mastic - black	26	132	sq ft	Good	No	
2		203	Floor	Asbestos	VFT - 9x9 brown with multicolored streaks + mastic - black	30	400	sq ft	Good	No	Beneath carpet tiles. Limited access

Note: Green cells indicate ACM VFT and black mastic/ Orange cells indicate non-ACM VFT but ACM containing black mastic

Floor	Room Name	Room #	Structure	Designated Substance	Material	Sample ID	Quantity	Units	Condition	Friability	Comments
2	208	208	Floor	Asbestos	VFT - 9x9 brown with multicolored streaks + mastic - black	30	64	sq ft	Good	No	
2	210, 210A, 210B, 210C	210	Floor	Asbestos	VFT - 9x9 brown with multicolored streaks + mastic - black	30	450	sq ft	Good	No	
2	215D,215C,216	216	Floor	Asbestos	VFT- 9x9 white with brown streaks + mastic - black	31	121	sq ft	Good	No	Beneath carpet tiles
2	219, 219A, 219B, 219C	219	Floor	Asbestos	VFT - 9x9 white with brown streaks + mastic - black	31	500	sq ft	Good	No	Beneath carpet tiles
2	Breaker room	220	Floor	Asbestos	VFT - white with brown streaks + mastic - black	31	72	sq ft	Fair	No	Tiles missing
1		102	Floor	Asbestos	VFT - 9x9 white with brown streaks + mastic - black	31	275	sq ft	Good	No	
2	203B	203	Floor	Asbestos	VFT- 9x9 white with brown streaks + mastic - black	31	176	sq ft	Good	No	Beneath carpet tiles
2	207, 207B	207	Floor	Asbestos	VFT- 9x9 white with brown streaks + mastic - black	31	345	sq ft	Good	No	
2	215, 215A, 215B	215	Floor	Asbestos	VFT- 9x9 blue with white streaks + mastic - black	32	70	sq ft	Good	No	
2	215D, 215C, 216	216	Floor	Asbestos	VFT - 9x9 blue with white streaks + mastic - black	32	77	sq ft	Good	No	Beneath carpet tiles
2		223	Floor	Asbestos	VFT - 9x9 blue with white + mastic - black	32	276	sq ft	Good	No	Beneath carpet tiles
2	204B	204	Floor	Asbestos	VFT- 9x9 blue with with streaks + mastic - black	32	156	sq ft	Good	No	
2	213, 213A, 213B, 213C	213	Floor	Asbestos	VFT - 9x9 blue with white + mastic - black	32	260	sq ft	Good	No	
2	204B	204	Floor	Asbestos	VFT-black with white streaks + mastic - black	33	40	sq ft	Good	No	
1	C103	103	Floor	Asbestos	VFT-grey with black streaks + mastic - black	34	16	sq ft	Good	No	

Note: Green cells indicate ACM VFT and black mastic/ Orange cells indicate non-ACM VFT but ACM containing black mastic

Floor	Room Name	Room #	Structure	Designated Substance	Material	Sample ID	Quantity	Units	Condition	Friability	Comments
1	113A	113	Floor	Asbestos	VFT - grey with black streaks + mastic - black	34	300	sq ft	Good	No	
2	204B	204	Floor	Asbestos	VFT - grey with black streaks + mastic - black	34	54	sq ft	Good	No	
2	213, 213A, 213B, 213C	213	Floor	Asbestos	VFT - grey with black streaks + mastic - black	34	260	sq ft	Good	No	
2	219, 219A, 219B, 219C	219	Floor	Asbestos	VFT- 9x9 red with white streaks + mastic - black	36	25	sq ft	Good	No	Beneath carpet tiles
1		128	Floor	Asbestos	VFT- 9x9 red with white streaks + mastic - black	36	450	sq ft	Good	No	
2	209, 209A	209	Floor	Asbestos	VFT- 9x9 red with white streaks + mastic - black	36	205	sq ft	Good	No	
2	C201		Floor	Asbestos	VFT- 9x9 red with white streaks + mastic - black	36	20	sq ft	Good	No	
2	209, 209A	209	Floor	Asbestos	VFT-orange/red + mastic - black	37	70	sq ft	Good	No	Some VFT seem more faded than others
2	209, 209A	209	Floor	Asbestos	VFT-dark multi red + mastic - black	38	18	sq ft	Good	No	
2	213, 213A, 213B, 213C	213	Floor	Asbestos	VFT - army green with white	39	170	sq ft	Good	No	
1		112	Floor	Asbestos	VFT - multigrey + mastic - black	42	16	sq ft	Good	No	
1		111	Floor	Asbestos	VFT - tan and brown + mastic -black	44	65	sq ft	Good	No	Likely installed at same time as other 12x12 tiles. Other tiles sampled are Samples 26, 42
1		138	Other	Asbestos	Transite board	N/A	50	sq ft	Good	No	Presumed ACM
2	209, 209A	209	Other	Asbestos	Sink undercoating - gold	N/A	2	units	Good	No	Presumed ACM

Note: Green cells indicate ACM VFT and black mastic/ Orange cells indicate non-ACM VFT but ACM containing black mastic

Appendix 'B'

Letter Report: Spray-Applied Beam Insulation Inspection – Former VMI Building – Ontario Veterinary College

Prepared by LEX Scientific Inc., June 2018 (LEX Project No. 01180066)

August 30, 2018
LEX Project No. 01180066-B

Mr. Peter Ibrajev
University of Guelph – Physical Resources Dept.
J.C. Hersey Building, 117 College Avenue East
Guelph, ON N1G 2W1

Re: Spray-Applied Beam Insulation Inspection
Former VMI Building – Ontario Veterinary College

Dear Mr. Ibrajev:

LEX Scientific Inc. (LEX) was retained by the University of Guelph – Physical Resources Dept. (the University) to conduct a visual confirmation inspection of Spray-Applied Beam Insulation (spray insulation) at the Ontario Veterinary College – Former VMI Building located at 50 College Ave. West, Guelph, ON. The inspection was requested to confirm the presence of asbestos containing fireproofing. The inspection was conducted by LEX Environmental Technologist Jarrett Deneau, B.Sc., on August 23, 2018.

The spray fireproofing insulation was identified to have been historically present from an internal review of University of Guelph documents. In addition to this, the following signage was present adjacent to the ceiling tiles in two locations where the fireproofing was historically identified. The signage stated: "*Asbestos Containing Materials above Ceiling Tiles. Please use Type 2 Procedures when entering this space. For more information call ext 2030*." As such, prior to LEX conducting a visual confirmation inspection, Fibrecon Insulation (Fibrecon) erected small enclosures in the corridor areas selected at the locations where fireproofing was potentially present. See **Attachment #1** for markup's of floor plans showing the locations of the enclosures.

LEX did not observe any materials of note in the ceiling space of inspection enclosure #1 located in corridor C102.

During the inspection, LEX observed the spray insulation along multiple beams in the ceiling space of corridor C201, outside room 217 in inspection enclosure #2. However, due to the extremely limited view above the ceiling tiles, the spray insulation was only be observable from the limited area exposed along the north side of the wall within the enclosure.

LEX observed what appeared to be spackling or dust along the decking beam located in inspection enclosure #3 in corridor C202. It does not appear to be spray insulation but could potentially be residue if fireproofing had been historically present and abated at some point.

Pictures of interest pertaining to the inspection can be viewed in **Attachment #2: Photolog of Notable Pictures**.

Between May 14 to 18, 2018, LEX conducted a Designated Substances Survey (DSS) of the building. During the survey, no spray insulation was observed by LEX staff. As part of the survey, LEX opened up multiple ceiling tiles to inspect the ceiling space along the corridors throughout the building. It was likely that the spray insulation was not observed due to extremely limited visibility in the ceiling space of the corridors. This was compounded by the limited amount of ceiling tiles that LEX staff thought could be removed and replaced without causing substantial damage to the tiles.

On behalf of LEX, we would like to thank you for the opportunity to serve you. If you have any questions regarding this report or any health and safety issue, please call us at (519).824.7082.

Yours truly,

LEX Scientific Inc.

Jarrett Deneau, B.Sc.
Environmental Technologist

Eric Hoffbauer, P. Eng.
Project Manager – Consulting Services

Attachment #1: Floor Plans Showing Enclosure Locations

Attachment #2: Photolog of Notable Pictures

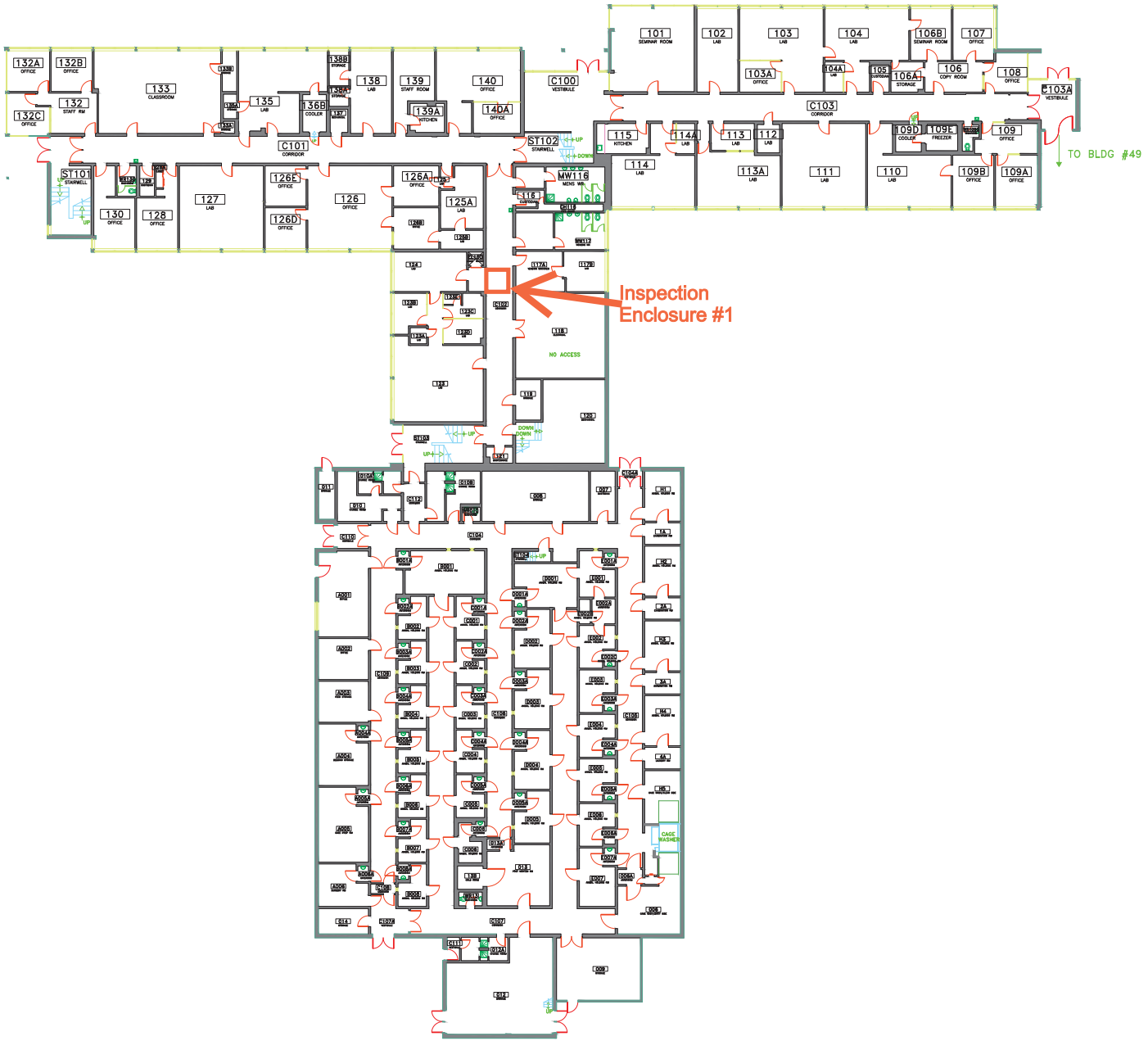
Disclaimer

This report is prepared exclusively for the purposes, project and site location outlined in the report. The report is based on information provided to, or collected and/or obtained by LEX as indicated in the report, and applies solely to site conditions existing at the time of sampling. LEX's report represents a reasonable analysis and interpretation of available information within an agreed scope of work, schedule and budget.

