Specifications for:

MUNICIPAL CHILD CARE CENTRE KITCHEN RENOVATION

at

376 CAMBRIDGE ST. GODERICH, ONTARIO N7A 2Z1

Prepared for:
The Corporation of the Town of Goderich
57 West Street,
Goderich, Ontario
N7A 2K5

Prepared by:
JPM Architecture Inc.
51 Kingston Street
Goderich, Ontario
N7A 3K3

Chorley + Bisset Consulting Engineers
201 Queens Ave, Unit 800
London, Ontario
N6A 1J1

Project No. 2316.00

Bid Issue Date: 04-August-2026

SECTION 00001 - TABLE OF CONTENTS

Section	Title	No. of Pages
00001	Table of Contents	1 thru 3
00002	Stipulated Price Bid Form Appendix: “C” - Domestic Supply Chain Plan (DSCP)	1 and 2 1 and 2
00005	List of Drawings	1 only
00100	Instructions to Bidders Appendix: "ITB 1" Voluntary Alternative Checklist	1 thru 7 1 only
00600	Security Deposit	1 only
00700	Agreement, Definitions and General Conditions "AGREEMENT BETWEEN OWNER AND CONTRACTOR" "DEFINITIONS" AND "THE GENERAL CONDITIONS OF THE STIPULATED PRICE CONTRACT", STANDARD CONSTRUCTION DOCUMENT CCDC2-2008	1 only Not Enclosed
00810	Supplementary Conditions Appendix: “CCDC 41"	1 thru 10 1 only
00900	Addenda & Modifications	1 only
01110	Summary of Work	1 and 2
01140	Work Restrictions	1 and 2
01210	Allowances	1 and 2
01250	Substitution Procedures	1 and 2
01260	Contract Modification Procedures	1 thru 4
01290	Payment Procedures Appendix: Statutory Declaration	1 thru 4 1 only
01311	Project Meetings	1 and 2
01320	Construction Progress Documentation	1 and 2
01330	Submittal Procedures	1 and 2
01400	Quality Requirements	1 and 2
01510	Temporary Utilities	1 only

Section	Title	No. of Pages
01520	Construction Facilities	1 only
01545	Safety Guidelines & Protections	1 and 2
	Appendix: Registration of Constructors and Employers Engaged in Construction	1 only
01560	Temporary Barriers and Enclosures	1 and 2
01610	Common Product Requirements	1 only
01730	Execution	1 thru 3
01732	Cutting and Patching	1 only
01740	Cleaning and Waste Management	1 and 2
01770	Closeout Procedures	1 thru 3
01780	Closeout Submittals	1 and 2
02050	Demolition & Removal	1 thru 4
03200	Concrete Reinforcement	1 and 2
03310	Cast-in-Place Concrete (Modified)	1 only
06100	Rough Carpentry	1 and 2
06200	Finish Carpentry	1 thru 3
07121	Moisture Control System & Underlayment	1 and 2
	Appendix: Ardex Product Data	1 thru 15
07213	Insulation	1 only
07536	Modified Bitumen Sheet Roofing	1 thru 5
09100	Metal Support Systems	1 only
09250	Gypsum Board	1 and 2
09511	Acoustic Lay-in Ceilings	1 and 2
09663	Slip-Resistant Safety Flooring	1 thru 5
09772	Fibreglass Reinforced Plastic Panels	1 thru 3
09900	Painting	1 thru 6

Section	Title	No. of Pages
15001	Mechanical General Provisions	1 thru 26
15200	Testing and Balancing	1 thru 6
15260	Insulation	1 thru 8
15300	Fire Protection	1 only
15400	Plumbing	1 thru 9
15410	Plumbing Fixtures	1 thru 3
15800	Air Distribution	1 thru 14
16001	Electrical General Provisions	1 thru 20
16100	Basic Materials and Methods	1 thru 8
16155	Motors, Starters and Wiring	1 thru 4
16400	Service And Distribution	1 thru 4
16400	Appendix - Panel Schedules	1 only
16500	Lighting	1 thru 3
16550	Lighting Control Systems	1 thru 4
16721	Fire Alarm System	1 thru 5
16722	Integrated Systems Testing	1 and 2

Information Documents:
The following information document(s) is (are) issued with these Specifications for information only. Be responsible for properly assessing the information contained, which has affect on the Work of the Contract.

2025 Asbestos Reassessment Survey Report
Goderich Municipal Childcare Centre
376 Cambridge Street, Goderich, Ontario
produced by WSP Canada Inc., dated September 5, 2025 . . . . . 50 pages

- END OF SECTION -

SECTION 00002 - STIPULATED PRICE BID FORM

MUNICIPAL CHILD
CARE CENTRE
KITCHEN RENOVATION
376 Cambridge St., Goderich, Ontario N7A 2Z1

Submitted To: **The Corporation of the Town of Goderich**
57 West Street, Goderich, Ontario N7A 2K5
Attn: Andrea Fisher, Director of Legislative Services/Clerk

Bidder
Legal Name: _____

Address: _____

_____
City Province Postal Code

Bid Price
Having examined the Bid Documents, as listed herein, and Addenda No. ____ to No. ____, inclusive, all as issued by the Consultant and having visited the Place of the Work, we hereby offer to enter into a Contract to perform the Work required by the Bid Documents for the stipulated price of

$ _____ in Canadian funds. This price excludes Value Added Taxes (HST).
amount in figures

Declarations
We hereby declare that:
(a) we agree to perform the Work in compliance with the following schedule:
- Award of Contract . . . . . September 08, 2026 .
- Mobilize on Site . . . . . September 15, 2026 .
- Attain Substantial Performance of Work on or before . . . . . December 15, 2026
- Completion of the Work, on or before . . . . . December 31, 2026 .

(b) no person, firm or corporation other than the undersigned has any interest in this Bid or in the proposed Contract for which this Bid is made;
(c) this Bid is open to acceptance for a period of 30 days from the date of bid closing;
(d) the information provided in the attached Appendices form an integral part of this Bid.

Enclosures
This Bid includes the following enclosures:
(a) Bid Surety in accordance with Section 00100 - Instructions to Bidders.
(b) Letter from Bidders financial institution that the Security Deposit will be fulfilled should the Contract be awarded to the Bidder, or Agreement to Bond, in accordance with Section 00600 - Security Deposit
(c) Appendices to Bid Form.

List of Bid Documents
The following is a list or description of the Bid Documents referred to in the Bid, for the above named Project:
(a) Specifications in accordance with Table of Contents Section 00001.
(b) Drawings in accordance with List of Drawings Section 00005.
(c) Addenda

Signatures

SIGNED AND SUBMITTED for and on behalf of:

_____ **Affix Corporate Seal**
company name

_____
name and title of authorized signing officer

_____
signature of authorized signing officer

_____
name of witness

_____
signature of witness

_____
name and title of authorized signing officer

_____
signature of authorized signing officer

_____
name of witness

_____
signature of witness

Date: _____ , 2026

- END OF SECTION -

APPENDIX 'C' - DOMESTIC SUPPLY CHAIN PLAN (DSCP)

MUNICIPAL CHILD CARE CENTRE KITCHEN RENOVATION
375 Cambridge St., Goderich, Ontario N7A 2Z1

The Domestic Supply Chain Plan (DSCP) is required to be completed and submitted as part of the Bid Form in accordance with the Municipal Buy Ontario Procurement Directive. Capitalized terms used in this DSCP have the meanings given to them in the Definitions section of Section 00100 - Instructions to Bidders.

The Owner has identified the Major Goods and Services required for the deliverables being produced in Tables 1 and 2 below. Bidders are required to complete the blue cells in Tables 1 and 2 for each listed Major Good and Service including good and services supplied by subcontractors.

All values must be submitted in dollar values excluding HST. Where not applicable, enter (0). The totals and percentages will calculate automatically.

As a mandatory eligibility requirement, Bidders must commit in this DSCP to meeting or exceeding a minimum of 51% Ontario or Canadian-Made Goods and Services as a proportion of the Bid Price. This is a mandatory eligibility requirement and is not scored. Bids that do not meet this mandatory threshold will not be eligible to proceed.

Table 1 - Major Goods

Item Description	**Value of Ontario Made Goods**	**Value of Canadian-Made Goods (excluding Ontario)**	**Total of Ontario and Canadian-Made Goods per Item**
Division 1: General Requirements	$ -	$ -	$ -
Division 2: Site Construction	$ -	$ -	$ -
Division 3: Concrete	$ -	$ -	$ -
Division 4: Masonry	$ -	$ -	$ -
Division 5: Metals	$ -	$ -	$ -
Division 6: Wood and Plastics	$ -	$ -	$ -
Division 7: Thermal and Moisture Protection	$ -	$ -	$ -
Division 8: Doors and Windows	$ -	$ -	$ -
Division 9: Finishes	$ -	$ -	$ -
Division 10: Specialties	$ -	$ -	$ -
Division 11: Equipment	$ 25,789.00	$ 80,718.41	$ 106,507.41
Division 12: Furnishings	$ -	$ -	$ -
Division 14: Conveying Systems	$ -	$ -	$ -
Division 15: Mechanical	$ -	$ -	$ -
Division 16: Electrical	$ -	$ -	$ -
Total of Ontario and Canadian-Made Goods			$ 106,507.41

Table 2 - Services

	Value of Ontario Services	**Value of Canadian Services (excluding Ontario)**	**Total of Ontario and Canadian Services**
Divisions 1 through 16 (excluding Division 11)	$ -	$ -	$ -
Division 11: Equipment	$ 4,895.00	$ -	$ 4,895.00

Total Value of Ontario and Canadian Goods and Services	$ 111,402.41

Bid Price, excluding HST, entered on Bid Form	$ -

Percentage of Ontario and Canadian Goods and Services in Submitted Price excl. HST. (Percentage must meet or exceed a minimum of 51% Ontario or Canadian-Made Goods and Services.	#DIV/0!

Attestation

By signing below, the Bidder hereby attests that the information provided in the Domestic Supply Chain Plan is accurate and complete as of date of submission. The Bidder acknowledges that the Owner may rely on this DSCP as evidence of the origin of goods and services for the purpose of the Municipal Buy Ontario Procurement Directive. Any misrepresentation by the Bidder regarding the origin of goods or services may be addressed through contract management, in accordance with the terms of the Bid Document and any resulting contract and may be a result in disqualification or termination of the Contract.

The Bidder further commits that the proportion of Ontario or Canadian-Made Goods and Services identified in this DSCP meets or exceeds the mandatory minimum threshold of 51% of the Bid Price and acknowledges that this commitment constitutes a mandatory eligibility requirement and establishes a binding contractual obligation. The Bidder acknowledges that this commitment will be incorporated into any resulting contract.

Legal Name of Bidder	Name and Title of Authorized Person(s)
Signature of Authorized Person(s)	Date Signed

SECTION 00005 - LIST OF DRAWINGS

1.0 DRAWINGS

The Drawings upon which the Bid and Contract are to be based include the following:

Drawing No.	Title	Date
A1.0	Site Plan, Legends and Code Matrix	04-Aug-2026
A1.1	Partial Plans	04-Aug-2026
A1.2	Roof Plan, Section and Details	04-Aug-2026
M1.1	Mechanical Legend, Drawing List, Schedules	04-Aug-2026
M1.2	Overall Floor Plan - Mechanical	04-Aug-2026
M1.3	Part Floor Plans - Mechanical Demolition	04-Aug-2026
M2.1	Part Floor Plans - Mechanical	04-Aug-2026
M2.2	Part Roof Plan and Details - Mechanical	04-Aug-2026
M2.3	Mechanical Details	04-Aug-2026
E1.1	Electrical Legend, Drawing List, Abbreviations, Etc.	04-Aug-2026
E1.2	Overall Floor Plan - Electrical	04-Aug-2026
E2.1	Partial Floor Plans - Electrical	04-Aug-2026
E3.1	Electrical Details	04-Aug-2026

2.0 INFORMATION DRAWINGS

The following drawings are issued with the Bid/Contract Drawings for reference only. Be responsible for properly assessing the information, contained in these drawings, which affects the Work of the Contract.

Drawing No.	Title	Date
K1.01	Equipment Plan	16-Apr-2026

- END OF SECTION -

SECTION 00100 - INSTRUCTIONS TO BIDDERS

PART 1 - INVITATION

1.1 Bid Call

.1 Bids for the provision of labour, products and services necessary for the performance of the Work, signed under seal, executed and dated, will be received electronically, via email, specified in Section 4.2 - Submissions.

until Bid Closing at 12:00:00 PM Local Time, Tuesday, August 18, 2026.

.2 Bid submissions shall be submitted in two (2) separate parts, identified as follows:

.1 Part 1 – "Bidder's Name – CCDC 11 – Contractor's Qualification Statement"

.2 Part 2 – "Bidder's Name – Bid Form and Appendices"

.3 Part 1 submissions shall be evaluated prior to the opening of Part 2 submissions.

.4 Only Bidders achieving a minimum score of 80 points out of 100 on the evaluation of the CCDC 11 – Contractor's Qualification Statement shall be deemed qualified. Only the Part 2 submissions of qualified Bidders will be opened and evaluated.

.5 The evaluation of the CCDC 11 – Contractor's Qualification Statement shall be based on the following criteria:

Scoring Chart		
No.	Evaluation Criteria	Points
1	Demonstrated experience on projects of similar size, scope, and complexity.	25 pts.
2	Corporate experience and stability, including a minimum of ten (10) years in business under the current legal entity.	25 pts.
3	Client references from comparable projects completed within the past five (5) years.	25 pts.
4	Qualifications and experience of the proposed Site Superintendent, including experience on projects of similar size and complexity.	25 pts.
	Total . . .	100 pts.

.3 Submissions not received by or before the exact time stated above will not be accepted by the Owner/Consultant.

.4 The Owner/Consultant will privately commence with the Bid evaluations immediately following Bid close. Once evaluations and scoring is completed, the successful Bids will be posted on Town of Goderich Bids & Tenders file sharing site.

.5 Bid Documents, including Drawings and Specifications, will be on display at the Consultant's Office.

.6 Bid Documents will be available to all interested parties.

1.2 Definitions

.1 Canadian-Made Good: means a good that meets any one of the following criteria:

.1 it is wholly manufactured or originating in Canada;

.2 at least 51% of the total direct costs of producing or manufacturing the good have been incurred in Canada; or

.3 it is labelled as "Made in Canada" or "Product of Canada."

.2 Canadian Service: means a service wholly provided by individuals (natural persons) located in Canada.

.3 Directive: means the Municipal Buy Ontario Procurement Directive issued under the Buy Ontario Act (Public Sector Procurement), 2025, effective April 13, 2026, and any amendments thereto, or, where the Owner is a designated broader public sector organization within the meaning of the Broader Public Sector Accountability Act, 2010, the Buy Ontario Procurement Directive issued under the Buy Ontario Act (Public Sector Procurement), 2025, effective April 13, 2026, and any amendments thereto.

.4 Domestic Supply Chain Plan or DSCP means the plan required to be submitted by each Bidder as part of its Bid Form identifying, at a minimum, the source of each Major Good and each service required for the deliverables being procured, including the value of each Major Good and service, whether each Major Good is an Ontario-Made Good or Canadian-Made Good, whether each service is an Ontario Service or Canadian Service, the total dollar value of Ontario-Made Goods and Ontario Services, Canadian-Made Goods and Canadian Services, and other goods and services, and the total dollar value of the DSCP.

.5 Major Goods: means durable materials, systems or components that are essential to ensuring the operational readiness or performance of the deliverable, and include:

.1 structural materials (concrete, steel and other metals, lumber, stone, aggregates);

.2 building envelope components (windows, glass, roofing systems, bricks);

.3 mechanical and electrical systems (HVAC units, generators, elevators);

.4 specialty items (prefabricated panels, major fixtures);

.5 fixtures, furniture and equipment;

.6 transit fleet vehicles.

.6 Ontario-Made Good: means a good that meets any one of the following criteria:

.1 it is wholly manufactured or originating in Ontario; or

.2 at least 51% of the total direct costs of producing or manufacturing the good have been incurred in Ontario.

.7 Ontario Service: means a service wholly provided by individuals (natural persons) located in Ontario.

1.3 Domestic Supply Chain Plan

.1 This Bid is subject to the Municipal Buy Ontario Directive and this is a capital infrastructure project.

.2 As a mandatory requirement of the Bid, the Bidder shall submit a completed Domestic Supply Chain Plan (DSCP) with the Bid Form. The DSCP shall identify the Major Goods and Services required for the Work. Failure to submit a completed DSCP with the Bid Form will result in the Bid being declared non-compliant and rejected.

.3 The Domestic Supply Chain Plan commitment approach applies to this Bid. The Bidder shall certify that the proportion of Ontario- or Canadian-made Goods and Services identified in its completed DSCP meets or exceeds the mandatory minimum threshold of 51% of the total established procurement value. The Bidder further acknowledges that this commitment is a mandatory condition of Bid eligibility and, if awarded the Contract, shall constitute a binding contractual obligation.

.4 The Bidder shall attest that the information contained in the submitted DSCP is complete, accurate, and true to the best of its knowledge at the time of Bid submission.

1.4 Intent: The intent of this bid call is to obtain an offer to perform the Work of

MUNICIPAL CHILD CARE CENTRE KITCHEN RENOVATION
375 Cambridge St., Goderich, Ontario N7A 2Z1

on the basis of a Stipulated Lump Sum Price, in accordance with the Contract Documents.

.1 The Bid Price, stated by the Bidder in the Stipulated Price Bid Form - Section 00002, shall be for the performance of the Work in accordance with the specified sequence and scheduled completion dates, and recognizing the location of the Place of the Work and existing conditions.
.2 Time requirements, stated in the Contract Documents, are of the essence to the Contract. The intent, at this time, is to award the Contract on or before Tuesday, September 10, 2026.

1.5 Bid Documents Identification
.1 The Bid Documents are identified as

MUNICIPAL CHILD CARE CENTRE KITCHEN RENOVATION
375 Cambridge St., Goderich, Ontario N7A 2Z1

Project No.: 2316.00

as issued by the Consultant and are listed in the Stipulated Price Bid Form.

PART 2 - BID DOCUMENTS

2.1 Definitions
.1 Contract Documents: defined in CCDC2-2020 Definitions, which are included in the Agreement between Owner and Contractor and in the General Conditions of the Stipulated Price Contract.
.2 Bid Documents: as identified in the Stipulated Price Bid Form.
.3 Bid: act of submitting an offer under seal.
.4 Owner:
The Corporation of the Town of Goderich
57 West Street,
Goderich, Ontario N7A 2K5
.5 Consultant:
JPM Architecture Inc.
51 Kingston Street
Goderich, Ontario N7A 3K3
.6 Bidder: All interested General Contractors.
.7 Addenda: any written orders, directives or instructions, of Owner or Consultant, relating to the Work and issued by the Consultant prior to execution of Contract.