LEX's liability to the Client and all claimants not party to this agreement shall be limited to injury or loss caused by negligence of LEX and/ or sub-consultants for which it is responsible. The total amount of LEX's liability for said negligence shall be limited to the lesser of the fees paid for or actual damages incurred by the Client and the Client hereby waives all claims in excess of this amount howsoever arising including any claim for contribution and indemnity which the Client may have against LEX. The Client irrevocably and unconditionally agrees to defend, indemnify and hold LEX harmless from all claims and expenses associated therewith resulting from claims brought by other parties in excess of the aforesaid limit.

LEX prepared this report for the sole benefit of University of Guelph – Physical Resources Dept.; it reflects LEX's best judgment in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. LEX accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

Attachment 1



DO NOT SCALE DRAWINGS:

Contractors must check and verify all site conditions. Notify the Owner's Representative in writing before proceeding with the work if discrepancies are evident between the drawings and the site condition. No extras to the contract will be allowed if discrepancies were evident prior to start of work.

ASBESTOS:

Perform all work avoiding contact or disturbance of any asbestos materials. If asbestos or suspected asbestos containing materials are discovered during the work, all work must stop. At that point, the Contractor is to bring in an Asbestos Removal Contractor along with the Owner's Representative to review the extent of the work & provide a quotation to the University of Guelph's Construction Dept. for subsequent removal. Work shall resume after the Owner's Representative has approved such action.

Reference Documents

A = Detail number
B = Sheet number where detailed

NO.	ISSUED	BY	DATE
5			
4			
3			
2			
1			

Orientation

Project North

UNIVERSITY of GUELPH
Planning, Engineering & Construction
Physical Resources
Guelph, Ontario. N1G 2W1

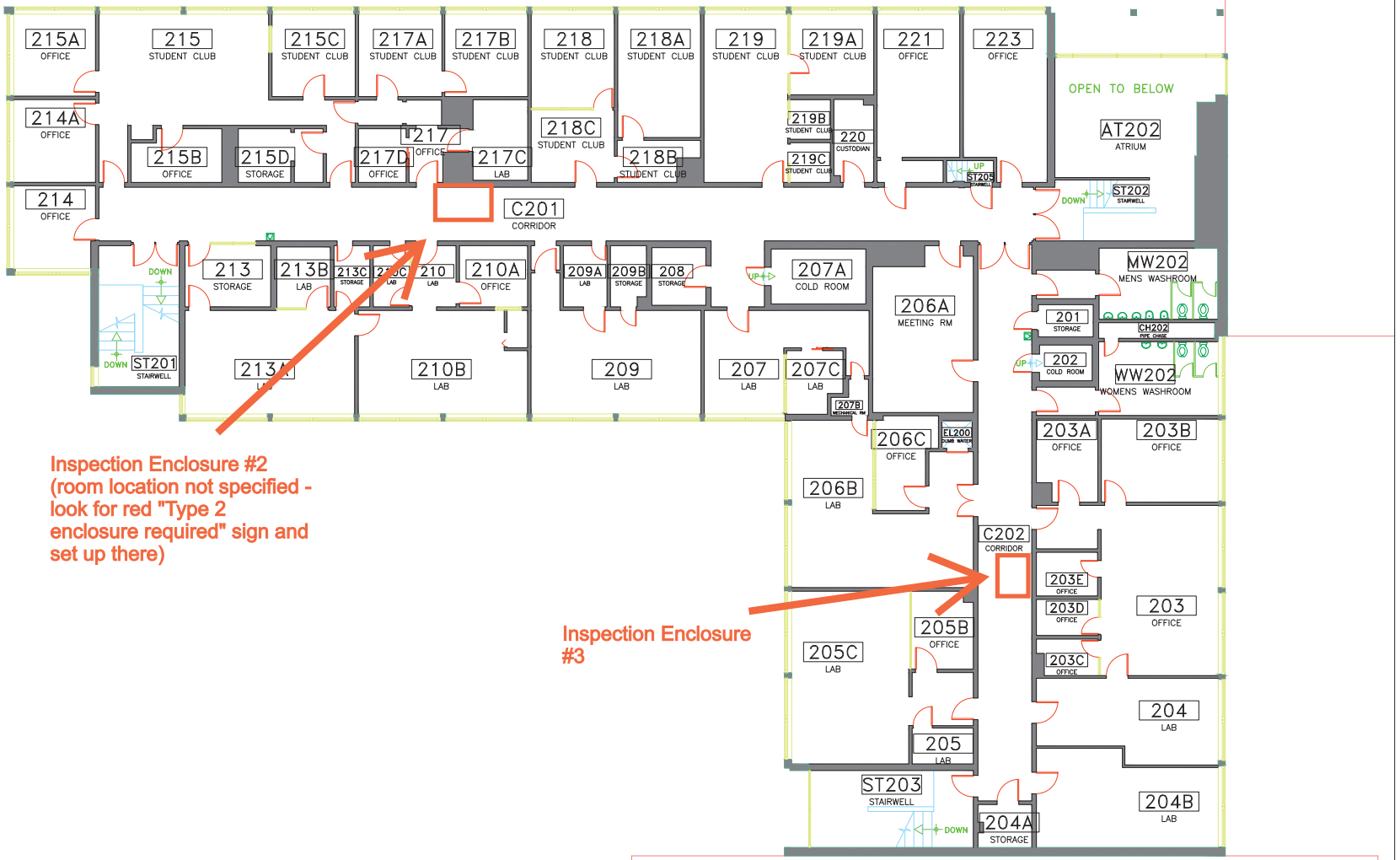
Project
BASE PLAN

Drawing Title
FIRST FLOOR

Project No.

Location
University of Guelph
FORMER VMI-Bldg.#046

Scale	Date
N.T.S.	MARCH, 2015
Drawn by: B.M.T.	Drawing No. B-1 of 1
Client's Approval	
Approved by	
Cad File No.	



Reference Documents

A = Detail number
B = Sheet number where detailed

NO.	ISSUED	BY	DATE
5			
4			
3			
2			
1			

Orientation

Project North

UNIVERSITY of GUELPH
Planning, Engineering & Construction
Physical Resources
Guelph, Ontario. N1G 2W1

Project
SPACE USE

Drawing Title
SECOND LEVEL

Project No.

Location
University of Guelph
FORMER VMI–Bldg#046

Scale	Date
N.T.S.	MARCH 2013
Drawn by: B.M.	Drawing No. B – 2 of 1
CEnt's Approval	
Approved by: J.V.	

Cad File No.

Attachment 2

Attachment #2: Photolog of Notable Pictures

Photo 1: Spray insulation on beam above ceiling tiles from within enclosure located in corridor C201.

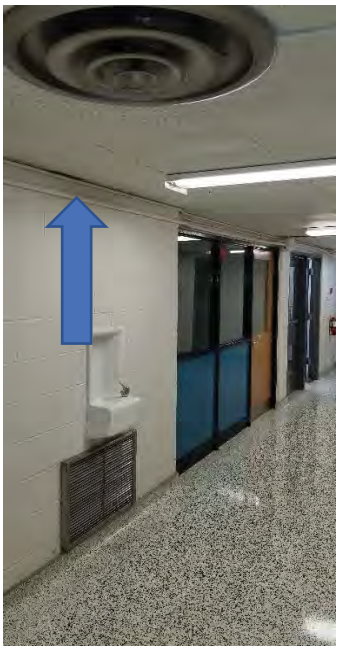


Photo 2: Approximate closest location where LEX inspected the ceiling space during the DSS. Located in corridor C201 outside room 213. Ceiling space easily accessible as hatch is equipped with a hinge. Fireproofing not visible from here.

Photo 3: No spray insulation visible on beam located in ceiling space in enclosure located in corridor C202. Specks visible on the beam.

Photo 4: Specks visible on beam above the ceiling of the vestibule C100. Similar to what was observed in corridor C202. Appeared to be dust or cement residue from application.

Appendix 'C'

Footing and Subgrade Inspection and Recommendations

Prepared by Chung & Vander Doelen Engineering Ltd., July 7, 2018

CHUNG & VANDER DOELEN
ENGINEERING LTD.

311 VICTORIA STREET NORTH
KITCHENER / ONTARIO / N2H 5E1
519-742-8979

SUBJECT:	**Footing and Subgrade Inspection and Recommendations**		
DATE:	July 7, 2018	**FILE NO.:**	M181172
TIME:	9:00 AM	**WEATHER:**	Interior
PROJECT:	Building 046 Renovations		
LOCATION:	University of Guelph	**CLIENT:**	Physical Resources, Design, Engineering &Construction University of Guelph
REPORTED TO:	Peter Ibrajev	**INSPECTED BY:**	Adam Mamon
AREA INSPECTED:	Proposed Elevator and High Density Storage		

As requested, a representative of CHUNG & VANDER DOELEN ENGINEERING LTD. (CVD) attended the site to inspect the existing subgrade conditions below the proposed areas.

Elevator

1. The existing building footing extends 1.05m below the existing finished floor elevation. The foundation comprises of 3.5 courses of masonry block on a 6-7" thick concrete footing.
2. The exposed subgrade material at the footing elevation consists of dense native Silty Sand and Gravel and is suitable to support a maximum bearing resistance of 150 kPa at SLS and 250 kPa at ULS. Subgrade suitability should be confirmed by the Geotechnical Engineer prior to pouring footings.
3. It is understood that the design footing elevation for the proposed elevator footing is 1500mm below the existing finished floor, or approximately 450mm below the existing underside of footing elevation.
4. Conventional spread footings are acceptable for use as the elevator footing. The subgrade materials are stable with no groundwater observed, therefore the excavation can be cut vertically against the existing footing for the elevator footing construction. The excavation should not be left open for an extended period of time.
5. The existing building footing should not be undermined during construction. CVD can assess the stability of the exposed existing footing soils during the excavation and construction.
6. No additional frost protection is required.
7. The existing subgrade materials are suitable for reuse as subgrade backfill.

High Density Storage

Existing Conditions:

1. An area measuring approximately 0.6m by 0.9m was cut into the existing concrete floor slab along the north wall of the proposed high density storage room.
2. The existing concrete slab is approximately 4.5" thick and does not contain any reinforcement. No voids were observed below the floor slab.
3. The composition of the existing slab base and subbase was generally found to consist of 6" of compact crushed clear stone overlying dense Silty Sand and Gravel with loose to compact fill of the same composition along the foundation wall.

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REPORTED TO:	Peter Ibrajev	**INSPECTED BY:**	Adam Mamon
AREA INSPECTED:	Proposed Elevator and High Density Storage		

4. The existing underside of the foundation along north wall is 1.05m below the existing finished floor elevation with a 5" to 6" thick concrete footing and masonry block foundation wall.

Recommendations:

1. The imposed load on the concrete floor slab was provided by J.L. Richards and Associates Ltd. as 7.2 kPa for the desired type of storage racking used.
2. The existing floor slab, base and native subbase is considered suitable to support the specified load however it is recommended to consider the following conditions:

    A. Due to the loose to compact backfill along the north foundation wall encountered in the test pit, the racking storage system should be placed a minimum of 1.2m away from the wall to avoid differential settlement caused by the unsuitable foundation wall backfill material. This condition is also likely to exist against the east wall and the racking should also be kept away 1.2m.

    B. To optimize the amount of area suitable to support the specified racking storage load, CVD recommends removing the concrete slab below the proposed area. The loose subgrade material should be removed and re-compacted as engineered fill. The existing fill is suitable for reuse as the subbase and should be compacted to 98% SPMDD. The crushed clear stone base should be replaced to match the existing base and the concrete slab should have a minimum 28 day strength of 25 MPa.