2.2 Availability
.1 Only Digital copies of the Drawings and Specifications are available. It is the Bidders responsibility, at their own expense, to print the Bid Documents for bidding purposes.
.2 Bidders will have user name and password access to Bid Documents via Town of Goderich Bids & Tenders file sharing site. It is the Bidder's responsibility to access the file sharing site and ensure that all required documents are downloaded, and to monitor the file sharing site for addenda.
.3 After submission of Bid, Bidders shall shred and recycle paper Bid Documents and delete electronic versions of the documents in their possession. Do not return Bid Documents to the Consultant.

2.3 Examination
.1 Upon receipt of Bid Documents, each Bidder shall verify that the documents are complete. Notify Consultant should the documents be incomplete.
.2 Immediately notify Consultant upon finding discrepancies or omissions in Bid Documents.
.3 The Drawings, upon which the Bid is based, are listed in the List of Drawings - Section 00005.

2.4 Queries - Addenda
- .1 Direct questions to the Consultant at:
  Tel: 519-524-5313, Fax: 519-524-5253 or Email: mc@jpmarchitecture.ca, Att: Marc Crane.
- .2 Questions will be accepted only from General Contractors. Subcontractors or suppliers shall obtain information from the Contractors, for whom they are providing bids.
- .3 Any interpretation of or change to Bid Documents, prior to Bid Closing, will be made only by written Addenda, issued via Town of Goderich Bids & Tenders site by the Owner, and such Addenda shall become part of the Bid Documents.
- .4 No other interpretation or explanations shall be valid.
- .5 Verbal answers are binding only when confirmed by written Addenda.
- .6 If no Addenda have been received insert the word "None" instead.

2.5 Voluntary Alternatives
- .1 Products specified by trade name shall be furnished per the Specifications. Review of proposed voluntary alternatives will be completed after Bid Close and will only be permitted after review and written approval by the Consultant. Such voluntary alternatives are NOT included within the Bid Price.
- .2 The Owner reserves the right to accept any or all voluntary alternatives. Adjustments to the Bid Price will be made, by the amounts stated, prior to award of Contract.
- .3 Voluntary Alternative Products
  - .1 Proposals for Voluntary Alternatives, to specified products, may be proposed as an attachment to the Bid Form.
  - .2 Submission of proposed Voluntary Alternative must be:
    - .1 in writing on appended "Voluntary Alternative Checklist" form;
    - .2 made in good faith as verifiably equal to or superior to the specified products.
  - .3 The Contractor shall accept full responsibility that a proposed Voluntary Alternative will not exceed space requirements, as shown on the Drawings, and that coordination and cost of installation, including interference with other areas of the work, is included in the Voluntary Alternative proposal.
  - .4 Submittals must account for applicable product requirements included on the Drawings and in the Specifications:
    - .1 Complete names and descriptions;
    - .2 Dimensions;
    - .3 Performance figures, as applicable;
    - .4 Latest catalogue numbers.
  - .5 When requested by Consultant, submit laboratory tests, product data, proof of standards, compliance, etc.
- .4 Voluntary Alternative Checklist
  - .1 For the convenience of Contractors, a checklist is provided as Appendix ITB - 1 to this Section, to expedite the proposal of Voluntary Alternatives. The page must be copied and submitted as an enclosure with the Bid Form, however, the Base Bid Price must include products and systems per the Bid Documents.

PART 3 - SITE ASSESSMENT

3.1 Site Examination
- .1 Visit the Place of Work and surrounding properties before submitting a Bid.
- .2 The Place of the proposed Work is located at:
  375 Cambridge St., Goderich, Ontario N7A 2Z1
- .3 There will be a non-mandatory Pre-Bid Meeting chaired by the Consultant at the Site on Tuesday, August 11, 2026, at 1:00 PM Local Time. The meeting will be conducted to review the Project work, answer questions and will allow for a Site Tour. Subtrade representatives are encouraged to attend.

.4 Bidders shall visit and examine the site, and fully inform themselves of existing conditions, limitations and difficulties, which may arise, and include in their Bid the cost of work required to complete the Work. Subtrade representatives are encouraged to examine the site. The Bidder, if awarded the Contract, will not be allowed any compensation by reason of any matter or thing, concerning that which such Bidder might have fully informed themselves of, prior to bidding.

PART 4 - BID SUBMISSION

4.1 Bid Ineligibility

.1 Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alteration or irregularities of any kind, may be regarded informal and subject to rejection.

.2 Bid Form including improperly prepared appendices and enclosures, may be declared informal and subject to rejection.

.3 Bids from unsolicited Bidders will be returned unopened.

.4 Bids containing escalation clauses will not be considered.

4.2 Submissions

.1 Only electronic email submission of the Bid will be accepted. Paper, telephone, facsimile and late submissions will not be accepted. This is a single Bid, 2-part submission and shall include the following information in PDF and XLSX formats.

.1 Part 1

.1 CCDC 11 – Contractor's Qualification Statement

.2 Part 2

.1 Stipulated Price Bid Form.

.2 Domestic Supply Chain Plan (XLSX).

.3 Bid Surety (Copy Accepted).

.4 Agreement to Bond.

.5 Up-to-date Workers Safety Insurance Board (WSIB) Clearance Certificate.

.6 Proof of insurance coverage per Section 00810 - Supplementary Conditions, identifying name of insurance company and policy number.

.2 Maximum upload file size is 10 MB (10000 KB).

.3 Please do not embed any documents within your uploaded files, as they will not be accessible or evaluated.

.4 Email your submission to:

.1 afisher@goderich.ca

.2 Include request for read receipt. The Town of Goderich will acknowledge receipt of Bid Submission.

.5 The Question & Answer (Q & A) period for this Bid starts Wednesday, August 05, 2026, 8:00 AM Local Time. The Q & A period for this Bid ends Thursday, August 13, 2026, 5:00 PM Local Time. Owner or Consultants will not be addressing any questions after this time. Refer to Section 2.4 - Queries - Addenda for contact information.

.6 Bidders shall be solely responsible to ensure submissions are uploaded, submitted and finalized prior to the closing times noted within this document. It is strongly recommended that the Bidder allows sufficient time and at least ONE (1) hour before Closing Time to begin the email process and to finalize your submission.

.7 Email the executed Bid, on the forms provided, signed with corporate seal affixed, together with the required appendices and securities, clearly identify email as "BID", with project identification and Bidder's name.

4.3 Bid Amendments

.1 Amendments to a submitted Bid will be permitted if received, via email, 5 minutes prior to Bid closing, endorsed by the same party or parties who signed the Bid and submitted in the same manner as the Bid.

.2 Modification of bid shall not reveal the original amount nor the revised amount, only the amount to be added or subtracted from the original bid amount shall be stated.

4.4 Withdrawal of Bid

.1 A Bidder may request, by email, that their Bid be withdrawn. The withdrawal shall be allowed if the request is made prior to the Bid Close. Telephone and facsimile requests will not be considered. The withdrawal of a Bid does not disqualify a Bidder from submitting another Bid.

PART 5 - BID ENCLOSURES

5.1 Security Deposit

.1 Bid shall be accompanied by a Bid Surety, in the form of a Bid Bond in the amount of 10% of Bid Price.

.2 Bid Surety shall be in the name of the Owner as Obligee, signed and sealed by the principal and surety as applicable.

.3 The Bid security deposit will be returned after delivery, to the Owner, of required Performance Bond and Labour and Materials Payment Bond by the accepted Bidder.

.4 Include cost of Bid Security, Performance Bond and Labour and Materials Payment Bond in the Bid Price.

.5 Bid shall be accompanied by an "Agreement to Bond", from a surety acceptable to Owner, for the provision of a Performance Bond and Labour and Materials Payment Bond. Bond amounts shall be as specified in Section 00600. Any costs associated with the “Agreement to Bond” shall be included in the Bid Price.

.6 Electronic copies of the Bid Surety and 'Agreement to Bond' shall be included with the Bidder's Bid submission and emailed as specified in Section 4.2 - Submissions.

.7 If the Bidder fails in their obligation to enter into a formal Contract with the Owner within 10 calendar days after receiving written notice from the Owner of Award of Contract and to provide the specified Security Deposit, then the Bidder is obliged to pay the Owner the difference in money between the amount of their Bid and the amount for which the Owner legally contracts with another party to do the Work, up to the face amount of the Bid Surety.

5.2 Bid Form Requirements

.1 The Bidder, in submitting the Bid, accepts the Time period and dates stated in the Bid Documents for performing the Work.

.2 The completion date in the Agreement shall be the completion Time added to the Contract Award date.

.3 Except for Value Added Tax (HST), include in the Bid Price other Federal and Provincial Sales Taxes and other Customs, Duties and Excise Taxes for the Work, regardless of any possible tax exemptions.

5.3 Bid Signing

.1 The Bid shall be signed under seal by the Bidder.

.2 Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Affix seal.

.3 Limited Company or Corporation: Signature of duly authorized signing officer with the corporate seal affixed is required. If the Bid is signed by officials other than the company President, Secretary or Treasurer of the company, a copy of the bylaw resolution of the Board of Directors, authorizing them to do so, must also be submitted with the Bid in the bid envelope.

.4 If the Bidder is a Joint Venture, each party to the Joint Venture shall execute the Bid under seal in the manner appropriate to such party.

PART 6 - OFFER ACCEPTANCE - REJECTION

6.1 Duration of Offer

.1 Bid shall remain open to acceptance and shall be irrevocable for a period of 30 days, after the bid closing date.

6.2 Acceptance of Offer

.1 The Owner reserves the right to:

.1 Not open the Bid, if only one Bid is received prior to closing. In this case, the unopened Bid will be deleted and notification will be issued to the Bidder.

.2 Request a 16-Division breakdown of work identifying the awarded subcontractor and cost.

.3 Negotiate with the low compliant bidder, in accordance with CCDC 23 - A Guide to Calling Bids and Awarding Construction Contracts, when required to explore modifications of the Work to reduce costs, in an effort to comply with the Owner's budget.

.4 Require any Bidder to submit qualification information prior to the award of the Contract.

.2 The Owner shall not, under any circumstance, be responsible for any costs incurred by the Bidder in the preparing of its Bid.

.3 It shall be noted that prior to award of the Work a meeting may be held to review the Bid and the Bidder's understanding of the Work, the terms and conditions which will apply and the requirements of the schedule.

.4 The Owner will issue the successful bidder a written Bid Acceptance.

.5 The successful Bidder shall sign a formal contract document with the Owner, based on the Standard Construction Document, CCDC 2 - 2020 for Stipulated Price Contract.

.6 By submitting a Bid, the Bidder waives all claims against, or entitlement to damages from, the Owner by reason of the Owner's rejection of its bid or all bids or failure to satisfy any Conditions Precedent referred to herein.

6.3 The Bidder agrees that if their Bid is acceptable to the Owner, the Bidder will:

.1 Accept a Letter of Intent as authority to commence work before executing a formal Contract.

.2 Submit to the Consultant certified copies of insurance policies, as required by the Conditions of the Contract.

.3 Submit, immediately, Notice of Project to the Ministry of Labour.

.4 Submit, immediately, Security Deposit in accordance with Section 00600.

.5 Submit to the Consultant, within 7 working days, a Certificate of Clearance from the Workers Compensation Board of Ontario and lost time frequency record and severity record per IAPA Standards.

.6 Submit to Consultant, within 7 working days, a detailed schedule of Work and the direction, phasing and scheduling of the Work.

.7 Submit to the Consultant, a breakdown of federal and provincial taxes other than Value Added Taxes (HST), for use by Owner.

.8 Furnish to the Consultant, with first Application for Payment, a breakdown of the Contract Price in such form and detail as required by the Consultant, for progress payments, taxation and internal accounting purposes.

.9 Submit to the Consultant, within 7 working days, a written copy of Contractor’s Health and Safety Policy.

- END OF SECTION -

APPENDIX ITB 1 - VOLUNTARY ALTERNATIVE CHECKLIST

Note that this page must be copied and included with the Bid Form, one for each proposed voluntary alternative product.

Bidder or subtrade name: . . . . . .

Proposed voluntary alternative: . . . . . .

. . . . . .

. . . . . .

Reason for change: _____ Problem with existing requirement

_____ Improvement to result from proposed change

_____ Proposed change needed to comply with codes or regulations as understood by trade

Estimated change to construction time (+ or -) . . . . . .

Estimated change to bid cost (+ or -) . . . . . .

To the best of our knowledge, opinion and belief, the proposed voluntary alternative is genuinely equal to or superior to the original requirement.

Signed . . . . . .

Owner Use Only:

Trade Affected	**Comparable quality validated**	**Comparable Quality not validated**	**Date**	**Signature**
General Trades				
Structural				
Mechanical				
Electrical				
Other				
Other				
Other				

SECTION 00600 - SECURITY DEPOSIT

Performance and Labour and Material Payments Security Deposit

1. The successful Bidder shall provide a Performance Bond and a Labour and Material Payment Bond in the amount of 50% of the Contract Price.

2. The Security Deposit shall provide indemnity to the Owner, up to the face value of the Security Deposit, in the event of default by the Contractor, as defined by the Contract Documents.

3. This Security Deposit shall guarantee that all claimants will be paid for labour and materials furnished to the Contractor for use on the Project. "Claimant" is one who is allowed a lien under the Construction Act, 1990, Amended 2019, Province of Ontario.

4. The Security Deposit shall extend from the date of Award of Contract until the fulfilment of the Contract, one year from the date of Substantial Performance of the Work.

- END OF SECTION -

SECTION 00700 - AGREEMENT, DEFINITIONS AND GENERAL CONDITIONS

The Agreement, Definitions and General Conditions contained in the Standard Construction Document for Stipulated Price Contract CCDC No. 2, revised 2020, shall become a part of the Contract and shall apply to all Contractors and Sub-Contractors.

A-3 CONTRACT DOCUMENTS

The following Contract Documents are required to be listed in Article A-2 of the Agreement:

1. Agreement as per CCDC2-2020, Common Law Version, Pages 1 to 5.
2. General Conditions as per CCDC2-2020, Common Law Version, Pages 8 to 28.
3. Definitions as per CCDC2-2020, Common Law Version, Pages 6 and 7.
4. Section 00810 - Supplementary Conditions.
5. Division 1 General Requirements - Sections as listed in Section 00001.
6. Contract Specifications, as listed in Section 00001, except Section 00002 and Section 00100, which will be deleted as not applicable after award of Contract.
7. Drawings, as listed in Section 00005.
8. Modifications, as listed in Section 00900.

- END OF SECTION -

SECTION 00810 - SUPPLEMENTARY CONDITIONS

CONTRACT DOCUMENTS

The Standard Construction Document for CCDC 2 Stipulated Price Contract, 2020 English version, consisting of the Agreement Between *Owner* and *Contractor*, Definitions, and General Conditions of the Stipulated Price Contract, Parts 1 to 13 inclusive, governing same is hereby made part of these Contract Documents, with the following amendments, additions and modifications. Where these amendments, additions, and modifications specifically reference a change to the Agreement, Definitions, or General Conditions, these amendments, additions and modifications shall govern.

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.

AMENDMENTS TO AGREEMENT

The following are amendments to CCDC 2, 2020 Agreement Between Owner and Contractor:

ARTICLE A-5 PAYMENT

.1 In paragraph 5.1.1 of Article A-5 add the following words to the end:
"or, where there is no *Payment Certifier*, jointly by the *Owner* and *Contractor*"

ARTICLE A-6 RECEIPT AND ADDRESSES FOR NOTICES IN WRITING

.1 Delete paragraph 6.5 of Article A-6 in its entirety and replace it with the following:

6.5 Contact information for a party may be changed by *Notice in Writing* to the other party setting out the new contact information in accordance with this Article.

AMENDMENTS TO DEFINITIONS

Add the following definitions:

Proper Invoice
Proper Invoice means a "proper invoice" as defined in the Payment Legislation, if any, and as may be modified by written agreement between the parties to the extent permitted by such Payment Legislation.

Proposed Change Notice
A *Proposed Change Notice* is a notice describing a proposed change in the *Work* prepared by the *Consultant*. A *Proposed Change Notice* is not an authorization to proceed with changes in the *Work*. The *Contractor* shall present, to the *Consultant* within 12 calendar days of notice, in a form acceptable to the *Consultant*, a method of adjustment or amount of adjustment for the *Contract Price*, if any, and the adjustment in *Contract Time*, if any, for the proposed change in the *Work*.

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
- As-built drawings and manuals to provide instructions to the operation and maintenance of the *Work*.

PART 1 GENERAL CONDITIONS

GC 1.1 CONTRACT DOCUMENTS

.1 Delete paragraphs 1.1.3 and 1.1.4 in their entirety and replace them with the following:

1.1.3 The *Contractor* shall review the *Contract Documents* for the purpose of facilitating and co-ordination and execution of the *Work* by the *Contractor*. The *Contractor* shall report promptly to the *Consultant* any ambiguities, design issues or other matters requiring clarification made known to the *Contractor* or that the *Contractor* may discover from such a review. Such review by the *Contractor* shall comply with the standard of care described in paragraph 3.9.1 of the *Contract*.

1.1.4 Except for its obligation to review the *Contract Documents* and report the result pursuant to paragraph 1.1.3, the *Contractor* is not responsible for ambiguities, design issues or other matters requiring clarification in the *Contract Documents* and does not assume any responsibility to the *Owner* or to the *Consultant* for the accuracy of the *Contract Documents*. Without limiting the foregoing, the *Contractor* shall not be liable for any damages or costs resulting from any ambiguities, design issues or other matters requiring clarification in the *Contract Documents* which the *Contractor* could not reasonably have discovered from such a review in accordance with the standard of care. If the *Contractor* does discover any ambiguities, design issues or other matters requiring clarification in the *Contract Documents*, the *Contractor* shall not proceed with the work affected until the *Contractor* has received modified or additional information from the *Consultant*. The impacts of any ambiguities, design issues or other matters requiring clarification in the *Contract Documents*, including to the *Contract Price* and *Contract Time*, shall be addressed by the parties in accordance with Part 6 – CHANGES."

.2 Add the following to the end of subparagraph 1.1.6.2:

Except to the extent the *Consultant* is indemnified as a third party beneficiary as provided in subparagraphs 9.2.7.4 and 9.5.3.4 and in paragraph 13.1.3.

PART 2 ADMINISTRATION OF THE CONTRACT

GC 2.2 ROLE OF THE CONSULTANT

.1 In paragraph 2.2.3 add the following to the end:

"Without limiting the foregoing, the *Consultant* may appoint one or more authorized representatives in writing who may fulfill the obligations of the *Consultant* under this *Contract*."

.2 In paragraph 2.2.8 add the words ", written statements" after the word "interpretations" in both the first and second sentences; and

i. add the following to the end of paragraph 2.2.8:

The *Owner* and the *Contractor* shall waive any claims against the *Consultant* arising out of its making of any interpretations, written statements or findings in accordance with paragraphs 2.2.6, 2.2.7, 2.2.8, and 7.1.2, but only to the extent that any such interpretations, written statements, and findings are made by the *Consultant* in an unbiased manner, and in accordance with the *Consultant's* professional standard of care at law.

.3 In paragraph 2.2.13 add the words "which are provided" before the words "by the *Contractor*".