Reviewed By:

Eric Y. Chung, M.Eng, P.Eng

Appendix 'D'

University of Guelph Standard Operating Procedures (SOP):

IU.324 – Procedures for Getting Supplies In and Out of the Facility

IU.326 – Donning and Doffing of Personal Protective Equipment (PPE)

IU.329 – Personal Items in the Containment Zone

Standard Operating Procedures	
UNIVERSITY of GUELPH **Isolation Unit**	Title: **Procedures for Getting Supplies In and Out of the Facility**
	SOP Number: **IU.324** Approval Date: February 2017 Revision Date:

PURPOSE: To provide instructions for getting supplies and equipment in and out of the Isolation facility to implement bio- security and containment

POLICY: To meet or exceed the standards as set out in the CCAC Guide to the Care and Use of Experimental Animals and CCAC guidelines and the Canadian Biosafety Standards and Guidelines

PROCEDURES:

***Cardboard boxes or Styrofoam containers are not to be used as storage. Cardboard is not to be brought into the facility. Only when samples are to be put on ice, can Styrofoam be brought in.**

A. Movement of single use cardboard boxes for oocyst collection from outside storage room

- researcher must make sure that boxes are free from any debris that may have accumulated on the boxes while in the outside storage room
- boxes must be doubled bagged and bags must be securely tied
- researcher must enter the building using main entrance going through the disinfectant mats
- it is recommended that personnel change into facility specific scrubs
- proceed directly to the designated room, put on the boots and disposable gown, mask, gloves and bonnet and bring the boxes right into the room
- when all of the doors are closed in the room, they may remove the boxes from the bags and leave the bags in the room
- an Isolation staff member will remove and dispose of the bags through the dirty corridor

B. Bringing in small to medium supplies to be used in an animal room

- any item that will be required within the animal containment area, must be double bagged

- bags are located in the main entrance foyer
- if more bags, or bigger bags are required, get assistance from a staff member before entering the facility with supplies
- remember that supplies **cannot** be brought from one room to another
- if you are dealing with multiple rooms, multiple packages should be made up and have one designated for each room
- do not share sharps containers between rooms, bring one small container for each room
- when you have your supplies double bagged, make your way to the assigned animal room
- open the door to the ante room and before donning personal protective equipment(PPE)remove the first bag and place it on the designated clean shelf in the ante room
- step into the ante room, stepping into the boots and set bagged supplies on a stable surface
- put on PPE (if PPE is not in the ante-room, it will be located in a rolling storage bin in the hall way and will need to be gathered before entering the ante-room)close hallway door , enter housing room and perform what procedures are needed
- exit room and enter ante room, remove dirty items from the dirty bag and place them in the clean bag on the clean shelf. Dispose of dirty bag in garbage.
- remove one pair of gloves and seal clean bag
- remove PPE and exit ante room into the clean hallway
- upon request research teams can be provided with disinfectant that is effective against the agent in use

C. Bringing in large or bulky supplies to be used in an animal room

- any item that will be required within the animal containment area, must be double bagged
- bags are located in the main entrance foyer
- if more bags, or bigger bags are required, get assistance from a staff member before entering the facility with supplies
- remember that supplies **cannot** be brought from one room to another
- if you are dealing with multiple rooms, multiple containers should be made up and have one designated for each room
- when you have your supplies double bagged, make your way to the assigned animal room
- step into the ante room, stepping into the boots and set bagged supplies on a stable surface
- put on PPE (if PPE is not in the ante-room, it will be located in a rolling

storage bin in the hall way and will need to be gathered before entering the ante-room) , close hallway door, enter housing room, remove both bags and perform what procedures are needed
- leave large and bulky items in the room and an Isolation staff member will dispose of the bags and ensure large and bulky items are washed and returned to the clean corridor.
- remove PPE and exit ante room into the clean hallway

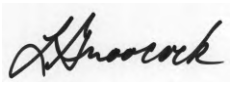
D. Bringing in Supplies to be used in the post mortem (PM) room

- if tissue collection or necropsies are to be done several times throughout the stay, a labelled plastic container with supplies may be left in the PM. This will help prevent the likelihood of cross contamination since supplies will not be going back and forth
- place equipment inside a durable, puncture resistant container and place in double garbage bags supplied at the entry way to Isolation Facility
- transport this equipment through clean halls in closed bags that are placed on lab carts to the PM room
- open the door to the ante room and before placing on personal protective equipment(PPE), remove the first bag and place it on the designated clean side of the shelf in the ante room
- step into the ante room, stepping into the boots and set bagged supplies on the dirty side of the shelf in the ante room
- put on PPE, close hallway door , enter PM room and perform what procedures are needed
- after you are done in the PM room, wipe down equipment with disinfect and place supplies in remaining bag
- exit PM room and enter ante room, remove dirty items from the dirty bag and place them in the clean bag on the clean side of the shelf. Dispose of dirty bag in garbage.
- remove one pair of gloves and seal clean bag
- remove PPE and exit ante room into the clean hallway
- if large quantities need to be removed from the building, arrangements can be made with the Isolation staff to pass it out the back door to a waiting member of the research team

E. Removing a cage of mice from the facility

- bring two bags from the main entrance
- open the door to the ante room and before placing on personal protective equipment(PPE), place one bag on the designated clean shelf in the ante room
- step into the ante room, stepping into the boots and set second bag on a stable surface
- put on PPE, close hallway door, enter housing room and locate the cage for removal
- within the animal containment area, place the cage in one bag and tie a knot in the bag providing an air bubble
- exit room and enter ante room and place the bagged cage into the clean bag on the clean shelf.
- remove one pair of gloves and seal the second clean bag
- remove PPE and exit ante room into the clean hallway
- alternatively, if exiting via the dirty corridor please coordinate with the lead hand or RAT x54428
- the transport container must protect animals from cold, heat, noise and wind; maintain bio-containment; and prevent animal escape. To that end, a cooler that may be disinfected between uses is recommended for transportation out of the facility.

Signatures

Author	Author	Author	Facility Manager	Facility Veterinarian
Name (please print): Linda Groocock	Name (please print): Vicky Carson	Name (please print): Tony Cengija	Name (please print): Mary Fowler	Name (please print):
Signature: 	Signature: 	Signature: 	Signature: 	Signature:

Standard Operating Procedures	
UNIVERSITY of GUELPH **Isolation Unit**	Title: **Donning and Doffing of Personal Protective Equipment (PPE)**
	SOP Number: **IU.326** Approval Date: February 2017 Revision Date:

PURPOSE: To outline the step-by-step process of donning and doffing of PPE

POLICY: To meet or exceed the Canadian Biosafety Standards and Guidelines

NOTE:

Donning and doffing of PPE is the process in which a person will put on and remove all PPE to decrease the possibility of exposing themselves to a contaminant.

When working with zoonotic pathogens and/or an airborne pathogen, precautions indicate that an N95 respirator must be worn. With regards to exposure to lab allergens or unknown health status of farm animals an N95 respirator is recommended.

Risk assessments for appropriate PPE are conducted both departmentally and through the Biosafety Committee.

PROCEDURES:

A – PPE for Entering the Animal Containment Rooms

DONNING

- PPE for all rooms (other than long-term mouse rooms) is located in rolling storage bins in the hallway
- Disposable gown must be worn in most animal rooms. Make sure both sets of strings are tied (one set behind neck and the other around the waist).
- For rooms with cattle or swine, coveralls must be worn instead of disposable gowns.
- Put on surgical mask (ear loop straps are placed around ears), N95 mask or respirator (fit test required)
- Put on a bonnet, making sure all hair is tucked inside.
- Put on the first pair of gloves, then a second pair of gloves is pulled over the cuff of the gown or coveralls
- Remove shoes in the clean corridor, step on sill and step into room-specific boots, without touching them

- Unsoiled coveralls can be reused during the course of the day to re-enter the animal rooms. To use coveralls hanging in the anteroom, remove shoes in hallway and balance on the anteroom sill. Place one leg into leg of coveralls and set foot into boot, tucking coveralls in, then repeat this step for the other leg.
- Eye protection (if warranted through a risk assessment) is stored in a container with a lid within the anteroom. Put on eye protection as you enter the anteroom.
- Enter and service room

DOFFING

- When exiting room, step boots into the footbath in the ante room
- Remove and dispose of outside/dirty layer of gloves
- Remove mask with gloved hands (inside/clean gloves), along with the bonnet and eye protection
- Eye protection is wiped with an alcohol wipe and placed back into the container with a lid
- Remove disposable gown and throw in garbage
- If wearing coveralls, open the door to the hallway with gloved hands. Unbutton and unzip the coveralls. Remove boots as you step on the sill, and remove coveralls one leg at a time while balancing on the sill. Hang coveralls on the hook.
- Remove inner pair of gloves. Discard gloves in garbage
- Wash hands, refer to SOP IU.325 " Hand Hygiene"
- Exit ante room while gently removing boots, leaving them upright in the anteroom

B – Use of the PM room

DONNING

- If there is a risk of contamination through the disposable gown or coveralls, please wear facility specific scrubs under prescribed PPE (gown or coverall)
- Put on appropriate PPE as outlined in Section A, PPE is located in a rolling storage in located outside of the PM Room door
- Remove shoes in clean hall, and step into the boots dedicated for the PM room

DOFFING

- Remove PPE following the procedure outlined in "A" and dispose in designated waste
- If coveralls were worn, they are to be placed in the "Dirty laundry" bin
- Exit PM room via anteroom, slip off designated boots in the anteroom one at a time returning to your shoes in the clean hall
- Wash hands at the hands-free sink, refer to SOP IU.325 " Hand Hygiene".
- In the change room, remove facility specific scrubs. A shower is available and highly encouraged after work in the post mortem room. Change into street clothes and exit the facility

Signatures

Author	Author	Author	Facility Manager	Facility Veterinarian
Name (please print): Linda Groocock	Name (please print): Vicky Carson	Name (please print): Tony Cengija	Name (please print): Mary Fowler	Name (please print):
Signature:	Signature:	Signature:	Signature:	Signature:

Standard Operating Procedures	
UNIVERSITY of GUELPH **Isolation Facility**	Title: Personal Items in the Containment Zone
	SOP Number: IU.329 Approval Date: February 2017 Revision Date:

PURPOSE: Personal items should not be brought into the animal containment zone unless it is critical to the experiment or animal monitoring. This SOP will outline a step by step procedure to prevent personal items from becoming contaminated while working in the containment zone.

POLICY: To meet the Canadian Biosafety Standards and Guidelines

PROCEDURES:

- Before entering the containment zone, remove all personal items (e.g. cell phones, music devices, cameras etc) and leave them in the locker room. A combination lock may be placed on the locker for the duration of time you are working in the unit
- If you are required to bring a device into the containment zone, the device must be placed in a resalable plastic bag prior to entry. These bags are available in the front entrance of the Isolation unit or from any of the full time technicians in the unit
- Most cell phones and cameras can be used when placed in a zip lock bags, as this level of film does not interfere with touchscreens, but testing the device before going into the containment zone is recommended
- When preparing to exit the containment zone, the resealable bag with the device still contained within it must be disinfected in the anteroom. The technicians will supply disinfectant wipes when they supply the bags. Apply disinfectant to the outer surfaces before doffing your PPE, (refer to SOP IU.326 – "Donning and Doffing of PPE")
- Immediately after exiting the containment zone anteroom remove the reseable bag and dispose it in the garbage in the anteroom. Wash hands thoroughly.

Signatures

Author	Author	Author	Facility Manager	Facility Veterinarian
Name (please print): Linda Groocock	Name (please print): Vicky Carson	Name (please print): Tony Cengija	Name (please print): Mary Fowler	Name (please print):
Signature: 	Signature: 	Signature: 	Signature: 	Signature:

Appendix 'E'

EACO Mould Abatement Guidelines Edition 3 (2015)

EACO Mould Abatement Guidelines
Edition 3 (2015)

Foreword

This guideline has been prepared to assist building owners, constructors, contractors, subcontractors and workers who have duties under the Occupational Health and Safety Act and its Regulations to safely perform work activities involving Mould (Microbial) Abatement and remediation. The guideline is intended to promote safe work practices, the use of personal protective equipment, worker awareness and training and is based in a thorough review of the available guidance materials available to December 2014 and professional experience of the abatement industry in Ontario.

We believe that this guideline will not only help employers fulfill their responsibilities and due diligence under the Occupational Health and Safety Act but will also assist them to better address the challenges involved with proper assessment and remediation of Mould (Microbial) contamination in buildings.

Disclaimer

EACO disclaims any liability or risk resulting from the use of the work practices and recommendations discussed in the guideline. It is the user's responsibility to ensure that work practices and recommendations discussed in the guideline apply to specific workplaces and projects and to ensure compliance with all other applicable federal, provincial and local acts, codes and regulations.

EACO Mould Abatement Guidelines
Edition 3 (2015)

Table of Contents

SECTION A: GENERAL POINTS AND LIMITATIONS

1. Three levels of work practice are given for removal of Small, Medium and Large-scale Mould growth, depending on the extent of material supporting Mould growth present. The thresholds between Small and Medium project areas (10 ft^2) and between Medium and Large project areas (100 ft^2) are a guideline only and are subject to professional judgment. EACO recommends that the enumeration of Mould growth be based on an approximation of the extent of visible growth (total affected area of building material), including the estimated extent of any hidden Mould.