GC 2.4 DEFECTIVE WORK

.1 In paragraph 2.4.1:

i. Add after the words “shall promptly correct” the phrase “in a manner acceptable to the *Owner* and the *Consultant*”; and

ii. Add after the words “*Contract Documents*” the phrase “or work that the *Contractor* discovers to be defective, whether or not the defective work had been identified by the *Consultant*, and”.

.2 Add new paragraph 2.4.4 as follows

2.4.4 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*.

PART 3 EXECUTION OF THE WORK

GC 3.1 CONTROL OF THE WORK

.1 Add new paragraph 3.1.3:

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 contradictions exist, or exact locations are not apparent, the *Contractor* shall immediately notify the *Consultant* in writing and obtain written instructions from the *Consultant* before proceeding with any part of the affected work.

GC 3.2 CONSTRUCTION BY OWNER AND OTHER CONTRACTORS

.1 Add new paragraph 3.2.7 as follows:

3.2.7 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 3.4, that 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*.

GC 3.7 LABOUR AND PRODUCTS

.1 Add the following to the end of paragraph 3.7.1:

The *Contractor* represents that it has sufficient skilled employees to replace, subject to the *Owner’s* approval, acting reasonably, its designated supervisor and project manager in the event of death, incapacity, removal or resignation.

.2 Add new paragraphs 3.7.4 and 3.7.5 as follows:

3.7.4 The *Owner* shall provide the *Contractor* in a timely manner with all relevant information (including storage, protection, and installation requirements) regarding *Products* to be supplied by the *Owner* or other contractors and, prior to delivery of any such *Products* to the *Place of the Work*, the *Owner* shall obtain the *Contractor's* written approval of the delivery date and proposed storage, protection and installation requirements.

3.7.5 Once the *Contractor* has accepted delivery of *Products*, the *Contractor* shall be responsible for the safe storage and protection of *Products* as required to avoid dangerous conditions or contamination to the *Products* or other persons or property. *Products* shall be stored in locations and at the *Place of the Work* to the satisfaction of the *Owner* and the *Consultant* as agreed and approved by the *Contractor* pursuant to paragraph 3.7.4.

Notwithstanding the foregoing, the *Contractor* shall not be responsible for any *Products* supplied by the *Owner* or other contractors unless:

(i) the *Contract Documents* expressly stipulate that such *Product* is to be the *Contractor's* responsibility and to be installed by the *Contractor* as part of the Work;
(ii) the *Contractor* has or has received from the *Owner* proof of insurance coverage sufficient, at a minimum, to cover the replacement cost of such *Product*; and
(iii) the *Owner* obtained the *Contractor's* approval as required by paragraph 3.7.4.

GC 3.8 SHOP DRAWINGS

.1 Add the words "AND OTHER SUBMITTALS" to the Title of G.C. 3.8 after the words "SHOP DRAWINGS".

.2 Add the words "and *Submittals*" after the words "*Shop Drawings*" in paragraphs 3.8.1, 3.8.2, 3.8.3, 3.8.3.2, 3.8.5, 3.8.6 and 3.8.7.

.3 Delete paragraph 3.8.2 in its entirety and replace it with new paragraph 3.8.2 as follows:

3.8.2 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 *Submittals* in an orderly sequence.

.4 Delete the words "with reasonable promptness so as to cause no delay in the performance of the *Work*" and replace them with the words "within 10 *Working Days* or such longer period as may be reasonably required" in paragraph 3.8.7.

GC 3.9 PERFORMANCE BY CONTRACTOR

.1 Add new General Condition GC 3.9 as follows:

GC 3.9 PERFORMANCE BY CONTRACTOR

3.9.1 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*.

PART 4 ALLOWANCES

GC 4.1 CASH ALLOWANCES

.1 Delete paragraph 4.1.7 in its entirety and replace it with the following:

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 3.4 that items called for under cash allowances are required to be delivered to the *Place of the Work* to avoid delaying the progress of the *Work*.

.4 Add new paragraph 4.1.8 as follows:

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

PART 5 PAYMENT

GC 5.2 APPLICATIONS FOR PAYMENT

.1 Delete the word "first" in paragraph 5.2.7 and replace it with the word "second."

GC 5.4 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF THE WORK

.1 Delete all paragraphs of GC 5.4 in their entirety and replace them with the following paragraphs:

5.4.1 When the Contractor considers that the Work is substantially performed, or if permitted by the lien legislation applicable to the *Place of the Work* a designated portion thereof which the *Owner* agrees to accept separately is substantially performed, the *Contractor* shall, within five (5) *Working Days*, deliver to the *Consultant* and to the *Owner* a comprehensive list of items to be completed or corrected, together with a written application for a review by the Consultant to establish *Substantial Performance of the Work* or substantial performance of the designated portion of the *Work*. Failure to include an item on the list does not alter the responsibility of the *Contractor* to complete the *Contract*.

5.4.2 The *Consultant* will review the *Work* to certify or verify the validity of the application and shall promptly, and in any event, no later than 10 calendar days after receipt of the *Contractor's* application:
.1 advise the *Contractor* in writing that the *Work* or the designated portion of the *Work* is not substantially performed and give reasons why, or
.2 state the date of *Substantial Performance of the Work* or a designated portion of the *Work* in a certificate and issue a copy of that certificate to each of the *Owner* and the *Contractor*.

5.4.3 Where the holdback amount required by the applicable lien legislation has not been placed in a separate lien holdback account, the *Owner* shall, no later than 10 calendar days prior to the expiry of the holdback period stipulated in the lien legislation applicable to the *Place of the Work*, place the holdback amount in a bank account in the joint names of the *Owner* and the *Contractor*.

5.4.4 Subject to the requirements of any *Payment Legislation*, all holdback amounts prescribed by the applicable lien legislation for the *Place of the Work* shall become due and payable to the *Contractor* no later than 10 *Working Days* following the expiration of the holdback period stipulated in the lien legislation applicable to the *Place of the Work*, as certified or verified by the *Consultant* when permitted by any *Payment Legislation*.

5.4.5 The Contractor shall submit an application for release of the lien holdback amount in accordance with the lien legislation applicable to the Place of the Work. Except to the extent required by any Payment Legislation, such application for release of the holdback shall not constitute an application for payment that is subject to Proper Invoice requirements.

5.4.6 Where legislation permits progressive release of the holdback for a portion of the *Work* and the *Consultant* has certified or verified that the part of the *Work* has been performed prior to *Substantial Performance of the Work*, the *Owner* hereby agrees to release, and shall release the holdback for such portion of the *Work* to the *Contractor* in accordance with such legislation.

5.4.7 Notwithstanding any progressive release of the holdback, the *Contractor* shall ensure that such parts of the *Work* are protected pending the issuance of a final certificate for payment or until the *Owner* takes early occupancy in accordance with GC12.2, whichever comes first, and shall be responsible for the correction of defects or work not performed regardless of whether or not such was apparent when the holdback was released.

GC 5.5 FINAL PAYMENT

.1 Add to the end of paragraph 5.5.1 the following sentence:

The application for final payment shall meet the requirements of a *Proper Invoice*.

.2 Add the following to the end of paragraph 5.5.3:

Subject to any *Payment Legislation*, when the *Consultant* finds the *Contractor's* application for final payment to be not valid, the *Contractor* shall revise and resubmit the application when the *Contractor* has addressed the reasons given by the *Consultant*.

PART 6 CHANGES IN THE WORK

GC 6.3 CHANGE DIRECTIVE

.1 Delete the word "and" from the end of subparagraph 6.3.7.17.

.2 Delete the period from the end of subparagraph 6.3.7.18 and replace it with "; and".

.3 Add new subparagraph 6.3.7.19 as follows:

.19 safety measures and requirements.

GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

.1 Add new paragraph 6.4.5:

6.4.5 The *Contractor* confirms that, prior to bidding the *Project*, it carefully reviewed the *Place of the Work* and applied to that review the degree of care and skill described in paragraph 3.9.1, 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 review undertaken in accordance with this paragraph 6.4.5.

GC 6.6 CLAIMS FOR A CHANGE IN CONTRACT PRICE

.1 Add the words "as noted in paragraph 6.6.3" after the words "of the claim" in paragraph 6.6.5 and add the words "and the *Consultant*", at the end of paragraph 6.6.5.

PART 8 DISPUTE RESOLUTION

GC 8.2 ADJUDICATION

.1 Delete the word "prescribed" from paragraph 8.2.1 and substitute the words "provided for".

GC 8.3 NEGOTIATION, MEDIATION AND ARBITRATION

.1 Add the following new paragraphs 8.3.9 to 8.3.13:

8.3.9 Within five *Working Days* of receipt of the notice of arbitration by the responding party under paragraph 8.3.6, the *Owner* and the *Contractor* shall give the *Consultant* a written notice containing:

.1 copy of the notice of arbitration;
.2 a copy of supplementary conditions 8.3.9 to 8.3.14 of this *Contract*, and;
.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.

8.3.10 The *Owner* and the *Contractor* agree that the *Consultant* may elect, within ten days of receipt of the notice under paragraph 8.3.9, to become a full party to the arbitration under paragraph 8.3.6 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 8.3.6, and,
.4 agrees to be bound by the arbitral award made in the arbitration.

8.3.11 Without limiting and subject to the *Owner* and *Contractor's* rights under paragraph 8.3.12 to challenge whether the *Consultant* has satisfied the requirements of paragraph 8.3.10, if an election is made under paragraph 8.3.10:
.1 the Owner or Contractor may request particulars and evidence of the Consultant's vested or contingent financial interest in the outcome of the arbitration;
.2 the Consultant shall participate in the appointment of the arbitrator; and,
.3 notwithstanding the rules referred to in paragraph 8.3.6, the time period for reaching agreement on the appointment of the arbitrator shall begin to run from the date the respondent receives a copy of the notice of arbitration.

8.3.12 The arbitrator in the arbitration in which the *Consultant* has elected under paragraph 8.3.10 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 8.3.10, and;
.2 make any procedural order considered necessary to facilitate the addition of the *Consultant* as a party to the arbitration.

8.3.13 The provisions of paragraph 8.3.9 shall apply (with all appropriate changes being made) to written notice to be given by the *Consultant* to any sub-consultant.

PART 9 PROTECTION OF PERSONS AND PROPERTY

CG 9.1 PROTECTION OF WORK AND PROPERTY

.1 Delete subparagraph 9.1.1.1 in its entirety and replace it with the following:

9.1.1.1 Errors or omissions in the *Contract Documents* which the *Contractor* could not have discovered applying the standard of care described in paragraph 3.14.1;

.2 Delete paragraph 9.1.2 in its entirety and replace it with the following:

9.1.2 Before commencing any *Work*, the *Contractor* shall determine the locations of all underground utilities and structures indicated in the *Contract Documents*, or that are discoverable by applying to an inspection of the *Place of the Work* the degree of care and skill described in paragraph 3.9.1.

GC 9.2 TOXIC AND HAZARDOUS SUBSTANCES

.1 Add the following words to paragraph 9.2.6 after the word "responsible":

or whether any toxic or hazardous substances or materials already at the *Place of the Work* (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the *Contractor* or anyone for whom the *Contractor* is responsible in a manner which does not comply with legal and regulatory requirements, or which threatens human health and safety or the environment, or material damage to the property of the *Owner* or others,

.2 Add the words “and the *Consultant*” after the word “*Contractor*” in subparagraph 9.2.7.4.

.3 Add the following words to paragraph 9.2.8 after the word “responsible”:

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,

GC 9.5 MOULD

.1 Add the words “and the *Consultant*” after the word “*Contractor*” in subparagraph 9.5.3.4.

PART 10 GOVERNING REGULATIONS

GC 10.2 LAWS, NOTICES, PERMITS AND FEES

.1 Delete from the first line of paragraph 10.2.5 the word, “The” and substitute the words: “Subject to paragraph 3.9.1, the”

PART 12 OWNER TAKEOVER

GC 12.1 READY FOR TAKEOVER

.1 After the second occurrence of the term “Ready-for-Takeover” insert before the term “Ready-for-Takeover” in paragraph 12.1.3 the words “determination of”.

GC 12.2 EARLY OCCUPANCY BY THE OWNER

.1 Delete the word “achieve” in paragraph 12.2.4 and replace it with the words “have achieved”.

GC 12.3 WARRANTY

.1 **Delete** the word “The” from the first line of paragraph 12.3.2 and replace it with the words "Subject to paragraph 3.9.1, the ".

PART 13 INDEMNIFICATION AND WAIVER

GC 13.1 INDEMNIFICATION

.1 Add new paragraph 13.1.0 as follows:

13.1.0 The *Contractor* shall indemnify and hold harmless the *Consultant*, its agents and employees from and against all 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:

.1 attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property, and

.2 caused by negligent acts or omissions of the *Contractor* or anyone for whose negligent acts or omissions the *Contractor* is liable, and

.3 made by *Notice in Writing* within a period of 6 years from the *Ready-for-Takeover* date or within such shorter such period as may be prescribed by any limitation statute or the Province or Territory of the Place of Work.

.2 Add the words "13.1.0," after the word "paragraphs" in paragraph 13.1.3.

- END OF SECTION -

1900-275 Slater Street
Ottawa, ON K1P 5H9

Tel: 613-236-9455
Fax: (613) 236-9526
info@ccdc.org

CANADIAN CONSTRUCTION DOCUMENTS COMMITTEE
CANADIAN CONSTRUCTION DOCUMENTS COMMITTEE

CCDC 41
CCDC INSURANCE REQUIREMENTS

PUBLICATION DATE: December 14, 2020

1. General liability insurance shall be with limits of not less than $10,000,000 per occurrence, an aggregate limit of not less than $10,000,000 within any policy year with respect to completed operations, and a deductible not exceeding $10,000. The insurance coverage shall not be less than the insurance provided by IBC Form 2100 (including an extension for a standard provincial and territorial form of non-owned automobile liability policy) and IBC Form 2320. To achieve the desired limit, umbrella or excess liability insurance may be used. Subject to satisfactory proof of financial capability by the *Contractor*, the *Owner* may agree to increase the deductible amounts.

2. Automobile liability insurance in respect of vehicles that are required by law to be insured under a contract by a Motor Vehicle Liability Policy, shall have limits of not less than $10,000,000 inclusive per occurrence for bodily injury, death and damage to property, covering all vehicles owned or leased by the *Contractor*. Where the policy has been issued pursuant to a government-operated automobile insurance system, the *Contractor* shall provide the *Owner* with confirmation of automobile insurance coverage for all automobiles registered in the name of the *Contractor*.

3. Manned Aircraft and watercraft liability insurance with respect to owned or non-owned aircraft and watercraft (if used directly or indirectly in the performance of the *Work*), including use of additional premises, shall have limits of not less than $10,000,000 inclusive per occurrence for bodily injury, death and damage to property including loss of use thereof and limits of not less than $10,000,000 for aircraft passenger hazard. Such insurance shall be in a form acceptable to the *Owner*.

4. Unmanned aerial vehicle liability insurance with respect to owned or non-owned aircraft (if used directly or indirectly in the performance of the Work), shall have limits of not less than $5,000,000 per occurrence or accident for bodily injury, death and damage to property or such amounts as required by any applicable law or regulation.

5. "Broad form" property insurance shall have limits of not less than the sum of 1.1 times *Contract Price* and the full value, as stated in the *Contract*, of *Products* and design services that are specified to be provided by the *Owner* for incorporation into the *Work*, with a deductible not exceeding $10,000. The insurance coverage shall not be less than the insurance provided by IBC Forms 4042 and 4047 or their equivalent replacement. Subject to satisfactory proof of financial capability by the *Contractor*, the *Owner* may agree to increase the deductible amounts.

6. Boiler and machinery insurance shall have limits of not less than the replacement value of the permanent or temporary boilers and pressure vessels, and other insurable objects forming part of the *Work*. The insurance coverage shall not be less than the insurance provided by a comprehensive boiler and machinery policy including hot testing and commissioning.

7. Contractors' equipment insurance coverage written on an “all risks” basis covering *Construction Equipment* used by the *Contractor* for the performance of the *Work*, shall be in a form acceptable to the *Owner* and shall not allow subrogation claims by the insurer against the *Owner*. Subject to satisfactory proof of financial capability by the *Contractor* for self-insurance, the *Owner* may agree to waive the equipment insurance requirement.

8. Contractors’ Pollution liability insurance shall have limits of not less than $5,000,000 per occurrence for bodily injury, death and damage to property.

Association of Canadian Engineering Companies

Canadian Construction Association

Construction Specifications Canada

The Royal Architectural Institute of Canada

SECTION 00900 - ADDENDA & MODIFICATIONS

Addenda and modifications, as listed herein, are included on the following issues:

- END OF SECTION -

SECTION 01110 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 Work of this Contract

.1 The following is a general description of the Work and is not meant to be all inclusive. Refer to Drawings and Specifications for complete Work required by the Contract.

.1 Interior renovations at the Municipal Child Care Centre provides for an upgraded Kitchen, including:

.1 Disassembly and removal of existing partition walls, suspended ceilings (acoustic ceiling tile and suspended gypsum board systems), casework and counter tops, flooring, etc.

.2 Cutting of concrete slab-on-grade to facilitate plumbing modifications.

.3 Placement of concrete fill, at floor slab removals.

.4 Construction of steel framed, gypsum board partitions.

.5 Priming of new gypsum board and painting of existing exposed painted surfaces.

.6 Provision of fibreglass reinforced panels (FRP) for finished wall surfaces.

.7 Provision of new built-up sills, at Kitchen pass-through openings, including modifications to the existing bi-fold doors, jambs and trims.

.8 Installation of new resilient sheet safety flooring and acoustic tile ceiling systems.

.9 Painting.

.10 Provision of new kitchen equipment and appliances.

.11 Installation of new roof curbs and flashing of same.

.12 Modifications and expansion of existing mechanical and electrical systems, as required by Division 15 and 16.

.2 Disassemble, store, protect and reinstall:

.1 Existing wall-mounted air conditioning unit.

.3 Disassemble and turn over to Owner:

.1 Mirrors, soap dispensers, paper towel dispensers, etc.

.4 Work not Included:

.1 Removal, relocation, storage, or reinstallation of existing appliances, utensils, dishes, pots, pans, food products, and other kitchen contents.

.5 Temporary Utilities: Refer to Section 01510.

.6 Construction Facilities: Refer to Section 01520.

.7 Safety Guidelines & Protections: Refer to 01545.

.8 Temporary Barriers and Enclosures: Refer to Section 01560.

1.2 Site Description

.1 Municipal Address: 376 Cambridge St., Goderich, Ontario N7A 2Z1.

.2 Legal Description: Concession Maitland, Part Lot 2, Town of Goderich.

1.3 The Existing Building

.1 The Child Care Centre is a active facility offering day care for young children. The existing single storey building, built in the1980's, is constructed of load-bearing architectural masonry walls, open web steel joists, steel roof deck and concrete slab-on-grade floors. The west addition was constructed in 1990. Renovations, complete in 2006, consisted of a new classroom and storage room, on main floor level, and a storage mezzanine above, built within the existing gymnasium space.