2. These procedures do not address the identification or control of the cause(s) of the Mould growth being abated by these procedures. This would include such factors as past flooding, moisture intrusion and elevated levels of relative humidity. The project authority is cautioned to ensure that the underlying cause(s) of the Mould growth is investigated and remedied prior to completing the Abatement process to reduce the potential for Mould re-growth.

3. These procedures do not address the potential for fungal infections that may be acquired by Susceptible Occupants in hospitals or other health care settings if Mouldy materials are disturbed without appropriate precautions. Refer to "Construction-related Nosocomial Infections in Patients in Health Care Facilities – Decreasing the Risk of Aspergillus, Legionella and Other Infections", July 2001, Canada Communicable Disease Report, Health Canada and CSA Standard Z317.13-12, Infection Control During Construction or Renovation of Health Care Facilities.

4. These procedures do not address the potential presence of Designated Substances (asbestos, lead, etc.) or other hazardous materials in a mould remediation work area. The project authority is cautioned that designated substances are regulated in Ontario under the Occupational Health & Safety Act. In addition, Ontario Regulation 278/05, *Regulation Respecting Asbestos on Construction Projects and in Buildings and Repair Operations* (O. Reg. 278/05) outlines specific procedures for the handling and disturbance of asbestos-containing materials (ACM). Typical ACMs that may be disturbed as part of a mould remediation project include drywall joint filling compound, ceiling tiles, pipe and duct insulation and vinyl flooring.

5. These procedures are not directly intended to address Biohazards, other than Mould, potentially present in a project area as a result of contamination with sewage waste, river floods or other water with high levels of Microbial contamination. Appendix D does provide additional procedures for unsanitary remediation. The reader is referred to the guidance of the Institute of Inspection, Cleaning and Restoration Certification S500 Standard, "Standard and Reference Guide for Professional Water Damage Restoration." Additional precautions might apply.

6. These guidelines are not meant to respond to the development of minor areas of superficial mould growth in households due to water absorption or condensation on the occupied side of finishes, often referred to as lifestyle mould growth. Examples include spotty mould growth on grout in bathrooms or on cold window frames under winter conditions. Such areas of minor surface mould growth are generally limited in area and can usually be addressed with improved ventilation and/or moisture control, and standard house cleaning methods. However, if there are large areas of surface condensation or indications of sub-surface moisture sources, the area should be inspected for the possibility of hidden water damage or mould growth.

SECTION B: GENERAL PRECAUTIONS APPLICABLE TO ALL LEVELS OF MOULD ABATEMENT WORK

1. Protection of Occupants

1.1 The project authority should consider whether occupants should be removed from areas adjacent to the work area. The removal of occupants from spaces adjacent to the work area is not necessary in all cases but should be considered in the presence of Susceptible Occupants including but not limited to infants less than 12 months old, persons having undergone recent surgery, the elderly, immune suppressed people, or people with chronic inflammatory lung diseases.

2. Worker Training and Medical Pre-screening

2.1 Mould abatement workers shall be trained in the hazards of Mould Abatement and in the procedures to be followed. Training at a minimum shall include classroom and site instruction. Minimum training topics shall include: hazards of mould abatement; use and limitations of personal protective equipment such as respirators and gloves; proper abatement practices including site isolation, removal techniques, proper clean-up and decontamination procedures. General health and safety training should also be provided to workers, as required by the Occupational Health & Safety Act and regulations for construction sites, and waste handling and disposal regulations.

2.2 Workers must be fit to work with potential Mould or microbial exposure. Workers with a history of significant allergic disease (asthma, hay fever, hives, etc.) or with a potential immuno-compromised status (persons with an immune system disease, taking immune system suppression medication, etc.) should consult with an experienced physician to determine whether Mould removal activities, and the associated potential for exposure to pathogenic materials, would present an unacceptable health risk.

2.3 Mould Abatement workers who may encounter a risk of infectious disease from unsanitary water sources (sewage, river floods, etc.) should consult with an experienced physician regarding vaccinations to reduce the risk of infectious disease through available immunizations, particularly Hepatitis A and B, tetanus and polio.

3. Respiratory Protection

3.1 The respiratory protection in these procedures has been established for protection against fungal particulate material, for which a Respirator with a NIOSH-approved particulate filter will be adequate. Another type of Respirator may be required if the Mould Abatement will employ a Disinfectant with a volatile hazardous ingredient (e.g., household chlorine bleach). Consult MSDS data for specific respiratory protection in relation to specific cleaning products.

3.2 Respirators shall be NIOSH approved.

3.3 Workers should complete Respirator pre-screening as detailed in CSA Standard Z94.4-11, Selection, Care and Use of Respirators (Appendix E Figure E1) and, if required, consult with an experienced physician to determine if a Respirator can be used without serious difficulty.

3.4 Respirator wearers shall be Fit-tested for each type of Respirator, prior to use, following CSA Standard Z94.4-11, Selection, Care and Use of Respirators.

3.5 Follow CSA Standard Z180.1-13 as amended, for testing of breathing air quality for supplied air respiratory protection required for dry ice abrasive blasting (see Appendix C).

3.6 Clean and maintain the Respirator and battery pack (where applicable) in accordance with manufacturer's recommendations.

3.7 No facial hair or spectacle side arms, which affect the seal of the Respirator to the skin, are allowed.

3.8 Dispose of filters daily due to the potential growth of Mould spores on damp filter media.

3.9 Due to the nature and working conditions of Mould Abatement, Filtering Facepiece Respirators shall not be utilized for Level 2 or Level 3 Abatement projects.

4. Personal Protection and Hygiene

4.1 Refer to the EACO Guideline Construction Worker Hygiene Practices 2014. Workers shall wear appropriate eye protection including safety glasses or goggles that provide protection from external debris (not required with full face negative pressure respirator), chemical splashes, impact or dusty environments, dust-impermeable gloves appropriate for the work underway and water-impermeable gloves for application of detergent and/or Disinfectant. Refer to the MSDS for the detergent and/or Disinfectant for glove selection.

4.2 Wash face and hands after work at the Abatement project each time after exiting the Abatement work area.

4.3 For all levels of work, eating, drinking or smoking is prohibited in the work area.

5. Cleaning

5.1 Pre-clean any items that will be retained, whether removed from the work area or covered and left in the work area. Use appropriate and effective cleaning methods.

5.2 After bulk removal, clean the surrounding areas with a HEPA vacuum. No other type of vacuum can be used. If a HEPA vacuum is not available, wet wiping may be adequate for Level 1 work.

5.3 Do not dry sweep or dry whisk. Use power tools only if fitted with effective HEPA-filtered dust collection.

5.4 Wipe all non-Porous surfaces within the removal area with a detergent solution. Rinse with clear water as required.

5.5 As an option, a Disinfectant solution can be used in place of, or in addition to a detergent. Apply the Disinfectant as specified by the manufacturer, maintaining the surfaces wet for the prescribed period. Generally, surfaces to be disinfected must be cleaned of all dust and loose organic material prior to application of the Disinfectant. A Disinfectant is required where the work area has been contaminated with a significant pathogenic hazard (i.e., sewage floods).

5.6 The project authority should consider the use of a Disinfectant in hospital or health care settings, or in other settings where the project authority believes occupants to be significantly immuno-compromised. Refer to the Health Canada and CSA guidelines for prevention of fungal infections in health care settings, given above.

5.7 Use only disinfectants with current Health Canada DIN registration. Apply the disinfectant according to the DIN label, observing requirements for mixing, storage time, worker safety, pre-cleaning, contact time, and any requirements for rinsing.

5.8 These cleaning requirements apply to all exposed surfaces within the work area. The project authority will determine if soft goods and Porous materials can be adequately cleaned or must be disposed of.

5.9 Clean all equipment used in the Abatement work area by HEPA vacuuming or wet wiping. Equipment that cannot be readily cleaned shall be HEPA vacuumed and sealed in 6 mil polyethylene bags before removal from the work area.

6. Post Abatement Cleanup

6.1 Remove Polyethylene sheeting used during abatement by carefully rolling towards the centre of the work area. Clean any visible dust and debris using a HEPA vacuum.

6.2 Clean all tools, supplies and equipment in the work area using a HEPA vacuum and by wet wiping. Equipment that cannot be readily cleaned (e.g. vacuum hose, wire brushes, etc.) shall be HEPA vacuumed and sealed in 6 mil polyethylene bags or suitable sealed containers before removal from the work area.

6.3 Seal the intake and exhaust of HEPA Filtered Exhaust Fans (negative air machines) and clean the cabinet by wet wiping, before removal from the work area.

6.4 Leave the work area and surrounding areas dry and visibly free of dust and debris.

7. Waste Disposal

7.1 Remove all waste as contaminated material, including but not limited to building debris, disposable coveralls, Respirator filters and/or cartridges, and plastic sheeting. All waste should be immediately double-bagged into two 6-mil polyethylene bags, each individually sealed. If the material cannot be bagged, wrap in 2 layers of 6 mil Polyethylene Sheeting and seal with tape.

7.2 Transport and dispose of the waste material in compliance with local, provincial and federal regulations, including the Ontario Environmental Protection Act and any other regulations, which may apply to the Mould or the substrate on which the Mould was located.

8. Post-Abatement Drying

8.1 By the completion of the mould abatement, ensure the cause of the mould growth has been identified and an action plan initiated to prevent further mould growth. This action would include mitigation of the original cause of the mould contamination. This would include such factors as past flooding, moisture intrusion or elevated levels of relative humidity. Also, at completion of mould abatement check that the remaining finishes (e.g., concrete, wood framing, sub-floors) have been adequately dried so that mould growth will not re-occur when new finishes are installed. The work area may require further drying efforts before re-construction can commence.

SECTION C: PRECAUTIONS FOR LEVELS 1, 2 AND 3 MOULD ABATEMENT

9. Level 1: Small Isolated Areas, Less than 10 ft^2 (1 m^2) of Building Materials or Clean-up of Less than 10 ft^2 (1 m^2) of Mould Growth in HVAC Systems in Non-occupied Areas.

9.1 This section gives instructions for performing Mould Abatement specifically for small-scale projects. This work practice is suitable for the abatement of under about 10 square feet of mould growth on building materials or finishes or the abatement of the same extent of mould growth within HVAC equipment in non-occupied areas such as mechanical rooms. Abatement of HVAC equipment in occupied locations shall be performed following a minimum of Level 2 procedures (contained mould abatement). Comply with all of the items of Section B, General Precautions (protection of occupants, worker training and medical pre-screening, respiratory protection, personal protection and hygiene, cleaning, and waste disposal) while performing this work.

9.2 The worker shall wear a half face piece air-purifying Respirator fitted with replaceable filters (N95 minimum) or a Filtering Facepiece Respirator (N95 minimum) plus appropriate gloves.

9.3 Workers shall wear full-body dust-impervious coveralls with attached hoods. Secure the coveralls tight at the ankles and wrists.

9.4 Turn off HVAC systems where possible and seal over any diffusers immediately adjacent to the work area.

9.5 Where possible, place a drop sheet below the Mouldy materials.

9.6 Dust Suppression methods should be used where possible, prior to disturbance of the Mouldy materials. Tape a section of plastic sheeting or duct tape over the Mouldy material, or if this is not feasible, lightly mist the Mouldy material with water.

9.7 Remove any Porous substrate materials (ceiling tiles, drywall, etc.) to a point beyond the immediate areas of visible contamination, for a minimum distance of 30 cm in all directions.

9.8 Clean the work area and dispose of the waste.

10. Level 2: Medium areas, 10-100 ft^2 (1-10 m^2) or less than 10 ft^2 (1 m^2) in HVAC Systems in Occupied Areas

10.1 This section gives instructions for performing Mould Abatement specifically for medium scale projects, or the abatement of less than 10 square feet of mould growth in HVAC equipment in occupied areas. Comply with all of the items of Section B, General Precautions (protection of occupants, worker training and medical pre-screening, Respiratory protection, personal protection and hygiene, cleaning, and waste disposal) while performing this work.

10.2 Consult with a qualified Health and Safety Professional prior to remediation work to provide Quality Assurance for the project and monitoring of compliance with these guidelines.

10.3 A competent supervisor must be present during all Contaminated Work.

10.4 The worker shall wear gloves appropriate for the work being done and full-body dust-impervious coveralls with attached hood. Secure the coveralls tight at the ankles and wrists.

10.5 The worker shall wear an elastomeric half face piece air-purifying Respirator fitted with 100 Series Filter cartridges.

10.6 Workers shall wear disposable boot covers or separate work boots that can be effectively HEPA vacuumed or wiped clean prior to removal from the work area.

10.7 Turn-off HVAC systems where possible and seal over any supply and return openings immediately adjacent to the work area. Objective of this engineering control is to maintain negative pressure and prevent the distribution of mould spores and dust from the work area.

10.8 The Abatement area must be secured and access restricted. Isolate the work area with an enclosure constructed of fibre-reinforced Polyethylene Sheeting or 6 mil Polyethylene Sheeting, taped and supported as required. Provide a temporary roof where an existing ceiling does not complete the temporary enclosure. The Project authority may require a single chamber decontamination/change room.

10.9 A Competent Supervisor or project authority must inspect the work area for defects in the enclosure, barriers and change room, at the beginning of every shift and at the end of every shift. Records of the inspections should be generated and maintained.

10.10 Install signs warning of the exposure hazard. Suggested wording: CAUTION, MOULD EXPOSURE, WEAR ASSIGNED PROTECTIVE EQUIPMENT, AUTHORIZED PERSONNEL ONLY.

10.11 Provide continuous Negative Pressure within the enclosure by drawing air from the work area and exhausting it out of the enclosure, either by use of a HEPA vacuum or a portable HEPA-filtered exhaust fan. Provide a minimum Negative Pressure of 5 Pascals (0.02 inches of water column) and at least 4 air changes per hour. Discharge the filtered air outside the building and away from persons wherever possible, and if this is not possible, consider on-site leak testing of the HEPA filtered equipment. Refer to the EACO DOP/PAO Testing Procedure Guideline 2013. Negative Pressure must be maintained until the completion of all Contaminated Work.

10.12 Remove any Porous substrate materials (ceiling tiles, drywall, etc.) to a point beyond the immediate areas of visible contamination, for a minimum distance of 30 cm in all directions.

10.13 Clean the work area and dispose of the waste.

10.14 Before exiting the work area, workers shall fully wipe or vacuum clean all footwear, coveralls and other personal protective equipment and remove and dispose of protective equipment not for re-use. Workers shall then complete personal cleaning as in Section B, General Precautions.

11. Level 3: Large Areas, More than 100 ft^2 (10 m^2), or more than 10 ft^2 (1 m^2) in HVAC Systems

11.1 The following work procedures describe the general set-up, conduct and safety measures for Level 3 Mould Abatement. Each project should be conducted following a site-specific work plan or specification developed by a Health and Safety Professional.

11.2 This section gives instructions for performing Mould Abatement specifically for large-scale projects. Comply with all of the items of Section B, General Precautions (protection of occupants, worker training and medical pre-screening, Respiratory protection, personal protection and hygiene, cleaning, and waste disposal) while performing this work.

Quality Assurance

11.3 Consult with a qualified Health and Safety Professional (qualified by knowledge, training and experience) with experience performing Microbial investigations and remediation, prior to remediation work, to develop a site specific work plan or specification and Quality Assurance services for the project and monitoring of compliance with these guidelines.

Quality assurance will include a combination of site inspections prior to abatement, during abatement, after abatement and clearance sampling including air sampling prior to dismantling of the abatement work area. Clearance sampling requirements to be defined by the appointed Health and Safety Professional. Refer to Section 11.22

Worker Protection

11.4 The worker shall wear a tight-fitting full face piece Powered Air Purifying Respirator with high efficiency particulate filters or a non-powered full face piece air purifying Respirator fitted with 100 Series Filters. Refer to Appendix C for respiratory protection for dry ice abrasive blasting.

11.5 The worker shall wear gloves appropriate for the work being done and full-body dust-impervious coveralls with attached hood. Secure the coveralls tight at the ankles and wrists.

11.6 Workers shall wear disposable boot covers or separate work boots that can be effectively HEPA vacuumed or wiped clean prior to removal from the work area.

11.7 A Competent Supervisor must be present during all Contaminated Work.

Site Isolation

11.8 Turn-off HVAC systems where possible and seal over any supply and return openings immediately adjacent to the work area.

11.9 Isolate the work area from adjacent spaces using temporary hoarding, tape and Polyethylene Sheeting, etc.

11.10 Install signs warning of the exposure hazard. Suggested wording: CAUTION, MOULD EXPOSURE, WEAR ASSIGNED PROTECTIVE EQUIPMENT, AUTHORIZED PERSONNEL ONLY.

11.11 Provide continuous Negative Pressure within the enclosure, through use of portable HEPA-Filtered Exhaust Fans. Provide a minimum Negative Pressure of 5 Pascals (0.02 inches of water column) and at least 4 air changes per hour. Note that higher levels of negative air pressure may be required to maintain site isolation. Discharge the filtered air outside the building and away from persons wherever possible, and if this is not possible, perform on-site leak testing of the HEPA filtered fan. Negative Pressure must be maintained until the completion of all Contaminated Work.

11.12 Negative Pressure within the enclosure shall be continuously measured and recorded with a portable monitor located at the entrance to the work area.

11.13 A Competent Supervisor and/or the Health and Safety Professional must inspect the work area for defects in the enclosure, barriers and change room, at the beginning of every shift, at the end of every shift where there is no shift beginning immediately following the shift that is ending, and at least once per day on days where there are no shifts. Records of the inspections should be generated and maintained.

Worker and Waste Decontamination Facilities

11.14 Provide a Worker Decontamination Facility, to include a clean change room and a dirty change room. Install flap doors at each opening into and within the decontamination facility. Provide a wash station consisting of at least a basin, fresh water, soap and toweling, in the clean change room. A shower for worker comfort may be provided, but is optional. Refer to Appendix A for a diagram of a typical Decontamination Facility.

11.15 When going into the Contaminated Work area the worker will don clean coveralls and a Respirator in the clean change room.

11.16 Prior to exiting the Contaminated Work Area, the worker will use a HEPA vacuum in the work area to remove gross contamination from coveralls and boot covers (or separate dirty work boots).

11.17 The worker will then enter the dirty change room where the dirty coveralls and boot covers are removed (to be used only once). Work boots used without boot covers will also be removed and stored in the dirty change room.

11.18 The worker then proceeds to the clean change room to complete clean up. The wash station is to be used by each worker on leaving the work area to clean face and hands.

11.19 A separate Waste Decontamination Facility, consisting of a double bagging room and a waste transfer room should be provided where large volumes of waste will be removed. Seal the waste into bags (or Polyethylene Sheeting sealed with tape) in the Contaminated Work area, and wipe the exterior of the bags or other containers. Transfer the waste to the double bagging room and place a second bag around bagged waste. Seal the second bag. Transfer the double-bagged waste into the waste transfer room for removal by workers entering from the outside of the decontamination facilities.

Removal, Salvage and Cleaning

11.20 Remove any Porous substrate materials (ceiling tiles, drywall, etc.) to a point beyond the immediate areas of visible contamination, for a minimum distance of 30 cm in all directions.

11.21 Clean the work area and dispose of the waste. Clean tools and equipment such as vacuums, negative air units or any other items that were exposed during abatement.

Clearance Inspection and Monitoring

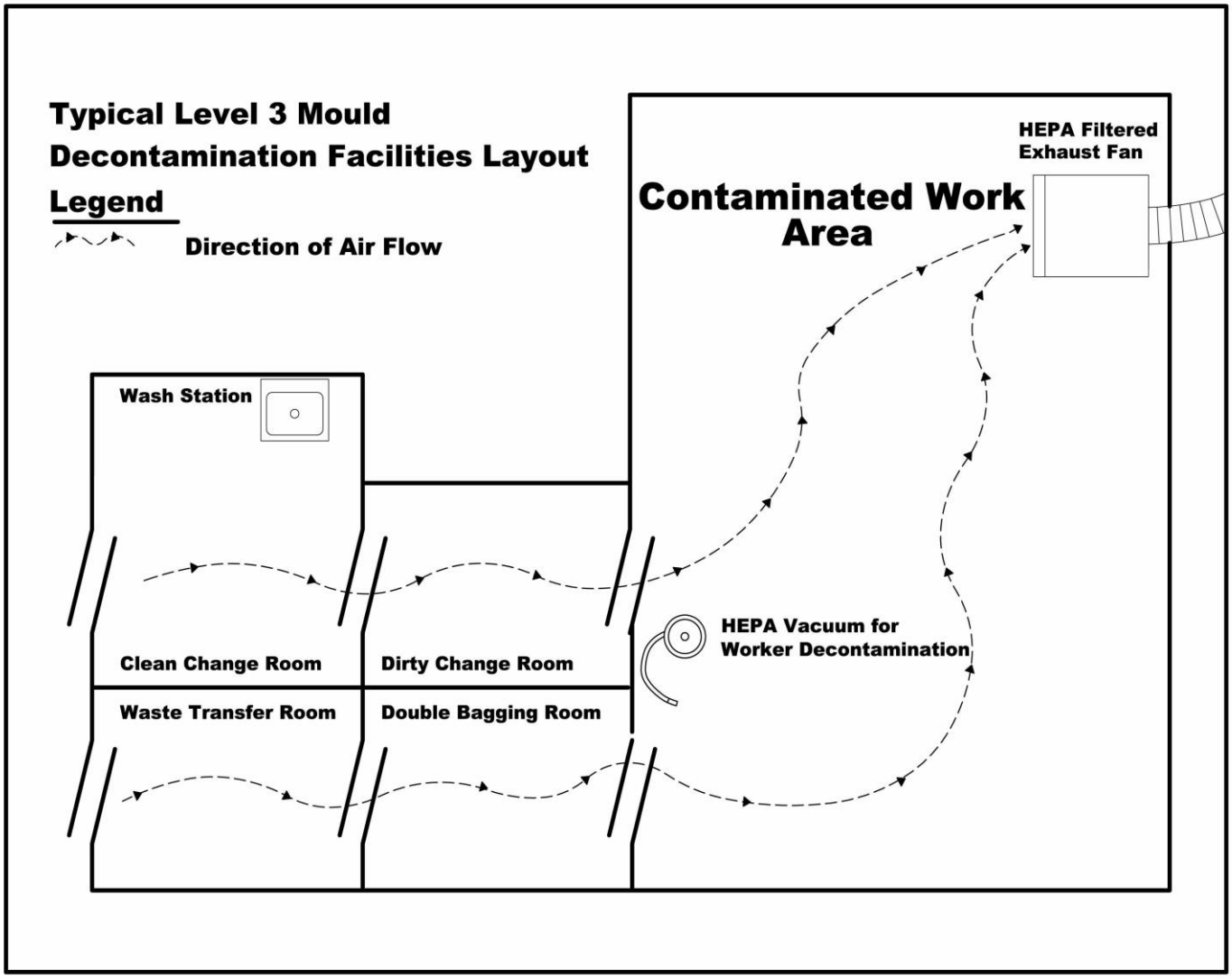
11.22 The Health and Safety Professional or representative should inspect the Level 3 work area for acceptable completion, by a combination of careful inspection and testing. A site will be considered acceptable and clean when a thorough inspection shows an acceptable state of cleanliness. In addition, Clearance air samples to be taken to indicate the work area is no longer impacted by the Mould contamination abatement process.

Generally, clearance air samples collected within the work area will be compared to samples taken in adjacent areas from where the work area make-up air is being drawn, another suitable location, or to outdoor air samples. An acceptable condition is indicated when:

1. Concentrations of airborne fungal particles in the work area are not significantly elevated when compared to concentrations in the reference area; and
2. The types of fungal particulate present in the work area do not significantly differ from those present in the reference area.

Surface samples should show minimal or no Mould growth remaining at completion. Interpretations of sample results are subject to the professional judgment of the Health and Safety professional with experience performing microbial investigation and remediation.

Appendix A: Typical Level 3 Mould Decontamination Facility Lay-Out



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Appendix B: Procedures for Clean-up of Bird and Bat Droppings

Workers removing accumulations of bird or bat droppings are at risk of exposure to airborne fungal spores (and other microbial hazards) likely to be released when this material is disturbed. Bird and bat droppings should be presumed to be contaminated with the fungi Histoplasma capsulatum, Cryptococcus neoformans, and other infectious hazards. The spores of some of these organisms can remain infectious for decades after their growth in the guano has ceased. Many of these microorganisms are known to cause respiratory infections in workers exposed during construction or maintenance disturbance.