1.4 Division of Work

.1 Division of the Work among Subcontractors and Suppliers is solely the Contractor's responsibility. Consultant and Owner assume no responsibility to act as an arbiter to establish subcontract limits between Sections or Divisions of the Work.

1.5 Specifications Language and Style

.1 These specifications are written in the imperative mood and in streamlined form. The imperative language is directed to Contractor, unless stated otherwise.

.2 Complete sentences by reading "shall", "Contractor shall", "shall be", and similar phrases by inference. Where a colon (:) is used within sentences and phrases, read the words "shall be" by inference.

.3 Fulfill and perform all indicated requirements whether stated imperatively or otherwise.

.4 When used in the context of a Product, read the word “provide” to mean “supply and install to result in a complete installation ready for its intended use”.

1.6 Contract Documents for Construction Purposes

.1 Owner will supply Contractor with a complete set of Contract Documents in electronic form before commencement of the Work. Contractor may print hard copies for construction purposes as required.

1.7 Documents at the Site

.1 Keep the following documents at Place of the Work, stored securely and in good order and available to Owner and Consultant in hard copy and electronic form:

.1 Current Contract Documents, including Drawings, Specifications and Addenda.

.2 Change Orders, Change Directives, and Supplementary Instructions.

.3 Reviewed Shop Drawings, Product Data and Samples.

.4 Field test reports and records.

.5 Construction progress schedule.

.6 Meeting minutes.

.7 Manufacturer’s certifications.

.8 Permits, inspection certificates, and other documents required by authorities having jurisdiction.

.9 Current as-built drawings.

.10 Material Safety Data Sheets (MSDS) for all controlled *Products*.

1.8 Contractor’s Use of the Premises

.1 Except as otherwise specified, Contractor has restricted use of Place of the Work from time of Contract award until Substantial Performance of the Work.

.2 Confine Construction Equipment, Temporary Work, storage of Products, waste products and debris, and all other construction operations to limits required by laws, ordinances, permits, and Contract Documents, whichever is most restrictive.

.3 Do not unreasonably encumber Place of the Work.

- END OF SECTION -

SECTION 01140 - WORK RESTRICTIONS

PART 1 - GENERAL

1.1 Related Work
- .1 Summary of Work . . . . . Section 01110.

1.2 Restrictions on Use of Premises
- .1 The Child Care Centre will remain fully operational throughout the construction period. The Contractor shall coordinate all work activities, deliveries, and access requirements with the Town and Child Care Centre staff to minimize disruption to the Centre's daily operations. Child drop-off occurs between 7:30 a.m. and 9:00 a.m. Deliveries, material unloading, and other activities that may interfere with vehicle or pedestrian access during this period shall be avoided unless prior approval has been obtained from Child Care Centre staff.
- .2 Construction is permitted during operating hours of the Centre, Monday through Friday 7:30 am - 5:30 pm. However, the Contractor shall make all reasonable efforts to avoid loud noises and disruption especially between the hours of 11:30 AM and 2:30 PM. Disruptive construction activities, e.g. destructive demolition and removals, shall be scheduled off-hours, such as evenings and weekends.
- .3 Limit use of premises for the Work, storage and access, as shown on Drawings, to allow.
  - .1 Owner occupancy.
  - .2 Public usage.
- .4 Coordinate use of premises under direction of Owner and Consultant.
- .3 The playing of radio and music is prohibited.
- .5 No work shall occur on Sundays or Statutory Holidays.
- .6 No smoking is permitted on the property.
- .7 The site area is restricted and therefore storage of materials is limited. Deliver materials to the site as they are required for installation.
- .8 Disruption to facilities must be minimal and the schedule be as compact as possible.

1.3 Work Sequence
- .1 Schedule and construct work to facilitate Owner's continued use of the site and building during construction. Do not close off public usage of the facility.
- .2 Extension and modification of electrical, water, sanitary, safety and telecommunication services must be scheduled before and after hours to minimize disruption.
- .3 Heavy sawcutting, drilling and demolition must be scheduled before and after centre hours.

1.4 Access to the Site
- .1 Primary vehicular access, to and from the site will be via Cambridge Street to the parking lot adjacent to the building.
- .2 Contractor deliveries and pick-ups shall be limited and be short-term only, at the Main Entrance Vestibule, as indicated on the Drawings. Contractor personnel is responsible for receiving the deliveries and unloading into the building.
- .3 Refer to Section 01520 for Contractor parking.

1.5 Maintaining Life Safety Systems in Occupied Facilities
- .1 Maintain operational life safety systems and public access to exits in occupied areas during all stages of the Work.
- .2 Determine nature and exact locations of existing fire and smoke sensors prior to the commencement of the Work. Avoid direct or indirect jarring while working in adjacent areas and exercise caution to avoid triggering these devices.
- .3 Be responsible for costs incurred by Owner on account of false fire alarms activated as a result of the execution of the Work without adequate precautions.

1.6 Scheduling

.1 Site Mobilization . . . . . September 15, 2026.

.2 Substantial Performance . . . . . December 15, 2026.

.3 Project Completion . . . . . December 31, 2026.

- END OF SECTION -

SECTION 01210 - ALLOWANCES

PART 1 - GENERAL

1.1 Refer to General Conditions GC 4.1. Contractor shall be responsible for carrying Allowance amounts in Stipulated Price Bid.

1.2 Specific Cash Allowances

.1 Expend each Allowance as directed. Allowance will be adjusted to actual cost, as defined hereunder, by means of a credit or by extra Change Order, processed during the period of the Contract.

.2 **Structural Roof Reinforcing: $25,000.00**

.1 Reinforcing of existing open-web steel joists, including structural review, design and construction documentation. Structural review, design and construction documentation by Pow Peterman Consulting Engineers, 50 Samnah Crescent, Ingersoll, Ontario N5C 3J7, Contact: Chris Willie, Tel: 1-519-425-5000 ext: 251, Email: chris.willie@pow.ca.

.3 **Kitchen Stainless-Steel Casework and Countertops, and Equipment/Appliances: $120,000.00**

.1 Supply and installation of stainless-steel casework and countertops, and equipment / appliances by Russell Hendrix London, 812 Dundas St, London, Ontario, Contact: Lance Berrisford, Cell: 519-670-9969, Email: lberrisford@russellhendrix.com. Note: Mechanical and electrical connections are by Divisions 15 and 16 and form part of the Base Bid.

.4 **ESA Plans Review: $2,500.00**

.1 Provision of Electrical Safety Authority (ESA) plans review for electrical systems.

1.3 Definition of scope of Cash Allowances

.1 Cash Allowances for Supply and Installation of Products:

.1 Amount of each cash allowance includes:

.1 All costs to provide the specified *Products*, including supply, installation, and related costs, excluding *Value Added Taxes*.

.2 *Subcontractor's* and sub-*Subcontractor's* overheads and profits related to the cash allowance.

.2 Amount of each cash allowance does not include Contractor's overhead and profit, and other related costs, which shall be included in the Contract Price and not in the cash allowance.

.2 Cash Allowances for Services

.1 Amount of each cash allowance includes:

.1 All costs related to the services, excluding *Value Added Taxes*.

.2 *Subcontractor's* and sub-*Subcontractor's* overheads and profits related to the cash allowance.

.2 Amount of each cash allowance does not include Contractor's overhead and profit, and other related costs, which shall be included in the Contract Price and not in the cash allowance.

1.4 Expenditure of Cash Allowances

.1 *Owner*, through *Consultant*, will provide *Contractor* with documentation required to permit pricing of a cash allowance item.

.2 *Owner*, through *Consultant*, may request *Contractor* to identify potential *Suppliers or Subcontractors*, as applicable, and to obtain at least three competitive prices for each cash allowance item.

.3 *Owner*, through *Consultant*, may request the *Contractor* to disclose originals of all bids, quotations, and other price related information received from potential *Suppliers* or *Subcontractors*.

.4 *Owner*, through *Consultant*, will determine by whom and for what amount each cash allowance item will be performed. Obtain *Owner's* prior written approval in the form of a *Change Order* before entering into a subcontract, amending an existing subcontract, or performing own forces work included in a cash allowance. Upon issuance of the *Change Order*, the *Contractor's* responsibilities for a cash allowance item shall be the same as for other work of the Contract.

1.5 Contingency Allowance

.1 Refer to General Conditions Article GC4.2.

.2 **$25,000.00 -** Include Contingency Allowance in the Stipulated Price Bid.
The cost of authorized changes to the Work, after Award of Contract, will be applied against the Contingency Allowance.

.3 Do not include overhead and profit in the Stipulated Price Bid by reason of the Contingency Allowance. Mark-up on cost for authorized changes will be covered by the Fees stated in Section 00810 - Supplementary Condition.

- END OF SECTION -

SECTION 01250 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 Definition

.1 In this Section “Substitution” means a *Product*, a manufacturer, or both, not originally specified in *Contract Documents* by proprietary name but proposed for use by *Contractor* in place of a *Product*, a manufacturer, or both, specified by proprietary name.

1.2 Substitution Procedures

.1 *Contractor* may propose a Substitution wherever a *Product* or manufacturer is specified by proprietary name(s), unless there is accompanying language indicating that Substitutions will not be considered.

.2 *Contractor* may propose a Substitution wherever a *Product* or manufacturer is specified by proprietary name(s) and accompanied by language such as "or equal", "or approved equal", or other similar words. Do not construe such language as an invitation to unilaterally provide a Substitution without *Consultant’s* prior acceptance in writing. Do not order or install any Substitution without a *Supplemental Instruction* or *Change Order*.

.3 Provided a proposed Substitution submission includes all of the information specified in this Section under Submission Requirements For Proposed Substitutions, *Consultant* will promptly review and accept or reject the proposed Substitution.

.4 *Consultant* may accept a Substitution if satisfied that:

.1 the proposed substitute *Product* is the same type as, is capable of performing the same functions as, interfaces with adjacent work the same as, and meets or exceeds the standard of quality, performance and, if applicable, appearance and maintenance considerations, of the specified Product,

.2 the proposed substitute manufacturer has capabilities comparable to the specified manufacturer, and

.3 the Substitution provides a benefit to *Owner*.

.5 If *Contractor* fails to order a specified *Product* or order a *Product* by a specified manufacturer in adequate time to meet *Contractor’s* construction schedule, *Consultant* will not consider that a valid reason to accept a Substitution.

.6 If *Consultant* accepts a Substitution and subject to *Owner’s* agreement, the change in the *Work* will be documented in the form of either a *Supplemental Instruction* or *Change Order* as specified in Section 01260 - Contract Modification Procedures.

.7 If a Substitution is accepted in the form of a *Supplemental Instruction* or *Change Order*, *Contractor* shall not revert to an originally specified Product or manufacturer without *Consultant’s* prior written acceptance.

1.3 Submission Requirements for Proposed Substitutions

.1 Include with each proposed Substitution the following information:

.1 Identification of the Substitution, including product name and manufacturer’s name, address, telephone numbers, and web site.

.2 Reason(s) for proposing the Substitution.

.3 A statement verifying that the Substitution will not affect the *Contract Price* and *Contract Time* or, if applicable, the amount and extent of a proposed increase or decrease in *Contract Price* and *Contract Time* on account of the Substitution.

.4 A statement verifying that the Substitution will not affect the performance [or warranty] of other parts of the *Work*.

.5 Manufacturer’s Product literature for the Substitution, including material descriptions, compliance with applicable codes and reference standards, performance and test data, compatibility with contiguous materials and systems, and environmental considerations.

.6 Product samples as applicable.
.7 A summarized comparison of the physical properties and performance characteristics of the specified Product and the Substitution, with any significant variations clearly highlighted.
.8 Availability of maintenance services and sources of replacement materials and parts for the Substitution, as applicable, including associated costs and time frames.
.9 If applicable, estimated life cycle cost savings resulting from the Substitution.
.10 Details of other projects and applications where the Substitution has been used.
.11 Identification of any consequential changes in the Work to accommodate the Substitution and any consequential effects on the performance of the Work as a whole. A later claim for an increase to the Contract Price or Contract Time for other changes in the Work attributable to the Substitution will not be considered.

- END OF SECTION -

SECTION 01260 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 Schedule of Labour Rates

.1 Prior to the first application for payment, submit for the Consultant's review a schedule of labour rates for all trades and classifications of trades, such as journeymen, apprentices, and foremen that will be employed in the Work. Provide a breakdown of payroll burden component of labour rates.

.2 Labour rates shall reflect the salaries, wages, and benefits paid to personnel in the direct employ of the Contractor, Subcontractors, and sub-Subcontractors, stated as hourly rates, that will be used when:

.1 preparing price quotations for Change Orders, and

.2 determining the cost of work attributable to Change Directives.

.3 Labour rates stated in the schedule of labour rates shall be consistent with rates that will actually be paid, and payroll burden costs that will actually be incurred, in the normal performance of the Work, during regular working hours. Labour rates shall not include any additional overhead and profit component.

.4 Where collective agreements apply, the labour rates shall not exceed those established by collective agreement.

.5 Obtain the Owner's written acceptance of the schedule of labour rates before submitting the first Change Order quotation.

.6 Accepted schedule of labour rates will be used solely for evaluating Change Order quotations and cost of performing work attributable to Change Directives.

.7 The Contractor may request amendments to the accepted schedule of labour rates if changes in the labour rates that will actually be paid, or payroll burden cost that will actually be incurred, in the normal performance of the Work can be demonstrated. Obtain the Owner's written acceptance of such changes.

1.2 Schedule of Equipment Rates

.1 Prior to the first application for payment, submit for the Consultant's review a schedule of equipment rates for Contractor owned Construction Equipment.

.2 Equipment rates shall reflect the rates that will be used when:

.1 preparing price quotations for Change Orders, and

.2 determining the cost of work attributable to Change Directives.

.3 Equipment rates stated in the schedule shall be consistent with local equipment rental market rates and shall not include any additional overhead and profit component.

.4 Obtain the Owner's written acceptance of the schedule of equipment rates before submitting the first Change Order quotation.

.5 Accepted schedule of equipment rates will be used solely for evaluating Change Order quotations and cost of performing work attributable to Change Directives.

.6 The Contractor may request amendments to the accepted schedule of equipment rates if changes in local equipment rental market rates can be demonstrated. Obtain the Owner's written acceptance of such changes.

1.3 Method of Contract Price Adjustment - Change Orders

.1 Unless otherwise agreed, the adjustment of the Contract Price on account of a proposed change in the Work shall be based on a quotation for a fixed price increase or decrease to the Contract Price regardless of the Contractor's actual expenditures and savings.

1.4 Change Order Procedures

.1 Upon issuance by the Consultant to the Contractor of a proposed change in the Work, and unless otherwise requested in the proposed change or unless otherwise agreed:

.1 Submit to the Consultant a fixed price quotation for the proposed change in the Work within 12 days after receipt of the *Proposed Change Notice*.

.2 If requested in the proposed change, provide a detailed breakdown of the price quotation including the following to the extent applicable, with appropriate supporting documentation:

.1 Estimated labour costs, including hours and applicable hourly rates based on the accepted schedule of labour rates.

.2 Estimated Product costs, including Supplier quotations, estimated quantities and unit prices.

.3 Estimated Construction Equipment costs.

.4 Enumeration of all other estimated costs included in the price quotation.

.5 Estimated credit amounts for labour and Products not required on account of the proposed change.

.6 Fees, not exceeding the applicable percentages for overhead and profit as specified in this Section.

.7 Where applicable, Subcontractor quotations, also including a detailed breakdown of all of the above.

.3 Include in the quotation the increase or decrease to the Contract Time, if any, for the proposed change, stated in number of days.

.4 Include in the quotation the number of days for which the quotation is valid.

.5 The quotation will be evaluated by the Consultant and the Owner and, if accepted by the Owner, be documented in the form of a signed Change Order.

.6 For the convenience of Contractor, a checklist is provided on the following page to expedite the proposal of changes, where such changes are initiated by the Contractor. The page may be freely copied and should be emailed or delivered to the Consultant's office within the stipulated time to notify of requested changes.

1.5 Fees for Overhead and Profit - Change Orders

.1 Where the Contractor’s price quotation for a Change Order results in a net increase to the Contract Price, the Contractor’s entitlement to a fee for overhead and profit in the quotation shall be as follows, as applicable:

.1 For work to be performed by the Contractor’s own forces, 5% of the Contractor’s price quotation before the Contractor’s fee of 10% is applied.

.2 For work to be performed by a Subcontractor, 10% of the Subcontractor’s price quotation including the Subcontractor’s fee.

.2 Where a Subcontractor’s price quotation for a Change Order results in a net increase to the Subcontractor’s contract price, the Subcontractor’s entitlement to a fee for overhead and profit in the quotation shall be as follows, as applicable:

.1 For work to be performed by the Subcontractor’s own forces, 5% of the Subcontractor’s price quotation before the Subcontractor’s fee of 10% is applied.

.2 For work to be performed by a sub-Subcontractor, 10% of the sub-Subcontractor’s price quotation including the sub-Subcontractor’s fee.

.3 Where the Contractor’s or a Subcontractor’s price quotation for a Change Order results in a net decrease in price before adjustment for fees for overhead and profit, such a price quotation shall be for the net decrease without any adjustment for fees for overhead and profit.

1.6 Method of Contract Price Adjustment - Change Directives

.1 Unless the Owner and the Contractor reach an earlier agreement on the adjustment to the Contract Price by means of a Change Order that cancels the Change Directive, the adjustment in the Contract Price for change carried out by way of a Change Directive shall be determined as specified in the General Conditions of Contract after the change in the Work is completed.

1.7 Change Directive Procedures

.1 If a Change Directive is issued for a change in the Work for which a proposed change was previously issued, but no Change Order has yet been signed, the Change Directive shall cancel the proposed change and any Contractor quotations related to that change in the Work.

.2 When proceeding with a change in the Work under a Change Directive, keep accurate records of daily time sheets for labour and Construction Equipment, and invoices for Product and Construction Equipment costs. Submit such records to the Consultant [daily] [weekly], until the Change Order superseding the Change Directive is issued.

1.8 Fees for Overhead and Profit - Change Directives

.1 The Contractor’s entitlement to a fee for overhead and profit on the Contractor’s expenditures and savings attributable to a Change Directive shall be as follows, as applicable:

.1 For work performed by the Contractor’s own forces, 5% of the Contractor’s net increase in costs before the Contractor's fee of 10% is applied.

.2 For work performed by a Subcontractor, 10% of the sum of the Subcontractor’s net increase in costs plus the Subcontractor’s fee.

.2 A Subcontractor’s entitlement to a fee for overhead and profit on the Subcontractor’s expenditures and savings attributable to a Change Directive shall be as follows, as applicable:

.1 For work performed by the Subcontractor’s own forces, 5% of the Subcontractor’s net increase in costs before the Subcontractor's fee of 10% is applied..

.2 For work performed by a Sub-subcontractor, 10% of the sum of the Sub-subcontractor’s net increase in costs plus the Sub-subcontractor’s fee.

.3 Where a Change Directive results in net savings on account of work not required to be performed and a net decrease in the Contractor’s or Subcontractor’s cost, the net savings to the Contractor or Subcontractor shall be calculated without any adjustment for fees for overhead and profit.