NOTE: Although a disinfectant will be applied during this work, the treated excrement may still contain viable organisms and use of personal protective equipment should continue until the site is cleaned.

General Precautions during Abatement Work

1. Health and safety measures and procedures required during the abatement of bird or bat droppings shall be based on the findings of a project-specific risk assessment completed by a health and safety professional.
2. The project-specific risk assessment must consider conservation and/or habitat preservation.
3. The project-specific risk assessment should consider post abatement corrective measures that may be necessary to prevent the return of birds or bats (e.g. block openings into buildings or structure ledges, screen off ventilation intakes or other void openings, install netting/mesh or anti-roosting control systems, etc.).
4. Requirements of Section B (of this document) shall also apply, as applicable, for the clean-up of bird or bat droppings. Section B provides general guidance related to; protection of occupants, worker training and medical pre-screening, respiratory protection, personal protection and hygiene practices.

Personal Protection

All work will require the following personal protective equipment, as a minimum:

- Rubber boots (CSA approved for construction work).
- Either disposable gloves taped to coveralls and worn under work gloves, or heavy rubber or nitrile work gloves, taped to coveralls.
- Water-resistant disposable coveralls, complete with elasticized hood, taped to gloves and boots.
- Minimum of a full-face piece respirator fitted with appropriate cartridge filters. As a minimum, P100 filters are required for protection against airborne particles. Depending on the disinfectant used, the cartridge may require protection against vapours or gases. A powered air purifying respirator (PAPR) fitted with an appropriate cartridge filter may also be used, and will provide more comfort for the worker.

Appendix B: Procedures for Clean-up of Bird and Bat Droppings

Disinfectant

Use only disinfectants with current Health Canada drug identification number (DIN) registration. Apply the disinfectant according to the DIN label, observing requirements for mixing, storage time, worker safety, pre-cleaning, contact time, and any requirements for rinsing.

Hazard Sign

Install signs warning of exposure hazard during all abatement operations.

Site Isolation Considerations

The site isolation procedures implemented shall be based on the findings of a project-specific risk assessment. The following site isolation procedures, as a minimum, should be considered for all bird or bat dropping abatement operations.

1. Turn-off HVAC systems where possible and seal over any openings immediately adjacent to the work area.
2. Isolate the work area from adjacent spaces using temporary hoarding, tape and polyethylene sheeting, etc.
3. If the work area is enclosed, establish continuous negative pressure using portable HEPA-filtered exhaust fans. Provide a minimum negative pressure of 5 Pascals (0.02 inches of water column) and at least 4 air changes per hour. Refer to EACO document "*DOP / PAO Testing Guideline*, 2013", for guidance on negative air system testing and reporting requirements.
    a. Negative pressure within the enclosure shall be continuously measured and recorded with a portable monitor.
4. Provide a worker decontamination facility, to include a clean change room and a dirty change room. Install flap doors at each opening into and within the decontamination facility. Provide a wash station consisting of at least a basin, fresh water, soap and toweling, in the clean change room. Refer to Appendix A for a diagram of a typical decontamination facility.
    a. For large work areas, long term projects or areas with excessive amounts of bird or bat droppings, including a shower in the worker decontamination facility should be considered.
5. Additional considerations for outdoor operations:
    a. Install signs warning of exposure hazard, and ropes or barriers, around the perimeter of the work area, to the extent that is practicable, to prevent unauthorized personnel from entering the work area. All workers and personnel within the perimeter of the work zone must be adequately protected.
    b. Provide a worker decontamination facility as close to the work area as practical.
    c. Assess the prevailing wind patterns affecting the work area. Arrange the location of the worker decontamination facility, and sequencing of abatement operations, in a manner to minimize exposure to workers and surrounding areas.
    d. Complete an assessment to identify the location of fresh air intakes for building heating, ventilation and air conditioning (HVAC) systems. Fresh air intakes and/or HVAC

systems located within the perimeter of the work area shall be turned-off where possible and openings shall be sealed.

i. Clean HVAC system sheet metal that may have been contaminated.

ii. Replace HVAC air filters that may have been contaminated.

e. Isolate other routes of potential air transfer (into a building) located within the perimeter of the work area, such as windows, doors, void spaces, vents, etc.

f. If soil removal is required, soil pretreatment or decontamination may be required.

Work Practices

1. Dampen dry and dusty droppings with water to reduce the amount of airborne dust that may be created during abatement activities. Adding a surfactant to water (i.e. a wetting agent) may further reduce the amount of dust that becomes airborne.
    a. Wetting should be completed only by a low-pressure system or hose.
        i. Never wet bird or bat droppings using a high pressure power-washer system or using a high pressure garden hose setting (e.g. do not use direct or jet spray settings).
    b. Where bird or bat droppings are excessive, a prolonged wetting period and/or, repeated wetting during abatement work may be required.
        i. Never dry shovel or dry sweep bird or bat droppings.
    c. Avoid walking over areas with bird or bat droppings unnecessarily.
2. Perform an initial shoveling and HEPA vacuum removal of as much of the residue as possible.
3. Following a HEPA vacuuming, apply a disinfectant solution to all areas with visible residue. Apply with a garden sprayer set for droplet as opposed to mist spraying. Lightly brush to ensure uniform wetting and contact through to the underlying surface. Apply additional disinfectant as necessary to maintain the area wet for the contact time specified by the disinfectant manufacturer. Leave the material wet overnight where practical to do so.
4. Clean the area of residue with suitable tools and HEPA vacuuming. Lightly mist with water to reduce dust formation.
5. After surfaces have been cleaned of residue to the extent possible, apply a second application of the disinfectant and maintain wet contact time for the period recommended by the manufacturer. If the surface cannot be left with a residue, rinse and wipe with clear water.

Waste Collection and Disposal

Collect all waste into 6 mil disposal bags and immediately seal. Wipe the bag with the disinfectant solution and place into a second bag. Ensure proper notification and compliance with all applicable local, provincial and federal regulations including the Ontario Environmental Protection Act.

Appendix B: Procedures for Clean-up of Bird and Bat Droppings

Clearance Inspection

The project authority or representative should complete a detailed visual inspection of the work area to confirm that an acceptable level of cleanliness has been achieved.

NOTE: Currently there are no accredited analytical procedures able to measure the presence of viable organisms of *Histoplasma capsulatum*.

Post Abatement Corrective Measures

1. Review the findings and recommendations of the project-specific risk assessment. The project-specific risk assessment must consider conservation and/or habitat preservation.
2. The project-specific risk assessment should consider post abatement corrective measures that may be necessary to prevent the return of birds or bats (e.g. block openings into buildings or structure ledges, screen off ventilation intakes or other void openings, install netting/mesh or anti-roosting control systems, etc.).

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Appendix C: Additional Hazards with Abrasive Blasting in Mould Abatement

General guidance related to; protection of occupants, worker training and medical pre-screening respiratory protection, personal protection and hygiene procedures are found in Section of B of this document and shall apply, as applicable, for mould abatement using abrasive blasting,

Abrasive blasting techniques, using media such as soda, dry-ice or sand, are effective methods for the removal of mould growth from contaminated building materials. However, it must be recognized that additional hazards to workers and building occupants might exist when utilizing such methods. The primary hazards and additional precautions recommended for abrasive blasting of mould growth are summarized below:

- The aggressive disturbance of mould growth through blasting will result in much higher airborne mould concentrations than manual removal methods.

- Dry-ice blasting will release significant amounts of carbon dioxide (CO_2) into the work area which may result in an overexposure to carbon dioxide in enclosed work areas.

- The compressed air used to deliver the blasting media will reduce the negative pressure in the containment. Even smaller blasting equipment delivers 2000 cfm or more of additional air into the containment. This air supply will offset the negative pressure created by ventilation equipment.

- The pressure applied by the blasting equipment can transport or drive mould debris through various substrates, building elements, and assemblies (such as floor board seams, roof and wall sheathing seams, service penetrations, expansion joints) to an uncontained or occupied area where it may impact air quality or expose other workers, building occupants or the public.

Based on these hazards, the following precautions, in addition to the measures prescribed in Section B (of this document), should be followed when conducting abrasive blasting operations.

Containment

1. Level 3 precautions should be used for all blasting activities.

2. Ensure the substrate being blasted will not permit the penetration of blast media, dust or mould. If the substrate is likely to permit the transport of blast media, dust or mould then erect appropriate containment.

3. Provide adequate negative pressure ventilation during abrasive blasting. The ventilation must take into consideration the supply of air into the work area by the compressed air delivery of the abrasive media.

4. Continually monitor the workplace atmosphere for oxygen content and carbon dioxide when using dry-ice blasting methods.

Appendix C: Additional Hazards with Abrasive Blasting in Mould Abatement

Blast Media and Substrate Dust

5. Silica containing blast media should not be used wherever possible due to the high toxicity of fine silica dust. This is of particular importance in occupied buildings.

6. Ensure that adequate precautions are taken to control the hazards of the dust generated from the surfaces being impacted, which may include lead based and lead containing paints, silica containing substrate or asbestos containing materials.

Personal Protection

7. The minimum respiratory protection for all abrasive blasting activities shall be a full face piece air purifying respirator with P100 filters.

8. Wear supplied air respiratory protection for abrasive blasting with dry ice. Monitor carbon dioxide concentrations on an ongoing basis to determine the requirement for and adequacy of supplied air respiratory protection.

9. The addition of a worker decontamination shower should be considered, but is optional.

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Appendix D: Additional Procedures for Unsanitary Remediation

1. *Introduction and Scope*

- Buildings can be flooded with Unsanitary Water sources that contain micro-organisms that pose a risk of infection to occupants and abatement workers. Examples of Unsanitary Water include water originating from a sanitary sewer system, and flooding from over-land water or waterways. This appendix presents the precautions necessary for the cleaning of Unsanitary Water contamination.

- Further precautions will be required where there other hazards in addition to Unsanitary Water, such as mould growth, chemicals or asbestos.

- For further information on water damage restoration, refer to Standard and Reference Guide for Professional Water Damage Restoration, IICRC S500, Institute of Inspection Cleaning and Restoration Certification, 3rd Edition, 2006.

- Requirements of Section B (of this document) shall also apply, as applicable, for the remediation of unsanitary water. Section B provides general guidance related to protection of occupants, worker training and medical pre-screening, respiratory protection, personal protection and hygiene practices.

2. *Personal Protection*

All work with Unsanitary Water restoration requires the following personal protective equipment:

- CSA-approved construction-rated rubber boots.

- Water-resistant disposable coveralls, complete with elasticized hood, taped to gloves and boots.

- Rubber or nitrile work gloves, tape-sealed to the coveralls at the wrists and cuffs. Inspect before re-use. Wear puncture-resistant work gloves on top of the liquid-resistant gloves, where there is a risk of cuts or tears.

- Minimum of a half-face piece Respirator, fitted with a P100 cartridge filter. Odour protection can be provided with combination organic vapour and P100 cartridges.

- Chemical splash goggles, or a full-facepiece respirator fitted with P100 filters, or a Powered Air Purifying Respirator (PAPR) fitted with Type H filters.

3. *Isolation*

- Turn off HVAC systems where possible and seal over any openings immediately adjacent to the work area.

- Seal off the contaminated areas to prevent access by unauthorized persons. Consider polyethylene sheeting isolation to ceiling height if there a strong odour present or there will be significant demolition work. Negative pressure ventilation as specified for Level 2 Mould Abatement elsewhere in this guideline may be a useful additional precaution.

- Install signs warning of a Biological Hazard and restricting access to personnel with suitable protection.

4. Cleaning and Disinfection

- Generally, all porous materials impacted by Unsanitary Water cannot be de-contaminated and must be discarded. Dispose of all drywall, carpets, carpet tiles, soft furniture, etc.

- It might be possible to restore some porous contents impacted by Unsanitary Water (e.g., high-value carpets, clothing, documents) using specialized restoration services. Any decision to restore contaminated porous articles should be approved by the Competent Person. Post-disinfection testing with bacteria swab testing is recommended for these items.

- Package all waste contaminated with Unsanitary Water into sealed water-tight containers, typically a 6 mil polyethylene bag. Wipe the containers with the disinfectant solution. Alternately, wrap items with 6 mil polyethylene sheeting, seal with tape and wipe the exterior of the packaged waste with disinfectant.

- After removal of items and finishes to be discarded, clean all surfaces with a general-purpose cleanser prior to application of a disinfectant. All soiling must be removed before disinfection.

- Apply a Health Canada approved disinfectant to all surfaces impacted with Unsanitary Water. If the product is sold as a concentrate, mix according to the manufacturer's recommendations and use within the time given by the manufacturer. Observe the wet contact time specified in the Health Canada approval (typically 5 – 10 minutes), re-applying as necessary.

- If indicated by the manufacturer, rinse the disinfected surfaces with clean potable water.

- Ensure all mould-susceptible surfaces are dry within 24 hours. Ensure all other surfaces are adequately dry before the installation of mould-susceptible surfaces that could be impacted by excess trapped moisture.

5. Post-Disinfection Testing

- Collect surface samples to test for residual viable bacteria, by swabbing 100 square centimetre areas of typical disinfected surfaces or articles.

- Analyse the swab samples for *E. coli* and possibly other Unsanitary Water indicator bacteria.

- The standard of acceptance for *E. coli* on disinfected surfaces, is no detectable Colony Forming Units per 100 square centimetre area.

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Appendix E: Definitions

Term	Definition
Abatement	The process of returning a building or part thereof, from a condition of Biohazard, to background concentrations of biological agents and products, typical of buildings not affected by Mould contamination.
Biohazard	The presence of (a) biologically derived aerosols, gases, or vapours of a kind and concentration likely to cause disease or predispose persons to adverse health effects, or (b) indoor biological growth and remnants of growth that may become airborne and to which people may be exposed.
Canister or Cartridge	A container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.
Clearance Tests	Environmental tests (e.g., air samples, tape lifts, swabs) taken after Mould Abatement has been completed as a Quality Assurance measure.
Competent Person or Supervisor	A person who is qualified because of knowledge, training and experience to organize the performance of Mould Abatement, is familiar with Mould Abatement procedures, and has knowledge of the hazards of Mould and other dangers in the Abatement work area.
Contaminated Work	The portion of the Abatement project during which active disturbance, handling or cleanup of contaminated materials is occurring.
Cryptococcus neoformans	A pathogenic yeast growing in accumulated bird (usually pigeon) or bat Guano and posing a risk of cryptococcosis infections in heavily exposed or immuno-compromised individuals.
Disinfectant	Substance used to reduce the number of micro-organisms such as Moulds, bacteria or viruses to below the level necessary to cause infection. Some common Disinfectants, include sodium hypochlorite, quaternary ammonium compounds, and hydrogen peroxide.
DIN	Drug Identification Number. Registration number given by Health Canada for approval of disinfectants. Specifies the organisms against which the disinfectant is effective, and requirements for mixing, storage, application, and rinsing, if required.
Designated Substance	Hazardous materials (asbestos, lead, silica, mercury and others) designated by the Ontario Ministry of Labour for specific regulation under the Occupational Health and Safety Act. Property owners must notify contractors bidding on projects of the presence of Designated Substances. In addition to a regulation on asbestos, the Ontario Ministry of Labour has issued guidelines for the potential exposure from silica, lead, mercury and isocyanates on construction projects.
Dust Suppression	Measures taken to reduce the release of spores and other Mould-derived particulate matter during Mould Abatement.
Filtering Facepiece	Particulate-filtering Respirator where the facepiece is also the filter.
Fit-test	A qualitative or quantitative method to evaluate the fit of a specific make, model and size of Respirator on an individual.
Guano	Bird or bat dung, considered a risk for infection by Moulds or other micro-organisms.
HEPA Filtered Exhaust Fan	Portable exhaust fan in sealed cabinet equipped with HEPA filtration used to exhaust filtered air out of an enclosed Mould Abatement work area for the purpose of establishing and maintaining a Negative Pressure in the Mould Abatement work area with respect to surrounding areas, and also to provide general ventilation of the Abatement area.

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Appendix E: Definitions

Health and Safety Professional	An individual qualified by knowledge, skills, education, training and experience to perform assessments of Mould contamination, collect and interpret environmental tests, develop recommendations for Abatement work and provide inspection and Quality Assurance services.
HEPA	High Efficiency Particulate Air filter capable of trapping and retaining particles greater than or equal to 0.3 micrometers in diameter, at a minimum efficiency of 99.97%
Histoplasma capsulatum	A fungus frequently found growing in deposits of bird and bat Guano, and a risk for human infections during remediation work, renovation and demolition.
HVAC	Heating, ventilating and air conditioning (equipment).
Mould	Normally refers to fungi with filamentous growth form, often giving rise to "fuzzy", cottony, wooly or powdery textured colonies. Moulds produce spores that are poorly visible or not visible at all to the naked eye and that in many species are specialized to become airborne.
Microbial	Referring to any of Mould, bacteria, viruses or other micro-organisms.
MSDS	Material Safety Data Sheet, required by Workplace Hazardous Materials Information System (WHMIS) legislation, and giving information on hazardous materials, including properties, hazards, first-aid, emergency response, and personal protection.
N95	A Respirator particulate filter, 95% efficient at stopping a 0.3 micrometer aerosol, and not resistant to oil, a classification of particulate filters set by NIOSH.
Negative Pressure	A reduced pressure established within a Mould Abatement enclosure by extracting air directly from Abatement area, and discharging this air outside the work area. The discharged air must be HEPA filtered, the exhaust unit should be leak-checked and preferably the air is discharged outside the building.
NIOSH	National Institute for Occupational Safety and Health, part of the U.S. Centers for Disease Control and Prevention.
100 Series Filter	Any Respirator particulate filter, 99.97% efficient at stopping a 0.3 micrometer aerosol. A classification of particulate filters set by NIOSH.
Polyethylene Sheeting	Polyethylene Sheeting or rip-proof Polyethylene Sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required providing a continuous membrane to protect underlying surfaces from damage, and to prevent escape of airborne contamination through sheeting into occupied areas.
Porous	Permeable to Mould growth, allowing growth to extend significantly below the immediate surface.
Project Authority	Individual who has overall management responsibility for the project.
P100	A Respirator particulate filter, 99.97% efficient at stopping a 0.3 micrometer aerosol, and resistant to oil droplets, a classification of particulate filters set by NIOSH.
Quality Assurance	Measures of inspection, testing and documentation to promote confidence that the Abatement process will meet the desired goals.
Respirator	A device to protect the user from inhaling a hazardous atmosphere.
Susceptible Occupants	Persons with elevated risks of reacting to Mould exposure, usually due to allergic pre-disposition or compromised immune state. Examples include but are not limited to infants (less than 12 months old), persons recovering from recent surgery, or

Appendix E: Definitions

	people with immune suppression, asthma, severe allergies, sinusitis or other chronic inflammatory lung diseases.
Unsanitary Water	Water containing the known or presumed presence of harmful micro-organism such as *E. coli*, viruses or bacteria. Examples of Unsanitary Water include water originating from a sanitary sewer system, or flooding from over-land water or waterways.
Waste Decontamination Facility	A series of two rooms (Double-bagging and Transfer) constructed in such a way as to allow waste and equipment to enter and leave a Mould Abatement area without spreading contaminants beyond the Abatement area.
Worker Decontamination Facility	A series to two rooms (Clean and Dirty) constructed in such a way as to allow persons to enter and leave a Mould Abatement area without spreading the contaminants beyond the Abatement area.

NOTES

Appendix ‘F’

University of Guelph Commissioning - IT

Table of Contents

REVISION HISTORY

Version	Date	Author	Description of Revision
1.0	September 6, 2018	Audley Lloyd	Initial Release for Comment

1.0 Scope

1.0 This commissioning guide prescribes the inspection and test procedures. These procedures will help to verify and inspect that the Access Control, Video Surveillance, Intrusion and Duress System has been installed and meets all expectations. These installations will be in conformance with the projects scope of work, specifications, the project design, and the drawings.

1.1 The inspections and testing in this commissioning guide shall be documented for the commissioning and acceptance of all systems.

1.2 This guide contains commissioning forms for Building #046 Renovations, Guelph, Ontario.

1.3 The contractor shall verify successful operations of all components of the Surveillance Cameras system, Access Control system, Intrusion system and Duress alarm system.

2.0 Commissioning Standards

This guide prescribes specific examinations to confirm the compliance to the latest edition of applicable codes and standards including the following references:

2.1 ANSI/TIA/EIA - 758 Customer-owned Outside Plant Telecommunications Infrastructure Standard;

2.2 ANSI/TIA/EIA - 569 Commercial Building Standard for Telecommunications Pathways and Spaces;

2.3 ANSI/TIA/EIA -568 Commercial Building Telecommunications Standard;

2.4 ANSI/TIA/EIA – 607 Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications;

2.5 BICSI Telecommunications Distribution Design Manual; per the systems manufacturer's specifications, installation and warranty requirements.

2.6 National Electrical Code. National Electrical Safety Code and other related NFPA Codes and Standards.

2.7 Manufacturer's instructions.

3.0 Commissioning Guide – Contacts Required

a. Project Lead Representative:

b. Contractor Representative:
c. Client Representative:

4.0 Commissioning Guide – References Required

a. Project Scope
b. Tender Drawings
c. Tender Specification
d. Shop Drawings as submitted to
e. Equipment/Software Installation Manuals
f. Equipment/Software Operations Manuals
g. IP Device Tracking Log
h. Video Surveillance Commissioning
i. Access Control Commissioning
j. Intrusion Detection Commissioning
k. Duress System Commissioning
l. Video Surveillance System Verification Checklist (Provided)
m. Access Control System Verification Checklist (Provided)
n. Intrusion System Verification Checklist (Provided)
o. Duress System Verification (Provided)

4.1 Commissioning Guide – Checklist Completion

The Checklists will be distributed in electronic form, and the final version must be filled in electronically to ensure complete legibility. Once fully completed and all parties are satisfied, please forward a copy to all parties. Please print two (2) copies of the completed form to be signed off by all parties. One of the printed and signed copies is to be retained by the lead contractor, and the second will go the time client at system turnover.

5.0 Physical Security System Component Abbreviations

Device	Description
NVR	Network Video Recorder

REX	Request to Exit Sensor
CM	IP Camera
ES	Electric Strike
DC	Door Contact
ESSC	Electronic Safety and Security Cabinet
PB	Handicap Push Button
ED	Electronic Deadbolt
CTR	Door Controller
OVR	Mantrap door Override
IPTV	IP Monitor
PR	Passive Infrared
ML	Magnetic Lock
KB	Keybox
CR	Proximity Card Reader
CRK	Proximity Card Reader with PIN Keypad

6.0 Video Surveillance System

6.1 Installation Quality Inspection

The following are items to be inspected to verify they have been completed in accordance with the design specifications:

- Electrical and communications cables have been appropriately sized and selected to ensure that they will support currently installed and future equipment
- Cabling has been run in conduit, cable tray, raceway, above ceiling, below raised floors, in wall cavities or risers as detailed design documentation
- Conduit and cable trays have been effectively secured to ensure that they can support currently installed and future cabling;
- Connections have been correctly terminated and insulated to ensure satisfactory connectivity and protection against faults and interference;
- All IP cameras have been installed at the locations specified in the design documentation;
- Cameras of the specified type (e.g. colour, black and white, fixed, pan tilt zoom; multi-sensor, panoramic, thermal, etc.) have been installed
- Cameras have been correctly secured to protect against operational damage and ensure stability for continuous use;
- External cameras have been provided with adequate protection against moisture and other environmental conditions, through the use of Liquid tight conduit and connectors, proper installation of mounting hardware, gaskets, drip loops and Nema 4X, IP66 or IP67 backboxes

- Operator workstation CPU, LCD screen and peripheral devices have been installed at the specified location. Interconnecting cables have been protected from mechanical damage and have been permanently connected
- Associated equipment such as power supplies and switches have been connected correctly and secured appropriately.

6.2 Software Installation Inspection

The following are items to be inspected to verify the application software has been installed and configured on the video surveillance computing equipment.

- All software modules specified in the design documentation or the modules required to perform all specified operation functions have been installed and configured to meet system requirements
- The latest release version of all software modules including patches and upgrades have been provided
- Ensure that all IP cameras are running the latest firmware that is compatible with the Video Management Software (VMS), and any analytics packages that will be deployed as part of the install
- The control equipment hardware has sufficient capacity to support the software routines and functions under worst case demand conditions
- All cameras, system reports, GUI maps, screens and menus have been correctly configured
- Software has been registered to client.