.4 When a Change Directive is ultimately recorded as a Change Order, there shall be no additional entitlement to fees for overhead and profit beyond those specified in this article.

1.9 Supplemental Instructions

.1 The Consultant may issue Supplemental Instructions to provide clarifications to the Contract Documents, provide additional information, or make minor variations in the Work not involving adjustment in the Contract Price or Contract Time.

.2 If the Contractor considers a Supplemental Instruction to require an adjustment in Contract Price or Contract Time, the Contractor shall promptly notify the Consultant and the Owner in writing and shall not proceed with any work related to the Supplemental Instruction pending receipt of a Change Order, a Change Directive, or, in accordance with the dispute resolution provisions of the General Conditions of Contract, a Notice in Writing of a dispute and instructions to proceed.

CONTRACTOR REQUEST FOR CHANGE ORDER

Note that this page must be emailed or delivered to the Consultant's office, prior to 14 days of need for a final opinion from the Consultant by the Contractor to ensure that the project incurs no delays. Use only 1 page for each proposed change.

Proposed change . . . . . .

. . . . . .

Reason for change: _____ Problem with existing requirement

_____ Improvement to result from proposed change

_____ Proposed change needed to comply with Codes or Regulations as understood by trade or as indicated by Authorities having jurisdiction

Estimated change to construction time (+ or -) . . . . . .

Estimated change to bid cost (+ or -) . . . . . .

Contractor or subtrade . . . . . .

Signed . . . . . .

Consultant Use Only:

Consultant Affected	**Need for change validated**	**Need for change not validated**	**Date**	**Signature**
Architect				
Structural				
Mechanical				
Electrical				
Landscape				
Other				
Other				

Contemplated change order initiated . . . . . .

Change order initiated . . . . . .

Change order Number. . . . . .

General comments . . . . . .

. . . . . .

- END OF SECTION -

SECTION 01290 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 Schedule of Values: Application for Payment

.1 Prior to the first application for payment, submit for Consultant's review an initial schedule of values. Modify the initial schedule of values if and as requested by Consultant. Obtain Consultant's written acceptance of the initial schedule of values prior to the first application for payment. Before submitting each "Application for Payment", the Contractor shall review with the Consultant the percentage of work completed for each item of work within the application.

.2 Together with the first and all subsequent applications for payment, submit updated versions of the schedule of values to indicate the values, to the date of application for payment, of work performed and Products delivered to Place of the Work. Refer to the attached "Application for Payment" form and Schedule of Values form, completed as specified herein. The Contractor may copy these forms and use them as a base for payment application. Both the Schedule of Values form and the Application for Payment forms must be submitted for each progress payment application.

.3 Provide the schedule of values in an electronic spreadsheet format that provides for inclusion of the following information:

.1 Identifying information including title and location of the Work, name of Contractor, number and date of application for payment, and period covered by the application for payment.

.2 A work breakdown structure based on Contractor, Subcontractor and sub-Subcontractor work breakdown. Include separate line items for closeout procedures including closeout submittals, demonstration and training, start-up and testing, and commissioning collectively valued at minimum **$2,500.00**.

.3 For each item in the work breakdown structure, provide as a minimum the following information, under headings as indicated:

.1 Breakdown Amount: A dollar amount, including an appropriate pro rata portion of Contractor's overhead and profit.

.2 Performed to Date: The value of Work performed and Products delivered to Place of the Work up to the date of the application for payment, stated as a percentage of the Contract Price and in dollars.

.3 Previously Performed: The value of Work performed and Products delivered to the Place of the Work for which payment has been previously certified, stated in dollars.

.4 Current Period: The value of Work performed and Products delivered to Place of the Work for which Contractor is currently applying for payment, stated in dollars.

.5 Balance to Complete: The value of Work not yet performed and Products not yet delivered to Place of the Work, stated in dollars.

.4 Provide the Application for Payment in an electronic spreadsheet format that provides for inclusion of the following information:

.1 the Contractor's H.S.T. Registration Number

.2 the H.S.T. applicable to the Current Contract Price

.3 the amount payable, including H.S.T.

APPLICATION FOR PAYMENT

Contractor: _____

Address: _____

To: JPM Architecture Inc.
51 Kingston Street, Goderich, Ontario N7A 3K3
Attn: Jason Morgan - Project Architect

Project: Municipal Child Care Centre Kitchen Renovations
376 Cambridge St., Goderich, Ontario N7A 2Z1

Owner: The Corporation of the Town of Goderich
57 West Street, Goderich, Ontario N7A 2K5

For submission with "Schedule of Values"

Progress Billing # __
Date: _____

Period Covered:
From: _____
To: _____

Contractor's H.S.T. Registration # _____

CONTRACT STATUS (All prices excluding H.S.T.)

	Total Amount	Work Performed to Date %	Work Performed to Date Value	Value Previously Performed	Value Current Period
Original Contract (Totals per schedule of Values)	$	%		$	
Approved C.O. #'s ____	$			$	
Current Contract Total	$			$	
H.S.T. @ 13 %	$			$	
Total including H.S.T.	$			$	

REQUEST FOR PAYMENT (All prices excluding H.S.T.)

Current Value of Work Performed (and products on site): $ _____

Total Holdback @ ____ % : $ _____

Holdback Released to Date: $ _____

Net Holdback Retained: $ _____ $ _____

Cumulative Amount Claimed (Value of work performed and products on site less holdback retained): $ _____

Less Amount Previously Certified on Certificate for Payment # __: $ _____

TOTAL AMOUNT DUE THIS APPLICATION (Excluding H.S.T.): $ _____

H.S.T. payable on application @ 13 %: $ _____

Total Payment Due this application including H.S.T.: $ _____

Prepared by : _____

SCHEDULE OF VALUES

Contractor: _____

Address: _____

For submission with
"Application for Payment"

Progress Billing # ____
Date: _____

Period Covered:
From: _____
To: _____

To: JPM Architecture Inc.
51 Kingston Street, GODERICH, Ontario N7A 3K3
Attn: Jason Morgan - Project Architect

Project: Municipal Child Care Centre Kitchen Renovations
376 Cambridge St., Goderich, Ontario N7A 2Z1

Owner: The Corporation of the Town of Goderich
57 West Street, Goderich, Ontario N7A 2K5

COST BREAKDOWN (All prices excluding H.S.T.)

Division #	Description	Total Amount	Work Performed To Date		Value Previously Performed	Value Current Period
			%	Value		
		$	%	$	$	$
Totals		$	%	$	$	$

1.2 Application for Payment Enclosure Requirements

.1 Each Application for Payment shall include:

.1 the attached "Application for Payment" form, completed as specified herein;

.2 the "Schedule of Values" form, completed as specified herein;

.3 Certificate of Clearance from the Worker's Compensation Board

.2 With second and subsequent Applications for Payment, include a completed CCDC 9A – Statutory Declaration of Progress Payment Distribution by Contractor, per the attached sample form. Ensure that the form is completed in accordance with CCDC guidelines and affix copyright seal.

1.3 Payment for Products Stored Off Site

.1 Owner may, due to extraordinary circumstances and at Owner’s sole discretion, make payments for Products delivered to and stored at a location other than Place of the Work, subject to:

.1 a request submitted by Contractor in writing, with appropriate justification, and

.2 whatever conditions Owner or Consultant may establish for such payments, as required to protect Owner’s interests.

1.4 Release of Holdback

.1 Documents for "basic" holdback release shall include a "tear sheet" from the Daily Commercial News or Link2Build Ontario showing publication of the certificate of Substantial Performance of the Work of the Contract as issued by the Consultant. Note: Contractor must not publish its own certificate, but must use the certificate issued and signed by the Consultant.

- END OF SECTION -

Statutory Declaration
of Progress Payment Distribution by Contractor

Standard Construction Document

CCDC 9A - 2001

To be made by the Contractor **prior to payment** when required as a condition for either:

- ☐ second and subsequent progress payments; or
- ☐ release of holdback.

The last application for progress payment for which the Declarant has received payment is No. _____

dated the _____ day of _____,

in the year _____.

Identification of Contract

Name of Contract (Location and description of the Work as it appears in the Contract Documents)

Date of Contract: _____ _____ _____

Day *Month* *Year*

Name of Owner

Name of Contractor

Identification of Declarant

Name of Declarant

Position or Title (of office held with Contractor)

Declaration

I solemnly declare that, as of the date of this declaration, I am an authorized signing officer, partner or sole proprietor of the Contractor named in the Contract identified above, and as such have authority to bind the Contractor, and have personal knowledge of the fact that all accounts for labour, subcontracts, products, services, and construction machinery and equipment which have been incurred directly by the Contractor in the performance of the work as required by the Contract, and for which the Owner might in any way be held responsible, have been paid in full as required by the Contract up to and including the latest progress payment received, as identified above, except for:

1) holdback monies properly retained,
2) payments deferred by agreement, or
3) amounts withheld by reason of legitimate dispute which have been identified to the party or parties, from whom payment has been withheld.

I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath.

Declared before me in _____ this _____ day of _____,

City/Town and Province

in the year _____.

_____ _____

Signature of Declarant *(A Commissioner for Oaths, Notary Public, Justice of the Peace, etc.)*

The making of a false or fraudulent declaration is a contravention of the Criminal Code of Canada, and could carry, upon conviction, penalties including fines or imprisonment.

Apply a CCDC 9 copyright seal here.

Use of this form without a CCDC 9 copyright seal constitutes an infringement of copyright. Use of this form with a CCDC 9 copyright seal demonstrates that it is intended by the parties to be an accurate and unamended version of CCDC 9A - 2001.

CCDC Copyright 2001

Canadian Construction Documents Committee

SECTION 01311 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 Construction Start-Up Meeting

.1 Promptly after Contract award, Owner will establish the time and location of a construction start-up meeting to review and discuss administrative procedures and responsibilities. Owner will notify Contractor at least 5 Working Days before the meeting.

.2 Senior representatives of Owner and Contractor, including Contractor's project manager and site superintendent, shall be in attendance.

.3 Owners representative will chair the meeting and record and distribute the minutes.

.4 Agenda will include following:

.1 Appointment of official representatives of Owner and Contractor.

.2 Project communications.

.3 Contract Documents for construction purposes.

.4 Documents at the site.

.5 Contractor's use of premises.

.6 Owner-supplied Products.

.7 Work restrictions.

.8 Cash allowances.

.9 Contract modification procedures.

.10 Payment procedures.

.11 Construction progress meetings.

.12 Construction progress schedule, including long lead time items.

.13 Submittals schedule and procedures.

.14 Quality requirements, including testing and inspection procedures.

.15 Contractor's mobilization.

.16 Temporary utilities.

.17 Existing utility services.

.18 Construction facilities.

.19 Temporary barriers and enclosures.

.20 Temporary controls.

.21 Site safety.

.22 Site security.

.23 Cleaning and waste management.

.24 Closeout procedures and submittals.

1.2 Construction Progress Meetings

.1 Schedule regular monthly construction progress meetings for the duration of the Work. Contractor shall prepare meeting agendas, chair the meetings, and record and distribute the minutes.

.2 Arrange for and provide physical space for meetings.

.3 Contractor shall record in the meeting minutes significant decisions and identify action items and action dates by attendees or the parties they represent.

.4 Contractor shall distribute copies of minutes within three Working Days after each meeting to meeting attendees and any affected parties who may not be in attendance.

.5 Ensure that Subcontractors attend as and when appropriate to the progress of the Work.

.6 Agenda for each meeting shall include the following, as a minimum:

.1 Work progress.

.2 Field observations, including any problems, difficulties, or concerns.

.3 Construction progress schedule.

.4 Submittals schedule.

.5 Proposed changes in the Work.

.6 Requests for information.

.7 Site safety issues.

.8 Other business.

- END OF SECTION -

SECTION 01320 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 Summary

.1 This Section specifies Contractor's responsibilities for preparation and submission of schedules and other documentation related to tracking construction progress, in accordance with General Conditions GC 3.4.

.2 The purpose of submitting progress schedules is to:

.1 inform Owner and Consultant of actual progress versus planned progress, and

.2 provide assurance that scheduling issues are being proactively identified and addressed in a timely manner, and that planned progress is being maintained as closely as possible.

.3 Include in the schedule the requirements of Section 01110 - Summary of Work and Section 01140 - Work Restrictions.

1.2 Construction Progress Schedule

.1 Format and Content:

.1 Prepare schedule in the form of a Critical Path Method (CPM) Gantt chart using appropriate scheduling software.

.2 Provide a work breakdown structure identifying key activities, work packages, and major milestones, including long delivery Products, inspection and testing activities, and similar items, at a sufficient level of detail to effectively manage construction progress.

.3 Indicate milestone date for Substantial Performance of the Work.

.2 Submission:

.1 Submit initial schedule to Owner and Consultant within 7 Working Days after Contract award.

.2 Submit schedule via e-mail as .pdf files.

.3 Consultant will review format and content of initial schedule and request necessary changes, if any, within 5 Working Days after receipt.

.4 If changes are required, resubmit finalized initial schedule within 5 Working Days after return of review copy.

.5 Submit updated progress schedule monthly to Owner and Consultant, indicating actual and projected start and finish dates with report date line and progress.

1.3 Submittals Schedule

.1 Format and Content:

.1 Prepare schedule identifying all required Shop Drawing, Product data, and sample submissions.

.2 Prepare schedule in electronic format.

.3 Provide a separate line for each required submittal, organized by Specifications section names and numbers, and further broken down by individual Products and systems as required.

.4 For each required submittal, show planned earliest date for initial submittal and latest date for return of reviewed submittal without causing delay.

.5 Allow time in schedule for resubmission of submittals, should resubmission be necessary.

.2 Submission

.1 Submit initial schedule to Consultant within 15 Working Days after Contract award.

.2 Submit schedule via e-mail as PDF files.

.3 Consultant will review format and content of initial schedule and request necessary changes, if any, within 5 Working Days after receipt.

.4 If changes are required, resubmit finalized schedule within 5 Working Days after return of review copy.

.5 Submit updated submittals schedule monthly to Consultant.

1.4 Schedule Management

.1 A schedule submitted as specified and accepted by Consultant shall become the baseline schedule and shall be used as the baseline for updates.

.2 At each regular progress meeting, review and discuss current construction progress and submittals schedules with Consultant [and Owner], including activities that are behind schedule and planned measures to regain schedule slippage in key areas on or near the critical path.

.3 Activities considered behind schedule are those with start or completion dates later than the dates shown on the baseline schedule.

1.5 Recording Actual Site Conditions on As-Built Drawings

.1 Obtain from Consultant an electronic copy of the construction Drawings for the purpose of creating as-built drawings. Record information in electronic form, clearly identifying as-built deviations from the originally obtained construction Drawings.

.2 Clearly label each drawing as “AS-BUILT DRAWING”. Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.3 Record actual construction including:

.1 Measured depths of elements of foundation in relation to finish first floor datum.

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.3 Measured locations of pipes, ducts, conduits, outlets, fixtures, access panels, and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Changes made by Change Orders and Supplemental Instructions.

.6 References to Shop Drawings, where Shop Drawings show more detail.

.4 Do not use as-built drawings for construction purposes.

1.6 Progress Photographs

.1 Arrange for periodic digital photography to document and provide a photographic record of the progress of the Work. Submit progress photographs at the request of the Consultant or Owner.

.2 Identify each photograph by project name and date taken.

.3 Submission: Submit .jpg format files in standard resolution, on USB drive, at completion of the Project.

.4 Do not use progress or any other Project photographs for promotional purposes without Owner’s written consent.

- END OF SECTION -

SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 Administrative

.1 Submit specified submittals to Consultant for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in the Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time or for Product substitutions or other deviations from the Drawings and Specifications.

.2 Where required by authorities having jurisdiction, provide submittals to such authorities for review and approval.

.3 Do not proceed with Work affected by a submittal until review is complete.

.4 Present Shop Drawings, Product data, and samples in imperial units. Where items or information is not produced in imperial units, converted values are acceptable.

.5 Review submittals, provide verified field measurements where applicable, and affix Contractor's review stamp prior to submission to Consultant. Contractor's review stamp represents that necessary requirements have been determined and verified, and that the submittal has been checked and coordinated with requirements of the Work and Contract Documents.

.6 Verify field measurements and that affected adjacent work is coordinated.

.7 Submittals not meeting specified requirements will be returned with comments.

.8 Reproduction of construction Drawings to serve as background for Shop Drawings is permitted. If construction Drawings are used for this purpose, remove references to Consultant.

.9 Do not propose Substitutions or deviations from Contract Documents via Shop Drawing, Product data and sample submittals.

1.2 Shop Drawings and Product Data

.1 Indicate Products, methods of construction, and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of the Work.

.2 Where Products attach or connect to other Products, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross-references to Drawings, Specifications and other already reviewed Shop Drawings.

.3 Accompany submittals with a transmittal information including:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification of each submittal item and quantity.

.5 Other pertinent data.

.4 *Shop Drawing* submittals shall include:

.1 Date and revision dates.

.2 Project title and number.

.3 Name and address of:

.1 Subcontractor.

.2 Supplier.

.3 Manufacturer.

.4 *Contractor's* stamp, date, and signature of *Contractor's* authorized representative responsible for *Shop Drawing* review, indicating that each Shop Drawing has been reviewed for compliance with *Contract Documents* and, where applicable, that field measurements have been verified.

.5 Details of appropriate portions of the *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 Relationships to other parts of the *Work*.

.5 *Product* data submittals shall include material safety data sheets (MSDS) for all controlled Products.
.6 Submit electronic copy of *Shop Drawings* where specified in the technical *Specifications*.
.7 Submit electronic copy of *Product* data sheets or brochures where specified in the technical *Specifications*.
.8 Where a submittal includes information not applicable to the *Work*, clearly identify applicable information and strike out non-applicable information.
.9 Supplement standard information to include details applicable to *Project*.
.10 If upon Consultant's review no errors or omissions are discovered, or if only minor corrections are required as indicated, submittal will be returned and fabrication or installation of Work may proceed. Submittal will be marked "Reviewed" and/or "Reviewed as Noted".
.11 If upon Consultant's review significant errors or omissions are discovered, a so noted copy will be returned for correction and resubmission. Do not commence fabrication or installation. Submittal will be marked "Revise and Resubmit".
.12 Consultant's notations on submittals are intended to ensure compliance with Contract Documents and are not intended to constitute a change in the Work requiring change to the Contract Price or Contract Time. If Contractor considers any Consultant's notation to be a change in the Work, promptly notify Consultant in writing before proceeding with the Work.
.13 Resubmit corrected submittals through same procedure indicated above, before any fabrication or installation of the Work proceeds. When resubmitting, notify Consultant in writing of any revisions other than those requested by Consultant.

1.3 Samples

.1 Submit samples for Consultant's review in duplicate where specified in the technical Specifications. Label samples as to origin, Project name, and intended use.
.2 Deliver samples prepaid to Consultant's business address.
.3 Notify Consultant in writing of any deviations in samples from requirements of Contract Documents.
.4 Where a required colour, pattern or texture has not been specified, submit full range of available Products meeting other specified requirements.
.5 Consultant selection from samples is not intended to change the Contract Price or Contract Time. If a selection would affect the Contract Price or Contract Time, notify Consultant in writing prior to proceeding with the Work.
.6 Resubmit samples as required by Consultant to comply with Contract Documents.
.7 Reviewed and accepted samples will establish the standard against which installed Work will be reviewed.