6.3 Use Case Functional Test

The following tests shall be performed for each camera:

- Verify that the camera produces a clear picture with the specified resolution
- Verify that cameras having wide dynamic range are installed where specified, and the feature is enabled to allow the camera to capture the desired shot
- Verify that the camera maintains a clear picture and automatically compensates for changing light conditions including day/night change
- Verify that cameras provide complete and correct coverage of the area specified
- Verify that areas of the camera view may be masked to prevent unwanted alarm activation
- Verify that the camera anti-tampering feature has been enabled
- Simulate a tamper alarm and verify that the correct signal is transmitted to the operator workstation

- Simulate a video feed fault and verify that the correct signal is transmitted to the operator workstation
- Verify manually recording; very recording can be played, stopped, paused, rewinded, fast forwarded, advance frame by frame
- Verify that historical data reports may be generated in real-time
- Verify that real time video data analysis functions (record on motion, line cross detection recording, third party analytics, etc.) are performed in real time and the corresponding view displayed on the monitor
- Verify the video surveillance system interfaces with all additional security sub-systems so as intrusion detection, access control system, intercom system, Key Control management systems, etc., to display the correct camera view on the monitor when the corresponding signal is received.

7.0 Access Control System

7.1 Installation Quality Inspection

For all newly installed devices, the following are items to be inspected and verified for all doors, prior to completing the commission test, a visual inspection shall be completed. The inspection shall include:

- Electrical and communications cables have been appropriately sized and selected to ensure that they will support currently installed and future equipment
- Cabling has been run in conduit, cable tray, raceway, above ceiling, below raised floors, in wall cavities or risers as detailed design documentation
- Conduit and cable trays have been effectively secured to ensure that they can support currently installed and future cabling;
- Connections have been correctly terminated and insulated to ensure satisfactory connectivity and protection against faults and interference;
- Confirm reader is level, mounted securely and there are no visual gaps
- Confirm the Door position contact is installed securely in door frame, hole was not over drilled and there is no movement.
- For surface mount contacts, no large gaps and installed on the secure side of door.
- If present, weather stripping should not impede the contact
- Request to Exit device installed on security side of door
- Door Lever function matches door configuration, to provide security and code compliant egress
- Door closes securely with no rubbing or binding
- Readers have all screw caps installed
- ACU ID clearly visible on can

- Verify wiring is labeled… at ACU end labeled with end point device and door number/location identified; at devices location, the ACU the device is wired to, as well the end point device it feeds.

7.2 Software Installation Inspection

The following are items to be inspected to verify the application software has been installed and configured on the computing equipment.

- All software modules specified in the design documentation or the modules required to perform all specified operation functions have been installed and configured to meet system requirements.
- The latest release version of all software modules including patches and upgrades have been provided
- The control equipment hardware has sufficient capacity to support the software routines and functions under worst case demand conditions
- Software has been registered to client.

7.3 Use Case Tests

The use case tests are to certify that the doors functions as intended. The following tests as determined by door type will be performed on each door:

- Access Granted
- Door Held Test
- Door Forced Open
- Auto Operator
- Valid Egress

7.4 Doors with Magnetic Lock and Fire Alarm Interface

When a door(s) contains a magnetic lock, a fire alarm interface is required, thus it will need to be tested for functionality during the ULC verification process. A copy of the fire alarm verification is required before sign off of this door series type. The contractor to ensure proper testing is completed.

7.5 Power Loss Test

The test validation criteria is to ensure that the door functions as intended during an A/C power failure and a complete power failure. An A/C power failure must be simulated by disconnect the UPS feeding a POE powered ACU from A/C power, or power supply feeding the ACU from A/C power, and power supply feeding the door locks from A/C. For total power failures simulations POE power ACU must be disconnected from the POE switch; ACU and strikes feed by a standard power supply is disconnect from A/C and the backup battery is disconnected.

- During A/C power fail simulation, test that valid card presented during a power failure situation within the facility will allow access to be granted/denied/reported as tested above.
- During a total power failure, confirm that door fails in intended state. Doors with strike that are intended to fail secure, fail secure while still allowing code compliant egress. Magnetic lock doors must fail safe to meet code compliant egress.

7.6 Elevator Commissioning

The test validation criteria is to ensure that access to control floors is available to authorized card holders only, and elevator movement is tracked.

- Access granted only to floor credential authorized for
- Access denied to unauthorized floors
- Elevator Tracked

8.0 Intrusion Detection Commissioning

8.1 Installation Quality Inspection

The following items are to be inspected and verified that they have been completed in accordance with the design specifications:

- Electrical and communications cables have been appropriately sized and selected to ensure that they will support currently installed equipment and as per the manufacturer's recommendations and the University standards.
- Cabling has been run in conduit, cable tray, raceway, above ceiling, below raised floors, in wall cavities or risers as detailed design documentation

- Conduit and cable trays have been effectively secured to ensure that they can support currently installed and future cabling;
- Connections have been correctly terminated and insulated to ensure satisfactory connectivity and protection against faults and interference;
- All sensors have been installed at the locations specified in the design documentation;
- Sensors of the specified type (e.g. PIR, contact, sounder, photoelectric detector, glassbreak detector, shock sensors) have been installed at the locations specified in the design documentation
- Sensors have been correctly secured to protect against operational damage and ensure stability for continuous use
- Associated power supplies have been installed, connect to A/C and have backup batteries installed.
- Backup batteries have been labeled with an in-service date

8.2 Use Case Functional Test

The following tests shall be performed for each endpoint sensor as identified, as part of an intrusion walk test when the system is armed:

- Verify PIR sensor is detecting movement and reporting alarm condition
- Verify door contact sensor is detecting when the distance between the magnet and the reed switch is outside the manufacturer's specked distance. Confirm reporting alarm conditions when armed. Confirm all 24-hour doors go into alarm, while the overall intrusion detection system is disarmed. Confirm entry/exit delay on all designated entry doors
- Verify Glassbreak sensor is detecting a glass break and reporting alarm condition. All glassbreak test must be performed using the glassbreak manufacturer's glassbreak test kit
- Verify shock sensor is detecting vibration and reporting alarm conditions
- Verify sounder/speaker fires on alarm and reporting of alarm condition takes place
- Verify all non-24-hour end points, can armed and disarmed
- Simulate a wire cut by disconnect the circuitry to end point devices to simulate trouble conditions, and that the trouble condition is being reported correctly.
- Simulate an A/C failure and verify the trouble is reported correctly. Also, verify that the alarm system functions as intended both in an armed and disarmed state
- Ensure that each alarm condition tested, is capture and reported to a third-party and/or in-house monitoring station, via the primary communication method.

9.0 Duress Alarm Commissioning

9.1 Installation Quality Inspection

The following items are to be inspected and verified that they have been completed in accordance with the design specifications:

- Electrical and communications cables have been appropriately sized and selected to ensure that they will support currently installed equipment and as per the manufacturer's recommendations and the University standards.
- Cabling has been run in conduit, cable tray, raceway, above ceiling, below raised floors, in wall cavities or risers as detailed design documentation
- Conduit and cable trays have been effectively secured to ensure that they can support currently installed and future cabling;
- Connections have been correctly terminated and insulated to ensure satisfactory connectivity and protection against faults and interference;
- Panic buttons have been installed at the locations specified in the design documentation
- Panic buttons have been correctly secured to protect against operational damage and ensure stability for continuous use
- Annunciator consoles and/or workstation monitor have been installed at the locations specified in the design documentation
- Associated power supplies have been installed, connect to A/C and have backup batteries installed.
- Backup batteries have been labeled with an in-service date

9.2 Use Case Functional Test

The following tests shall be performed for each endpoint panic button as identified, as part of duress alarm walk test when the system:

- Verify panic button activation is reporting alarm condition
- Verify on panic button activation that the light outside the interview room is illuminated.
- Verify the alarm condition is being reported to the Annunciator console and/or workstation monitor, that a room location is being reported, and the room location is accurate.
- Verify that the alarm condition is being reported to campus police via Onyxworks

- Verify the alarm condition remains present on the Annunciator console and /or workstation, and the light outside the interview room door stays illuminated until the system is reset
- Simulate a wire cut by disconnect the circuitry to panic buttons to simulate trouble conditions, and that the trouble condition is being reported correctly.
- Simulate an A/C failure and verify the trouble is reported correctly.

10.0 Worksheets

- The worksheets that follow are to be reproduced on Tabloid (11” x 17”) sheets prior to the commencement of all inspections and testing.
- Results will be recorded in the worksheets and the worksheets will be reviewed and approved by the project lead prior to system acceptance.

Video Surveillance System Commissioning Worksheet

						Equipment Type								Commissioning Testing								Sign-off	
NO.	Termination Room	End Point Location	Name	Power Source	Indoor / Outdoor	Sinle Sensor	Multi-Sensor	Panoramic	PTZ	Thermal	People Counting	HARDWARE NOTES	SECURITY NOTES	Aimed	Focused	Blocking	Motion Recording	Tamper Detection	Access Control Sync	Intrusion Detection Sync	NOTES	Client Initials	Contractor Initials

Contractor Signature:

Contractor Signature:

Access Control Commissioning Worksheet

ROOM				ELECTRIC DOOR EQUIPMENT							ALIGMENT			Commissioning Testing							Sign-off	
NO.	NAME	Termination Room	Address	NO.	TYPE	DSS	RTE	LOCK	LBM	DPC	Latch/strike	HARDWARE NOTES	SECURITY NOTES	All Points Visible	Card Authorized	Card Denied	REX - Strike Release	Door Forced	Door Held	NOTES	Client Initials	Contractor Initials
Contractor Signature:																						
Contractor Signature:																						

Intrusion Detection Commissioning Worksheet

				Equipment Type									HARDWARE NOTES	SECURITY NOTES	Commissioning Testing							NOTES	Sign-off	
NO.	Termination Room	End Point Room	Zone Address	Door Contact	PIR	Glass Break	Shock Sensor	Photo-electric	Optex Laser	Fence Detect	Sounder	Smoke			24 HR	Arm	Disarm	In-Alarm	Trouble	In-Alarm to 3rd Party Primary	In-Alarm to 3rd Party		Client Initials	Contractor Initials
Contractor Signature:																								
Contractor Signature:																								

Duress Alarm Commissioning Worksheet												
ROOM			Commissioning Testing							NOTES	Sign-off	
NO.	NAME	Termination Room	Button Activation	Light Activation	Annunciator display	On your cells Notification	Alert Until Reset	Wire cut Trouble	AC Fail		Client Initials	Contractor Initials
Contractor Signature:												
Contractor Signature:												

Access Control Commissioning Worksheet

ROOM				ELECTRIC DOOR EQUIPMENT							ALIGMENT	HARDWARE NOTES	SECURITY NOTES	Commissioning Testing						NOTES	Sign-off	
NO.	NAME	Termination Room	Address	NO.	TYPE	DSS	RTE	LOCK	LBM	DPC	Latch/strike			All Points Visable	Card Authorized	Card Denied	REX - Strike Release	Door Forced	Door Held		Client Initials	Contractor Initials

Contractor Signature: ____________________

Client Signature: ____________________

Duress Alarm Commissioning Worksheet

ROOM			Commissioning Testing							NOTES	Sign-off	
NO.	NAME	Termination Room	Button Activation	Light Activation	Annunciator display	Onyxworks Notification	Alert Until Reset	Wire cut Trouble	AC Fail		Client Initials	Contractor Initials
Contractor Signature:												
Contractor Signature:												

Intrusion Detection Commissioning Worksheet

				Equipment Type											Commissioning Testing								Sign-off	
NO.	Termination Room	End Point Room	Zone Address	Door Contact	PIR	Glass Break	Shock Sensor	Photo-electric	Optex Laser	Fence Detect	Sounder	Smoke	HARDWARE NOTES	SECURITY NOTES	24 HR	Arm	Disarm	In-Alarm	Trouble	In-Alarm to 3rd Party Primary	In-Alarm to 3rd Party	NOTES	Client Initials	Contractor Initials

Contractor Signature:

Client Signature:

Video Surveillance System Commissioning Worksheet

						Equipment Type								Commissioning Testing								Sign-off	
NO.	Termination Room	End Point Location	Name	Power Source	Indoor / Outdoor	Sinle Sensor	Multi-Sensor	Panoramic	PTZ	Thermal	People Counting	HARDWARE NOTES	SECURITY NOTES	Aimed	Focused	Blocking	Motion Recording	Tamper Detection	Access Control Sync	Intrusion Detection Sync	NOTES	Client Initials	Contractor Initials

Contractor Signature:

Client Signature:

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