- END OF SECTION -

SECTION 01400 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 Reference Standards

.1 "Reference standards" means consensus standards, trade association standards, guides, and other publications expressly referenced in Contract Documents.

.2 Where an edition or version date is not specified, referenced standards shall be deemed to be the latest edition or revision issued by the publisher at the time of bid closing. However if a particular edition or revision date of a specified standard is referenced in an applicable code or other regulatory requirement, the regulatory referenced edition or version shall apply.

.3 Reference standards establish minimum requirements. If Contract Documents call for requirements that differ from a referenced standard, the more stringent requirements shall govern.

.4 If compliance with two or more reference standards is specified and the standards establish different or conflicting requirements, comply with the most stringent requirement. Refer uncertainties to Consultant for clarification.

.5 Within the Specifications, reference may be made to the following standards writing, testing, or certification organizations by their acronyms or initialisms:

.1 AA - Aluminum Association
.2 AAMA - American Architectural Manufacturers Association
.3 ACI - American Concrete Institute
.4 AISC - American Institute of Steel Construction
.5 ANSI - American National Standards Institute
.6 ASHRAE - American Society of Heating, Refrigeration and Air-Conditioning Engineers
.7 ASME - American Society of Mechanical Engineers
.8 ASTM - American Society for Testing and Materials
.9 AWI - Architectural Woodworking Institute
.10 AWMAC - Architectural Woodwork Manufacturers Association of Canada
.11 AWPA - American Wire Producers Association
.12 CaGBC - Canadian Green Building Council
.13 CCMC - Canadian Construction Materials Centre
.14 CNRC - National Research Council Canada
.15 CRCA - Canadian Roofing Contractors Association
.16 CSDFMA - Canadian Steel Door and Frame Manufacturers Association
.17 CGSB - Canadian General Standards Board
.18 CISC - Canadian Institute of Steel Construction
.19 COFI - Council of Forest Industries of British Columbia
.20 CPCI - Canadian Prestressed Concrete Institute
.21 CSA - Canadian Standards Association
.22 CSSBI - Canadian Sheet Steel Building Institute
.23 CUFCU - Canadian Urethane Foam Contractors Association
.24 CWB – Canadian Welding Bureau
.25 GANA - Glass Association of North America
.26 ICC - International Code Council
.27 IGCC - Insulating Glass Certification Council
.28 ICEA - Insulated Cable Engineers Association
.29 IEEE - Institute of Electrical and Electronics Engineers
.30 IGMAC – Insulating Glass Manufacturers Association of Canada
.31 ISO - International Organization for Standardization

.32 LEED - Leadership in Energy and Environmental Design
.33 MPP – Master Painters Institute
.34 MSS - Manufacturers Standardization Society of the Valve and Fittings Industry
.35 NAAMM - National Association of Architectural Metal Manufacturers
.36 NEMA - National Electrical Manufacturers Association
.37 NFPA - National Fire Protection Association
.38 NFRC - National Fenestration Rating Council
.39 NHLA - National Hardwood Lumber Association
.40 NLGA - National Lumber Grades Authority
.41 OIRCA - Ontario Industrial Roofing Contractors Association
.42 OPSS - Ontario Provincial Standard Specifications
.43 OPSD - Ontario Provincial Standard Drawings
.44 PCI - Precast Concrete Institute
.45 RFCI - Resilient Floor Covering Institute
.46 RSIC - Reinforcing Steel Institute of Canada
.47 SSPC – The Society for Protective Coatings
.48 SIGMA - Sealed Insulating Glass Manufacturer’s Association
.49 SMACNA - Sheet Metal and Air Conditioning Contractors’ National Association
.50 SSPC – Steel Structures Painting Council
.51 TPIC - Truss Plate Institute of Canada
.52 TTMAC - Terrazzo, Tile and Marble Association of Canada
.53 ULC - Underwriters' Laboratories of Canada
.54 VSI - Vinyl Siding Institute
.55 WDMA - Window and Door Manufacturer’s Association

- END OF SECTION -

SECTION 01510 - TEMPORARY UTILITIES

PART 1 - GENERAL

1.1 Temporary Utilities - General
- .1 Provide temporary utilities, as specified, and as otherwise necessary to perform the Work expeditiously.
- .2 Remove temporary utilities after use.

1.2 Temporary Water Supply
- .1 Connect to and utilized the Owner's existing water supply for temporary use during construction. Usage at no cost to Contractor.

1.3 Temporary Heating and Ventilation
- .1 The building will remain occupied throughout construction, and all existing HVAC systems shall remain operational. The Contractor is responsible for providing any supplemental heat, ventilation, and/or dehumidification necessary to maintain safe, comfortable, and acceptable environmental conditions for building occupants and to facilitate the execution of the work.
- .2 Provide supplemental temporary heat and ventilation in enclosed areas as required to:
  - .1 Facilitate progress of Work.
  - .2 Protect the Work against dampness and cold.
  - .3 Prevent moisture condensation on surfaces, freezing, or other damage to finishes or stored Products.
  - .4 Maintain specified minimum ambient temperatures and humidity levels for storage, installation and curing of Products.
  - .5 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
    - .1 Conform with applicable codes and standards.
    - .2 Enforce safe practices.
    - .3 Prevent abuse of services.
    - .4 Prevent damage to finishes.
- .3 Provide supplemental temporary ventilation for the Work as required to:
  - .1 Prevent accumulations of fumes, exhaust, vapours, gases and other hazardous, noxious, or volatile substances in enclosed spaces, as required to maintain a safe work environment meeting applicable regulatory requirements.
- .4 During dust-generating work, the Contractor shall provide temporary filters and/or block off return air grilles and ductwork within the work area.
  - .1 Protect the ducting system using filters with at least 50% efficiency (NDS), to be inspected daily and replaced weekly, or more frequently as necessary based on inspection.
  - .2 Any dust migration beyond the work area must be immediately addressed by additional filtration, barriers, or cleaning, to ensure safe and healthy conditions for building occupants.

1.4 Temporary Electrical Power & Lighting
- .1 Connect to and utilize the Owner's existing electrical supply for temporary construction power, provided at no cost to the Contractor.
- .2 The Contractor shall coordinate all temporary electrical use with the Owner to prevent overloading circuits or disrupting normal building operations.
- .3 All temporary electrical installations shall comply with the latest edition of the Ontario Electrical Safety Code (or applicable local code), including proper grounding, overcurrent protection, and use of suitable extension cords, panels, and connections.
- .4 The Contractor shall immediately report any electrical issues, interruptions, or hazards to the Owner and take corrective action as required to maintain safe and continuous building operations.

- END OF SECTION -

SECTION 01520 - CONSTRUCTION FACILITIES

PART 1 - GENERAL

1.1 Construction Facilities - General
- .1 Provide temporary construction facilities as necessary for performance of the Work and in compliance with applicable regulatory requirements.
- .2 Maintain temporary construction facilities in good condition for the duration of the Work.
- .3 Remove temporary construction facilities from Place of the Work when no longer required.

1.2 Construction Parking
- .1 Parking for Contractor personnel shall be provided in the public parking area on north side of Cambridge Street. Designation of specific spaces is as shown on Drawings. Multiple trades are expected on-site simultaneously; therefore, the Contractor shall minimize the number of vehicles on-site to reduce congestion.

1.3 Vehicular Access
- .1 The Contractor shall provide and maintain adequate access to the Work Area at all times.
- .2 Site access is shared by the public, staff and Contractor personnel. The Contractor shall assume full responsibility for any damage caused by construction traffic and shall prevent, contain, or promptly clean up any construction debris or material spillage.

1.4 Site Offices
- .1 A site office is not required for this Project. The Contractor shall provide the Site Foreman with a cell phone, portable laptop, and Wi-Fi connection to enable email communication.

.

1.5 Sanitary Facilities
- .1 Provide portable washroom facilities on site, within fenced work area. Locate the portable washroom so that access for cleaning is readily available by portable washroom company.
- .2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.6 Project Signage
- .1 Only Project Identification and Consultant/Contractor signboards, and notices for safety or instruction are permitted on site. No other site signage will be allowed.

- END OF SECTION -

SECTION 01545 - SAFETY GUIDELINES & PROTECTIONS

PART 1 - GENERAL

1.1 Construction Safety Measures

.1 Observe and enforce construction safety measures required by Ontario Building Code (latest revision), Provincial Government, Worker's Compensation Board and Municipal statutes and Authorities.

.2 This project is classed as Notifiable under Provincial Department of Labour regulations. Submit proof, to the Consultant, within 5 days of commencement of project, indicating that the Department has been duly notified.

.3 The Ontario Ministry of Labour also requires that the appended “Registration of Constructors and Employers Engaged in Construction” be completed and posted at the site of the Work.

.4 In event of conflict between any provisions of above authorities, the most stringent provision will apply.

1.2 Construction Safety

.1 Provide an on-site safety meeting, for all principal trades and their on-site personnel, before work on the project commences.

.2 Take all necessary steps to protect persons on or affected by the Work from any harm during the construction. Conform to all relevant Safety Standards. Ensure that the site is monitored at all times and that any incompetent or non-complying (to safety requirements) personnel are removed from the site.

.3 On-site accidents and reports by inspectors noting noncompliance with Safety Standards must be reported immediately, in writing, to the Consultant.

.4 Be responsible for the safety performance of all sub-trades. Include all safety requirements of this Contract in agreements with sub-trades.

.5 Where the Drawings or Specifications require the Contractor to provide temporary footway, erection of structures or equipment, protection for workmen or others, the Contractor shall assume all expense and responsibility.

1.3 Public Safety

.1 Notwithstanding instructions elsewhere in this Specification, take steps to ensure that members of the public are protected from falling debris, movement of vehicles and other operations, which may cause death or injury.

.2 Immediately comply with orders of safety officials and rectify situations, which may cause danger to the general public.

1.4 WHMIS

.1 The Contractor will adequately train and instruct their workers in accordance with WHMIS requirements.

.2 The Contractor will consult with the Owner’s WHMIS coordinator, regarding the physical set up of the job site and comply with any orders of the coordinator in that regard.

.3 The Contractor will supply the Owner with a list of hazardous materials to be used and MSDS (Material Safety Data Sheets) to be kept in a readily accessible location, for the duration of the project.

.4 The Owner will supply the Contractor with information regarding any hazardous materials known to be on the site, prior to construction. The Consultant will assist in this, where possible, but it is agreed by the two parties to the Contract that the Consultant has no responsibility in this Contract for the discovery or provision of this information.

.5 The Contractor will not bring any controlled products onto the property that are not labelled in accordance with WHMIS requirements.

.6 The WHMIS coordinator is permitted to inspect the work site at any time and to speak to workers to determine the adequacy of their safety knowledge, if considered necessary. Repeated or serious violations may result in cancellation of the Contract.

.7 The Contractor will indemnify the Owner for any costs incurred as a result of their failure to comply with the Occupational Health and Safety Act.

1.5 Fire Safety Requirements

.1 Comply with requirements of fire safety, as may be defined by the Provincial Fire Marshal.

.2 Comply with requirements as issued by the local Fire Chief.

.3 Maintain on site fire extinguishers, during the operations, for emergency use by work crews. Extinguishers shall be class A, B or C, as required and appropriate, depending on the types of operations and flammables in the vicinity.

.4 Remove rubbish and flammable materials daily. Do not dispose of waste material by burning on or near the premises.

.5 Do not use open flames on the job.

1.6 Overloading

.1 Ensure no part of the Work is subjected to a load, which will endanger its safety or will cause permanent deformation.

- END OF SECTION -

Ontario Ministry of Labour / Ministère du Travail de l'Ontario

Registration of Constructors and Employers Engaged in Construction
Inscription des constructeurs et des employeurs associés à des travaux de construction

Pursuant to section 5 of the Construction Regulations made under the OHSA, "Before beginning work at a project, each constructor and employer engaged in construction shall complete an approved registration form. The constructor shall ensure that each employer at the project provides to the constructor a completed approved registration form; and a copy of the employer's completed form is kept at the project while the employer is working there."

Conformément à l'article 5 du règlement intitulé Construction Projects, pris en application de la Loi sur la santé et la sécurité au travail, «les constructeurs et les employeurs associés à des travaux de construction doivent remplir un formulaire officiel avant de commencer leurs travaux. Les constructeurs doivent veiller à ce que tous les employeurs associés au chantier lui remettent un formulaire d'inscription dûment rempli. Une copie du formulaire d'inscription des employeurs doit être gardée au chantier tant et aussi longtemps que les employeurs y travaillent.»

Nature of Business (check one)
Genre d'entreprise (cochez une case)

☐ Individual / *Individuelle* ☐ Sole proprietorship / *À propriétaire unique* ☐ Partnership / *En nom collectif* ☐ Corporation / *Société* ☐ Joint Venture / *Coentreprise*

Name and Full Address of Business / *Nom et adresse complète de l'entreprise*

Telephone No.: / *N° de téléphone*

Fax: / *N° de télécopieur*

Names of Corporations / *Nom des sociétés*

Main Business Address / *Adresse principale*

1.

Telephone No.: / *N° de téléphone*

Fax: / *N° de télécopieur*

2.

Telephone No.: / *N° de téléphone*

Fax: / *N° de télécopieur*

Names of Directors & Principal Officers / *Nom des directeurs et des principaux dirigeants*

Title / *Titre*

Date Appointed / *Date d'entrée en fonction*

1.

2.

Average No. of Employees on Project / *Nombre moyen d'employés sur le chantier*
☐ 1 - 5 ☐ 6 - 19 ☐ 20 - 49 ☐ 50 + / *50 et plus*

Master Business Licence No. / *N° du permis principal d'entreprise (MCC)*	Retail Sales Tax No. / *N° de taxe de vente au détail*	WSIB No. / *N° de compte (CSPAAT)*	WSIB Rate No. / *N° de groupe tarifaire (CSPAAT)*

I hereby certify that the above information is correct / *J'atteste par la présente que les renseignements donnés plus haut sont exacts.*

Position & Title / *Poste et titre*

Signature / *Signature*

Date / *Date*

Employers are required to submit the completed form to the Constructor for posting/display at the project.
Les employeurs doivent remettre le formulaire dûment rempli au constructeur pour qu'il puisse l'afficher sur le chantier.

This form may be photocopied / *Ce formulaire peut être photocopié.*

1000 (03/00)

SECTION 01560 - TEMPORARY BARRIERS AND ENCLOSURES

PART 1 - GENERAL

1.1 Barriers and Enclosures - General

.1 As per the General Conditions Article GC 3.3 the Contractor shall have sole responsibility for the design, erection, operation, maintenance, and removal of temporary supports, structures, and facilities and the design and execution of construction methods required in their use.

.2 The Contractor shall engage and pay for registered professional engineering to perform functions related to such temporary supports, structures and facilities, in accordance with the General Conditions. Submit, for review, temporary work shop drawings stamped by a Structural Engineer, registered in the Province of Ontario, as applicable under Section 01545.

.3 This work includes but is not limited to temporary platforms, scaffolding, and temporary support of existing structures to carry construction loads.

.4 Provide temporary barriers and enclosures necessary to protect the public and to secure Place of the Work during performance of the Work.

.5 Provide protection of existing structures and landscaping adjacent to work areas, including asphalt pavement, trees, bushes, grassed areas etc.

.6 Comply with applicable regulatory requirements.

.7 Remove temporary barriers and enclosures from Place of the Work when no longer required.

1.2 Weather Enclosures

.1 Provide weather tight enclosures to unfinished openings, and other openings in roofs.

.2 Design weather enclosures to withstand wind pressure and snow loading requirements.

1.3 Storage Enclosures

.1 The Contractor shall provide enclosed, lockable trailer(s), truck(s), or box storage as required to store and protect all materials intended for use in the Work. All materials shall be maintained in a secure and protected condition within the Work area.

.2 Where exterior site storage is necessary, the Contractor shall submit proposed storage locations to the Owner's Representative and Consultant for review and approval prior to use. The Contractor shall ensure that all exterior storage does not interfere with ongoing site operations and maintains the security and condition of stored materials.

1.4 Dust Tight Partitions and Floor Protection

.1 Provide dust-tight polyethylene screens to isolate interior building areas from dust-generating activities and to separate these areas from the public and staff. Screens shall fully enclose the protected areas to prevent the spread of dust and debris.

.2 Protect air diffusers and return air grilles by installing tightly sealed polyethylene covers to prevent dust entry into duct systems. Temporarily close down dampers in ducts to reduce supply air pressures. Contractor is responsible to clean ducts and replace filters and make good any damage caused by the Work due to lack of temporary protection measures.

.3 Erect, maintain, and relocate screens as required to facilitate ongoing construction operations, ensuring that all protected areas remain sealed from dust intrusion.

.4 Provide protective floor covering, similar to "Ram Board Plus," over new flooring. Maintain floor protection throughout construction until deficiency inspections commence. Following removal of floor protection, provide protective booties for use by all personnel until Substantial Performance of the Work. Ensure that all floor protection lies flat, does not create a tripping hazard, and does not interfere with construction activities.

1.5 Fire Routes

.1 Maintain fire access routes, including overhead clearances, for use by emergency response vehicles.

1.6 Protection of Building Finishes

.1 Provide necessary temporary barriers and enclosures to protect completed or partially completed finished surfaces from damage during performance of the Work.

- END OF SECTION -

SECTION 01610 - COMMON PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 General
- .1 Provide Products that are not damaged or defective, and suitable for purpose intended, subject to specified requirements. If requested by Consultant, furnish evidence as to type, source and quality of Products provided.
- .2 Unless otherwise specified, maintain uniformity of manufacture for like items throughout.
- .3 Permanent manufacturer's markings, labels, trademarks, and nameplates on Products are not acceptable in prominent locations, except where required by regulatory requirements or for operating instructions, or when located in mechanical or electrical rooms.

1.2 Product Options
- .1 Subject to the provisions of Section 01250 - Substitution Procedures:
  - .1 Wherever a Product or manufacturer is specified by a single proprietary name, provide the named Product only.
  - .2 Wherever more than one Product or manufacturer is specified by proprietary name for a single application, provide any one of the named Products.
- .2 Wherever a Product is specified by reference to a standard only, provide any Product that meets or exceeds the specified standard. If requested by Consultant, submit information verifying that the proposed Product meets or exceeds the specified standard.
- .3 Wherever a Product is specified by descriptive or performance requirements only, provide any Product that meets or exceeds the specified requirements. If requested by Consultant, submit information verifying that the proposed Product meets or exceeds the specified requirements.

1.3 Product Availability and Delivery Times
- .1 Promptly upon Contract award and periodically during construction, review and confirm Product availability and delivery times. Order Products in sufficient time to meet the construction progress schedule and the Contract Time.
- .2 If a specified Product is no longer available, promptly notify Consultant. Consultant will take action as required.
- .3 If delivery delays are foreseeable, for any reason, promptly notify Consultant.
  - .1 If a delivery delay is beyond Contractor’s control, Consultant will provide direction.
  - .2 If a delivery delay is caused by something that was or is within Contractor’s control, Contractor shall propose actions to maintain the construction progress schedule for Consultant’s review and acceptance.

1.4 Storage, Handling and Protection
- .1 Store, handle, and protect Products during transportation to Place of the Work and before, during, and after installation in a manner to prevent damage, adulteration, deterioration and soiling.
- .2 Comply with manufacturer's instructions for storage, handling and protection.
- .3 Store packaged or bundled Products in original and undamaged condition with manufacturer's seals and labels intact. Do not remove from packaging or bundling until required in Work.
- .4 Comply with the requirements of the workplace hazardous materials information system (WHMIS) regarding use, handling, storage, and disposal of hazardous materials, including requirements for labeling and the provision of material safety data sheets (MSDS).
- .5 Store Products subject to damage from weather in weatherproof enclosures.
- .6 Store sheet Products on flat, solid, supports and keep clear of ground. Slope to shed moisture.
- .7 Remove and replace damaged Products.

- END OF SECTION -

SECTION 01730 - EXECUTION

PART 1 - GENERAL

1.1 Summary
- .1 Except where otherwise specified in technical Specifications or otherwise indicated on Drawings, comply with requirements of this Section.

1.2 Codes and Standards
- .1 Perform work in accordance with Ontario Building Code (latest revision) and any other code of provincial or local application, provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.
- .2 Meet or exceed requirements of Contract Documents, specified standards, codes and referenced documents.

1.3 Setting Out of Work
- .1 The Drawings show general location, alignment and elevations of work but no guarantee will be given as to the accuracy of the locations. Contractor shall verify location and elevations on site. Where discrepancies in location or elevations are found, immediately notify Consultant and do not proceed until the discrepancies have been resolved. Upon commencement of work, the Contractor will be deemed to have properly verified all site dimensions and site and building levels, and will therefore assume full responsibility for, and execution of, the complete layout of work to locations, lines and elevations indicated or required to complete the work in general conformity with the design.

1.4 Manufacturer’s Instructions
- .1 Install, erect, or apply Products in strict accordance with manufacturer's instructions.
- .2 Notify Consultant, in writing, of conflicts between Contract Documents and manufacturer’s instructions where, in Contractor’s opinion, conformance with Contract Documents instead of the manufacturer’s instructions may be detrimental to the Work or may jeopardize the manufacturer’s warranty.
- .3 Do not rely on labels or enclosures provided with Products. Obtain written instructions directly from manufacturers.
- .4 Provide manufacturer’s representatives with access to the Work at all times. Render assistance and facilities for such access so that manufacturer’s representatives may properly perform their responsibilities.

1.5 Delivery and Storage
- .1 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.
- .2 Prevent damage, adulteration and soiling of material and equipment, during delivery, handling and storage. Immediately remove rejected material and equipment from site.
- .3 Store material and equipment in accordance with suppliers instructions.
- .4 Touch up damaged factory-finished surfaces to Consultant's satisfaction. Use primer or enamel to match original. Do not paint over name plates or plates carrying equipment specifications and/or code compliance information.

1.6 Concealment
- .1 Conceal pipes, ducts, and wiring in floors, walls and ceilings in finished areas:
  - .1 after review by Consultant and authority having jurisdiction, and
  - .2 where locations differ from those shown on Drawings, after recording actual locations on as-built drawings.
- .2 Provide incidental furring or other enclosures as required.
- .3 Notify Consultant in writing of interferences before installation.

1.7 Fastenings - General

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials.

.2 Prevent electrolytic action and corrosion between dissimilar metals and materials by using suitable non-metallic strips, washers, sleeves, or other permanent separators to avoid direct contact.

.3 Use non-corrosive fasteners and anchors for securing in spaces where high humidity levels are anticipated.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Do not use fastenings or fastening methods that may cause spalling or cracking of material to which anchorage is made.

.7 The Contractor shall not use high velocity powder-actuated fastening tools .

.8 The Contractor may use low velocity powder-actuated fasting tools, only if operated by an operator holding a valid operator's certificate for the device being used.

.9 Fastenings in corrosive materials, or in locations where corrosion may occur, shall be treated or coated as necessary to resist such corrosion.

.10 All steel fastening shall be galvanized, except where otherwise noted.

.11 Provide fastenings as shown on Drawings and as specified in various Sections of these Specifications.

1.8 Fastenings - Equipment

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Bolts shall not project more than one diameter beyond nuts.

1.9 Fire-Rated Assemblies

.1 When penetrating fire rated walls, ceiling, or floor assemblies, completely seal voids with fire-stopping materials, smoke seals, or both, in full thickness of the construction element as required to maintain the integrity of the fire rated assembly.

1.10 Alteration and Repairs to Existing Building

.1 Provide temporary means to maintain security of the building at all times.

1.11 Location of Fixtures, Outlets and Devices

.1 Location of equipment, fixtures and outlets indicated or specified:

.1 Are to be considered as approximate unless specifically dimensioned.

.2 It is the responsibility of the Contractor to bring mounting heights of electrical boxes and other equipment items to the attention of the sub-trades involved.

.3 Where electrical or mechanical outlets or devices are shown, in relationship to elements such as openings or doors, they shall be positioned centred vertically and horizontally on each such element, unless dimensioned or indicated otherwise.

.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. Report any interference between items and installed assemblies, prior to cutting for such installations.

.3 Inform Consultant of impending installation and obtain approval for actual locations.

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

1.12 Protection of Completed Work and Work In-Progress

.1 Adequately protect parts of the Work completed and in progress from any kind of damage.

.2 Promptly remove, replace, clean, or repair, as directed by Consultant, work damaged as a result of inadequate protection.

.3 Do not load or permit to be loaded any part of the Work with a weight or force that will endanger the safety or integrity of the Work.

1.13 Remedial Work

.1 Notify Consultant of, and perform remedial work required to, repair or replace defective or unacceptable work. Ensure that properly qualified workers perform remedial work. Coordinate adjacent affected work as required.

- END OF SECTION -

SECTION 01732 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 Request for Cutting, Patching and Remedial Work
- .1 Submit written request in advance of cutting, coring, or alteration which affects or is likely to affect:
  - .1 Structural integrity of any element of the Work.
  - .2 Integrity of weather-exposed or moisture-resistant elements.
  - .3 Efficiency, maintenance, or safety of any operational element.
  - .4 Visual qualities of sight-exposed elements.
  - .5 Work of Owner or other contractors.
  - .6 Warranty of Products affected.
- .2 Include in request:
  - .1 Identification of Project.
  - .2 Location and description of affected work, including drawings or sketches as required.
  - .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 other contractors.
  - .7 Written permission of affected other contractors.
  - .8 Date and time work will be executed.

1.2 Products
- .1 Unless otherwise specified, when replacing existing or previously installed Products in the course of cutting and patching work, use replacement Products of the same character and quality as those being replaced.
- .2 If an existing or previously installed Product must be replaced with a different Product, submit request for substitution in accordance with Section 01250 - Substitution Procedures.

1.3 Preparation
- .1 Provide supports to ensure structural integrity of surroundings; provide devices and methods to protect other portions of the Work from damage.
- .2 Provide protection from elements for areas that may be exposed by uncovering work.

1.4 Cutting, Patching and Remedial Work
- .1 Coordinate and perform the Work to ensure that cutting and patching work is kept to a minimum.
- .2 Perform cutting, fitting, patching, and remedial work to make the affected parts of the Work come together properly and complete the Work.
- .3 Provide openings in non-structural elements of the Work for penetrations of mechanical and electrical work.
- .4 Perform cutting by methods to avoid damage to other work.
- .5 Provide proper surfaces to receive patching, remedial work, and finishing.
- .6 Perform cutting, patching, and remedial work using competent and qualified specialists familiar with the Products affected, in a manner that neither damages nor endangers the Work.
- .7 Do not use pneumatic or impact tools without Consultant's prior approval.
- .8 Ensure that cutting, patching, and remedial work does not jeopardize manufacturers' warranties.
- .9 Refinish surfaces to match adjacent finishes. For continuous surfaces refinish to nearest intersection. For an assembly, refinish entire unit.
- .10 Fit work to pipes, sleeves, ducts, conduit, and other penetrations through surfaces with suitable allowance for deflection, expansion, contraction, acoustic isolation, and firestopping.
- .11 Maintain fire ratings of fire rated assemblies where cutting, patching, or remedial work is performed. Completely seal voids or penetrations of assembly with firestopping material to full depth or with suitably rated devices.

- END OF SECTION -

SECTION 01740 - CLEANING AND WASTE MANAGEMENT

PART 1 - GENERAL

1.1 Regulatory Requirements
- .1 Comply with applicable regulatory requirements when disposing of waste materials.
- .2 Obtain permits from authorities having jurisdiction and pay disposal fees where required for disposal of waste materials and recyclables.

1.2 General Cleaning Requirements
- .1 Provide adequate ventilation during use of volatile or noxious substances. Do not rely on building ventilation systems for this purpose.
- .2 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .3 Prevent cross-contamination during the cleaning process.
- .4 Notify the Consultant of the need for cleaning caused by Owner or other contractors.

1.3 Progressive Cleaning and Waste Management
- .1 Maintain the Work in a tidy and safe condition, free from accumulation of waste materials and construction debris.
- .2 Provide appropriate, clearly marked, containers for collection of waste materials and recyclables. Locate containers within construction areas.
- .3 Remove waste materials and recyclables from work areas, separate, and deposit in designated containers at end of each Working Day. Collect packaging materials for recycling or reuse.
- .4 Remove waste materials and recyclables from Place of the Work at regular intervals.
- .5 Clean interior building areas prior to start of finish work and maintain free of dust and other contaminants during finishing operations.
- .6 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly finished surfaces nor contaminate building systems.

1.4 Final Cleaning
- .1 Before final cleaning, arrange a meeting at Place of the Work to determine the acceptable standard of cleaning. Ensure that Owner, Consultant, Contractor are in attendance.
- .2 Remove from Place of the Work surplus Products, waste materials, recyclables, Temporary Work, and Construction Equipment not required to perform any remaining work.
- .3 Provide professional cleaning by a qualified, established cleaning company.
- .4 Re-clean as necessary areas that have been accessed by Contractor’s workers prior to Owner occupancy.
- .5 Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed interior finished surfaces.
- .6 Clean and polish glass, stainless-steel, hardware, fibreglass reinforced wall panels, chrome, porcelain enamel, baked enamel, plastic laminate, and all other finished surfaces, including mechanical and electrical fixtures. Replace broken, scratched or otherwise damaged glass.
- .7 Remove dust from lighting reflectors, lenses, lamps, bulbs, and other lighting surfaces.
- .8 Vacuum clean and dust exposed wall, floor, and ceiling surfaces, behind grilles, louvres and screens and above suspended ceiling tiles.
- .9 Clean mechanical, electrical, and other equipment. Replace filters for mechanical equipment if equipment is used during construction.
- .10 Remove waste material and debris from accessible concealed spaces.
- .11 Clean interior window glass and frames.
- .12 Clean and sweep flat roof areas, disturbed by the work.
- .13 Sweep clean and power wash exterior sidewalks, parking areas, and other paved surfaces, disturbed by the work.

1.5 Waste Management and Disposal

.1 Dispose of waste materials and recyclables at appropriate municipal landfills and recycling facilities in accordance with applicable regulatory requirements.

.2 Do not burn or bury waste materials at Place of the Work.

.3 Do not dispose of volatile and other liquid waste such as mineral spirits, oil, paints and other coating materials, paint thinners, cleaners, and similar materials together with dry waste materials or on the ground, in waterways, or in storm or sanitary sewers. Collect such waste materials in appropriate covered containers, promptly remove from Place of the Work, and dispose of at recycling facilities or as otherwise permitted by applicable regulatory requirements.

.4 Cover or wet down dry waste materials to prevent blowing dust and debris.

- END OF SECTION -

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 Ready-for-Takeover

.1 The prerequisites to attaining Ready-for-Takeover of the Work are described in the General Conditions of the Contract.

1.2 Inspection and Review Before Substantial Performance

.1 Contractor's Inspection: Before applying for the Consultant’s review to establish Substantial Performance of the Work:

.1 Conduct an inspection of the Work to identify defective, deficient, or incomplete work.

.2 Prepare a comprehensive and detailed list of items to be completed or corrected.

.3 Provide an anticipated schedule and costs for items to be completed or corrected.

.2 Deficiency Reviews

.1 Consultant and sub-consultants will conduct one (1) deficiency review site visit, at the end of the project, and one (1) inspection to verify that deficiencies are completed. Upon completion of the listed deficiencies, the Contractor shall complete the form on the following page verifying that deficiencies have been attended to and completed, and that the site is ready for final review. Should an additional inspection be required by the Consultant, and/or any other sub-consultants, as a result of deficiencies that have been claimed as completed but are found to be incomplete, any additional site visits or inspections, required of the Consultants, to verify such completion will be charged at the Consultant's contractual rate to the Owner (including expenses) and such charges will be deducted from the amount payable by the Owner to the Contractor.

.2 The form on the following page may be copied freely by the Contractor.

CONTRACTOR REQUEST FOR FINAL INSPECTION

Note that this page must be emailed or delivered to the Consultant's office within 7 days of the requested final inspection.

This is to certify that . . . . . (Name of Contractor)

has completed the work identified as deficient in the site inspection and deficiency list

prepared by the Consultant on . . . . . .

and received by our office on . . . . . .

and that the site is now ready for final inspection. Rectification and completion of these

deficiencies does not in any way relieve us of the terms and conditions of the Contract for the

completion of the work in accordance with the Contract Documents.

Contractor or subtrade . . . . . .

Signed . . . . . .

Consultant Use Only:

Consultant Affected	**Work completed as per deficiency list**	**Work not completed per list attached**	**Date**	**Signature**
Architect				
Structural				
Mechanical				
Electrical				
Landscape				
Other				
Other				

General comments . . . . . .

. . . . . .

. . . . . .

.3 Consultant's Review: Upon receipt of the Contractor's application for review, together with the Contractor's list of items to be completed or corrected, the Consultant will review the Work. The Consultant will advise the Contractor whether or not the Work is substantially complete and will provide the Contractor with a list of items, if any, to be added to the Contractor's list of items to be completed or corrected. Provide the Consultant with a copy of the Contractor's revised list.

.4 Maintain the list of items to be completed or corrected and promptly correct or complete defective, deficient and incomplete work. The Contractor's inspection and Consultant's review procedures specified above shall be repeated until the Work is substantially complete and no items remain on the Contractor's list of items to be completed or corrected.

.5 When the Consultant determines that the Work is substantially complete, the Consultant will notify the Contractor and the Owner in writing to that effect.

1.3 Prerequisites to Final Payment

.1 After Ready-for-Takeover of the Work and before submitting an application for final payment in accordance with the General Conditions of Contract:

.1 Correct or complete all remaining defective, deficient, and incomplete work.

.2 Remove from the Place of the Work all remaining surplus Products, Construction Equipment, and Temporary Work.

.3 Perform final cleaning and waste removal necessitated by the Contractor's work performed after Ready-for-Takeover, as specified in Section 01740 - Cleaning and Waste Management.

1.4 Substantial Performance of the Work

.1 The prerequisites to, and the procedures for, attaining substantial performance of the Work, or similar such milestone as provided for in the lien legislation applicable to the Place of the Work, shall be:

.1 independent of those for attaining Ready-for-Takeover of the Work, and

.2 in accordance with the lien legislation applicable to the Place of the Work.

- END OF SECTION -

SECTION 01780 - CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.1 Operation and Maintenance Manual
- .1 Prepare a comprehensive operation and maintenance manual, in the language of the Contract, using personnel qualified and experienced for this task.
- .2 Submit an initial draft of the operation and maintenance manual for Consultant's review in electronic PDF format. If required by Consultant's review comments, revise manual contents and resubmit for Consultant's review. If required, repeat this process until Consultant accepts the draft manual in writing.
- .3 Submit final version to Owner in electronic format.

1.2 Operation and Maintenance Manual Format
- .1 Organize data in the form of an instructional manual.
- .2 Cover: Identify manual titled, “Operation and Maintenance Manual”, name of Project or facility, and subject matter of contents.
- .3 Arrange content under Section numbers and sequence of Table of Contents.
- .4 Provide tabbed titled subsections for each separate Product or system, with description of Product and major component parts of equipment.
- .5 Text: Insert Manufacturer's printed data, or typewritten data.
- .6 Drawings: Include as-built Drawings; bind in with text.
- .7 Include one complete set of reviewed shop drawings indicating corrections and changes made during fabrication and installation.

1.3 Operation and Maintenance Manual - General Content
- .1 Table of contents for each volume.
- .2 Introductory information including:
  - .1 Date of manual submission.
  - .2 Complete contact information for Consultant, subconsultants, other consultants, and Contractor, with names of responsible parties.
  - .3 Schedule of Products and systems indexed to content of volume.
- .3 For each Product or system, include complete contact information for Subcontractors, Suppliers and manufacturers, including local sources for supplies and replacement parts.
- .4 Product Data: mark each sheet to clearly identify specific products, options, and component parts, and data applicable to installation. Delete or strike out inapplicable information. Supplement with additional information as required.
- .5 Reviewed Shop Drawings.
- .6 Permits, certificates, letters of assurance and other relevant documents issued by or required by authorities having jurisdiction.
- .7 Warranties.
- .8 Operating and maintenance procedures, incorporating manufacturer's operating and maintenance instructions, in a logical sequence.

1.4 Operation and Maintenance Manual - Equipment and Systems Content
- .1 Provide information and inclusions in manuals as specified in Divisions 15 and 16 in format as specified.

1.5 Operation and Maintenance Manual - Products and Finishes Content
- .1 Include Product data, with catalogue number, options selected, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured Products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Include an outline of requirements for routine and special inspections and for regular maintenance to ensure that on-going performance of the building envelope will meet the initial building envelope criteria.
- .4 Include additional content as specified in technical Specifications sections.

1.6 Operation and Maintenance Manual - Warranties Content
- .1 Separate each warranty with index tab sheets keyed to Table of Contents listing.
- .2 List each warrantor with complete contact information.
- .3 Verify that documents are in proper form and contain full information. Ensure that warranties are for the correct duration and are in Owner's name.

1.7 Contractor's As-Built Drawings
- .1 Submit final as-built drawings in the form specified in Section 01320 - Construction Progress Documentation to Consultant.

1.8 Spare Parts, Maintenance Materials and Special Tools
- .1 Supply spare parts, maintenance materials, and special tools in quantities specified in technical Specifications sections.
- .2 Ensure spare parts and maintenance materials are new, not damaged nor defective, and of same quality, manufacturer, and batch or production run as installed Products.
- .3 Provide tags for special tools identifying their function and associated Product.
- .4 Deliver to and store items at location directed by Owner at Place of the Work. Store in original packaging with manufacturer's labels intact and in a manner to prevent damage or deterioration.
- .5 Catalogue all items and submit to Consultant an inventory listing organized by Specifications section. Include Consultant reviewed inventory listing in operation and maintenance manual.

- END OF SECTION -

SECTION 02050 - DEMOLITION & REMOVAL

PART 1 - GENERAL

1.1 Work Included

.1 Provide disassembly and removal work, as shown on Drawings and specified herein, including, but not limited to, the following:

.1 Concrete floor slab sections facilitating installation of, and modifications to, under-slab plumbing lines (sanitary).

.2 Gypsum board and steel stud partition walls.

.3 Gypsum board ceilings and steel suspension system, including hanger wires.

.4 Acoustic ceiling tile and suspension system, including hanger wires.

.5 Resilient flooring and base (vinyl), including razor scraping of adhesive.

.6 Built-in counters, base and wall mounted cabinets and shelves.

.7 Plumbing fixture disconnection and removals, by Division 15.

.8 Electrical fixture and device disconnection and removals, by Division 16.

.9 Remove and retain, and store and protect, for reinstallation:

.1 Existing wall-mounted air conditioning unit.

.10 Refer to Section 01110 – Summary of Work for identification of items required to be disassembled, stored, protected, and reinstalled, or disassembled and turned over to the Owner as part of the Work.

.2 Requirements specified herein or elsewhere shall be considered the minimum requirements and Contractor is responsible for providing and performing things required and necessary to complete the work, in a safe, proper and workmanlike manner.

.3 Temporary partitions, screens and enclosures.

1.2 Related Work

.1 Summary of Work . . . . . Section 01110.

.2 Temporary Utilities . . . . . Section 01510.

.3 Temporary Barriers & Enclosures . . . . . Section 01560.

.4 Cleaning & Waste Management . . . . . Section 01740.

.5 Cutting off, diversion or removal of existing water, gas, electric and other services which interfere with the disassembly and removal work . . . . . Division 15 & 16.

1.3 Maintaining Traffic

.1 Maintain and preserve Owner's access requirements to and from existing building in areas where demolition and removal work is being carried out and throughout the existing building for life safety requirements.

.2 Conduct operations with minimum interference to fire access routes, roads, streets, driveways and passageways.

.3 Do not close or obstruct sidewalks or other facilities occupied and used by the Owner without prior permission.

.4 Comply with the requirements of "Occupational Health and Safety Act".

1.4 Hauling Operations

.1 Maintain roadways and paving, in the hauling areas, on a continuous, clean basis and as required by Municipal authorities.

.2 Provide flag personnel as required to make certain safe access and egress to and from the site.

.3 It is imperative operations and machine and equipment movements, deliveries and removals are executed at time or times that will permit uninterrupted Owner operations in and around buildings, including deliveries and site access and egress.

1.5 Protection

.1 Conduct disassembly operations and remove debris off the Site in a manner to ensure minimum interference with the operations of others, private or public.

.2 Protect existing building finishes against damage from operations under this Section, including lifting, moving, rolling, etc., of materials. Use polyethylene tarps, over existing floors to remain, to control and collect dust and debris beyond Work area. Be responsible for repairs of any damage caused to existing floors to remain and other finishes.

.3 Pay particular attention to prevention of fire and elimination of fire hazards, which could endanger the work or adjacent premises.

.4 Provide and maintain necessary fire extinguishers throughout the work area at all times, to the approval of the Fire Marshal, located at convenient and accessible points.

1.6 Interruptions to Operations

.1 There will be absolutely no interruptions to the Municipal Child Care Centre operations. Therefore, it is imperative to separate Construction activities, via barriers, throughout the work.

.2 Carry out work in such a manner to comply with Section 01110 and within work restrictions per Section 01140.

1.7 Maintaining Services

.1 Many of the service lines which are being modified, particularly those on or in existing structures, must be kept in service throughout the construction period except for brief changeover periods.

.2 Do work required to maintain such services, including preparation of sketches, detail scheduling of such work and coordinating and obtaining approval from Owner's site staff.

1.8 Hazardous Materials

.1 Asbestos:

.1 Asbestos abatement procedures are not anticipated to form part of the Work under this Contract. Should materials suspected of containing asbestos be encountered during the course of the Work, immediately cease work in the affected area, secure the area to prevent disturbance, and notify the Consultant. Do not disturb, remove, or otherwise handle the suspected material until written direction has been provided by the Consultant.

.2 Where friable asbestos-containing material is encountered, all work shall be carried out in accordance with the requirements of Ontario Regulation 278/05 – Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations, including the implementation of an Asbestos Management Program where applicable. Any asbestos abatement work required shall be performed only by qualified personnel using procedures prescribed by the applicable legislation and regulations.

.2 Silica:

.1 Free crystalline silica (quartz) may be component of acoustic ceiling tile. It may also be present as amorphous diatomaceous earth in pipe fittings, and other insulation materials. Silica may be present in mortar and concrete.

.2 Disturbance of materials containing silica will occur during removal of building finishes, and saw cutting of concrete. The contractor undertaking this work is responsible to ensure that the workers performing the work are not exposed to airborne silica levels in excess of 0.20 mg/m^3. This can be accomplished by:

.a providing workers with suitable respiratory protection and disposable coveralls if airborne levels are in excess of regulated limits;

.2 misting work area with water to suppress dust levels and avoiding dry sweeping of dust and debris during clean-up (i.e. use damp mopping or HEPA vacuums;

.3 ensuring that adequate temporary ventilation is available inside the work area.

.3 It should be noted that the use of mechanically powered tools for demolition work increases the concentration of airborne silica and therefore requires more stringent respiratory protection and controlled work procedures.

.4 Precautions must be taken, during construction disturbance of silica, to ensure that building occupants and persons in the vicinity of the Work are protected. Provide wet cutting of concrete and mortar. Constructing physical barriers and using polyethylene drop sheets or enclosures to isolate the work area will control silica levels in occupied areas.

.5 Comply with “Guideline Silica on Construction Projects”, dated April 2011, Occupational Health and Safety Branch, Ministry of Labour.

.3 Mercury:

.1 The presence of mercury in fluorescent light tubes and mechanical thermostats poses no risk to occupants or workers provided that equipment is handled properly and the mercury is not allowed to escape. Lighting fixture tubes shall be removed and disposed of intact to prevent the mercury vapour from escaping.

.2 Redundant thermostats shall be collected and disposed of in accordance with Ontario Regulation 347, as amended by O. Reg. 102/07.

.4 Polychlorinated Biphenyls (PCBs)

.1 All light ballasts must be cross referenced with Environment Canada’s document “Identification of Lamp Ballasts Containing PCBs, Reports EPS 2/CC/2 (revised), August 1999, as they are removed. Confirmed PCB light ballasts shall be collected and disposed of in accordance with PCB Regulations (SOR/2008-273).

1.9 Coordination and Procedures

.1 Coordinate the Work of this Section with the Work of all other Sections to ensure the satisfactory execution and completion of the Contract.

.2 Coordinate demolition and removal activities with all affected trades to ensure that all work necessary to complete the demolition and removals is performed in the proper sequence and without damage to existing construction designated to remain.

.3 Verify existing site conditions prior to commencing demolition. Immediately notify the Consultant of any discrepancies or conditions that may affect the Work before proceeding.

PART 2 - PRODUCTS

2.1 Materials

.1 Temporary Wood Studs: Construction Grade Spruce.

.2 Polyethylene Sheet: 0.152mm (6 mil), thick, clear, stapled and/or taped in place (minimum).

.3 Plywood: Canadian softwood plywood.

PART 3 - EXECUTION

3.1 Protections

.1 Temporary Partitions and Screens

.1 Dust-Proof Partitions (Screens):

.1 Prior to commencing any demolition or construction activities, provide temporary dust-tight enclosures around the Work area and all access points using light-gauge steel or wood framing, purpose-made telescopic construction poles, or other approved support systems. Install clean polyethylene sheeting not less than 0.15 mm (6 mil) thick, lapped a minimum of 100 mm (4 in.) and sealed continuously with tape at floors, ceilings, walls, doors, and all intersecting surfaces to prevent the migration of dust and debris into adjacent occupied areas.

.2 Maintain dust-proof partitions in good condition throughout the Work and relocate or modify them as required to suit the progress of the Work. Promptly repair any tears, openings, or deficiencies to maintain an effective dust barrier at all times.

.3 Take all necessary precautions to prevent dust, dirt, and airborne contaminants generated by the Work from entering Owner-occupied or operational areas. Employ additional dust-control measures, including negative air pressure, HEPA-filtered air filtration units, or other methods where required to protect the building occupants and the Work.

.2 Weather Protection:
.1 Where demolition or construction activities expose the building interior to the elements, provide temporary weather-tight protection to prevent the ingress of rain, snow, wind, and moisture. Construct temporary enclosures using tarpaulins, polyethylene sheeting, framing, plywood, insulation, gypsum board, or other suitable materials as required to maintain a weather-tight enclosure until permanent construction is complete.
.2 Protect existing building finishes, equipment, furnishings, and materials from weather-related damage throughout the Work. Inspect temporary weather protection regularly and immediately repair or replace damaged or ineffective protection to maintain continuous weather-tight conditions.

3.2 Demolition and Removals - General
.1 Mechanical and electrical trades to cut off, cap, divert or remove existing water, electric and other services which interfere with the work of this Section as required.
.2 Carry out disassembly work, removal of existing materials, and disposal of resultant debris not specifically called for under various Sections of the Specification, but which is required to complete the Work. Proceed with disassembly of, or alteration to, any portion of existing building ONLY after thorough protection of existing building components to remain is achieved.
.3 During demolition operations control dust to a minimum and prevent dust from travelling to clean adjacent rooms.
.4 Confine operations and work personnel to cause least disruption and exercise great care not to damage existing construction beyond that necessary for carrying out the new work. Make good any damage in every aspect.
.5 Materials to be Reused: Where specified and indicated on Drawings to be removed and stored for future use by Owner, or for later reuse by other trades, remove, handle and transport such items to storage area. Perform such work carefully and with diligence to prevent any damage to the items during removal and in storage.
.6 Cutting:
.1 Perform required cutting using power operated cutting devices. Breaking out shall commence only after sawcutting of the cutoff points has been performed in order to prevent damage to remainder of structure and to obtain straight and clean junctions of new and existing works.
.2 Demolish concrete in small sections.
.3 Coordinate with mechanical and electrical trades and sawcut and breakout existing structures to accommodate services. Have mechanical and electrical trades lay out and supervise work.

3.3 Disposal of Materials, Rubble and Debris
.1 Materials that require removal become the property of the Contractor and must be removed from site daily, unless such materials are otherwise specified or shown on Drawings to be reused by the other trades or turned over to Owner. Remove materials not suitable for reuse, as shown or specified, from site.
.2 Stockpiling and surplus debris of materials on site is not permitted.
.3 Rubbish and debris, resulting from execution of the Work, shall be cleaned up as generated. Dispose of same at end of each day or place in waste disposal bins, which must be emptied on a regular basis.

3.4 Cleaning-up
.1 Leave building areas in a “vacuum-clean” condition on an area by area or room by room basis.

- END OF SECTION -

SECTION 03200 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 Work Included
- .1 Provide concrete reinforcement as shown on Drawings and specified herein.

1.2 Related Work
- .1 Cast-in-Place Concrete (Modified): . . . . . Section 03310.

1.3 Reference Standards
- .1 Ontario Building Code (Current)
- .2 CSA A23.1-24, Concrete Materials and Methods of Concrete Construction
- .3 CAN3-A23.3-04, Design of Concrete Structures for Buildings
- .4 ASTM A1064 / A1064M - 18a, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- .5 Reinforcing Steel Institute of Canada Manual of Standard Practice and RSIC manual of standard practice.

1.4 Design of Details and Connections
- .1 Lap all woven wire mesh 12" (300 mm) (two full mesh spaces).

1.5 Delivery, Storage and Handling
- .1 Store materials on site in a manner to prevent damage thereto. Protect from the weather. Comply with CSA A23.1-24.
- .2 Protect work of this Section from damage. Protect other work from damage resulting from this work. Replace damaged work which cannot be satisfactorily repaired.

1.6 Inspection & Testing
- .1 All materials and fabrication are subject to testing or inspection by the Consultant or designated representative.
- .2 Notify the Consultant for final review of preparation of steel, allow 24 hours for review by the Consultant prior to placing concrete.

1.7 Warranty
- .1 Defects or deficiencies which are to be corrected by the Contractor at no cost to the Owner during the period of the warranty shall include corrosion of any new steel or other defects in material or workmanship as determined by the Consultant.

PART 2 - PRODUCTS

2.1 Materials
- .1 Mesh Reinforcement: 448 Mpa to ASTM A1064 / A1064M - 18a, flat sheets (roll not acceptable). Provide WWM 152x152 (6"x6") MW18.7xMW18.7, unless noted otherwise.
- .2 Chairs and Spacers: As manufactured by Drummond and Reeves Ltd., Acrow Richmond or Superior Concrete Accessories Ltd. of sufficient strength to rigidly support weight of reinforcement and construction loads.
- .3 Furnish stainless steel dowels in construction of cold joints, between concrete slabs, as shown.

PART 3 - EXECUTION

3.1 Examination

.1 Inspect existing conditions upon which work of this Section is dependent. Notify Consultant, in writing, of any conditions which may cause harm to or interfere with a correct or proper installation. Commencement of work implies acceptance of existing conditions.

3.2 Placing Reinforcing Steel

.1 Place mesh reinforcing in accordance with the drawings, and as directed by the Consultant in accordance with CAN/CSA-A23.1.

.2 Securely tie mesh together with coated tie wire turning the ends of ties towards the interior of the concrete. Support reinforcement with chairs or spacers spaced as closely as necessary to prevent displacement from the intended position before and during placement of the modified concrete.

.3 Slab bolsters and bar supports shall be in accordance with the Reinforcing Steel Institute of Canada "Manual of Standard Practice". All reinforcement for slabs-on-grade, including welded wire mesh, shall be placed on brick chairs with the cover indicated on the drawings. 'Floating' of reinforcement shall not be permitted.

.1 As a minimum, supply and install addition supports as required to maintain reinforcing in its proper position during the pour. For slab on grade construction, set wire mesh on 4" x 4" x 2" (100mmx100mmx50mm) pre-cast concrete units spaced at 4'-0" (1200mm) on-centre, each-way or provide welded-wire mesh chair supports.

.4 Use plain round stainless steel bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint. When paint is dry, apply a thick even film of mineral lubricating grease. Install stainless steel bars into existing concrete slab edge at 18" on-centre and extending into new modified concrete patches minimum 4".

.5 Lap all woven wire mesh minimum 12" (300 mm) in each direction and wire together securely.

.6 Reinforcing mesh is to be tied with wire ties no less than 18 gauge.

.7 When welded wire mesh is placed, it must be free from loose or flaking rust, mud, oil, or other coatings which would affect/ reduce adhesion.

.8 Supply and install chairs/ supports for the support of reinforcing in slab-on-grade construction in a manner which will not puncture the vapour barrier.

.9 Obtain Consultant's approval of reinforcing steel and position before placing concrete.

.10 Clean reinforcing before placing concrete.

- END OF SECTION -

SECTION 03310 - CAST-IN-PLACE-CONCRETE (MODIFIED)

PART 1 - GENERAL

1.1 Work Included
- .1 Provide vapour barrier and modified cast-in-place concrete, as shown on Drawings and as specified herein.

1.2 Related Work
- .1 Concrete Reinforcement . . . . . Section 03200.

1.3 Storage and General Protection
- .1 Store materials on site in a manner to prevent damage thereto. Protect from the weather.

1.4 Submittals
- .1 Product Data: Submit manufacturers product data for each product proposed for use under this Section.

PART 2 - PRODUCTS

2.1 Materials
- .1 Modified Concrete: Furnish Mapei "Mapecem 102" a one component, shrinkage-compensated, polymer-modified, fast-setting cementitious mortar, with 20% by weight of 5/16" to 3/8" pea gravel (saturated surface dry) added, for replacement of floor slab sections, as shown on Drawings.
- .2 Furnish bonding agent compatible with modified concrete.
- .3 Vapour Barrier: Furnish W.R. Meadows "Perminator" 10 mil thickness. Furnish 4" wide "Perminator" tape for sealing overlaps.
- .4 Reinforcing mesh and stainless steel stud anchors: Per Section 03200.

PART 3 - EXECUTION

3.1 Installation
- .1 Vapour Barrier
  - .1 Place vapour barrier just prior to placement of slab reinforcing.
  - .2 Place vapour barrier continuous, with minimum 6" (150mm) end and edge laps. At pipe and other penetrations provide film collar per manufacturer’s specifications. Ensure tape area of adhesion is free from dust, dirt and moisture to allow maximum adhesion of the pressure sensitive tape.
  - .3 Install vapour barrier in accordance with manufacturer’s product data.
  - .4 Prior to pouring of concrete slab, inspect vapour barrier for cuts, punctures and tears. Repair damage areas utilizing “Perminator” tape. Clean area free of dust, dirt and moisture and tape damage with minimum 6" overlap in all directions.
- .2 Concrete Reinforcement
  - .1 Make certain welded wire mesh and stainless steel stud anchors, as shown on Drawings and per Section 03200, are in place and inspected prior to placement of concrete.
- .3 Modified Concrete
  - .1 Clean surfaces of existing concrete slab edges and brush generously with a bonding mixture.
  - .2 Mix modified concrete including washed aggregate per manufacturer directions.
  - .3 Pour, screed and float concrete flush with the adjacent concrete floor slab surface. Provide concrete finish to match adjacent concrete.

- END OF SECTION -

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 Work Included
- .1 Provide rough carpentry and underlayment as shown on Drawings and specified herein, including but not limited to the following:
  - .1 Blocking for stainless-steel cabinets and mechanical curbs.

1.2 Related Work
- .1 Installation of stainless-steel casework and countertops. . . . . Section 01210.
- .2 Temporary partitions . . . . . Section 02050.
- .3 Finish Carpentry. . . . . Section 06200.
- .4 Insulation . . . . . Section 07213.
- .5 Modified Bitumen Sheet Roofing . . . . . Section 07536.
- .6 Premanufactured mechanical curbs . . . . . Division 15.

1.3 References

NLGA - National Lumber Grades Authority
CAN/CSA G164 - Hot-dip Galvanizing (minimum 600 mg/m2 zinc coating).
CSA O121-08 (2013) - Douglas Fir Plywood
CSA O141-05 (2014) - Softwood Lumber
CSA O151-09 (2014) - Canadian Softwood Plywood

PART 2 - PRODUCTS

2.1 Lumber Material
- .1 Except as indicated or specified otherwise lumber shall be softwood, S4S, moisture content (MC) not greater than 19% at time of installation, in accordance with following standards:
  - .1 CSA 0141-05 (R2104)
  - .2 NLGA Standard Grading Rules for Canadian Lumber.
- .2 Machine stress-rated lumber is acceptable for all purposes.
- .3 Glued end-jointed (finger-joined) lumber is not acceptable.
- .4 Framing and board lumber: in accordance with the Ontario Building Code.
- .5 Furring, blocking, nailing strips, etc.:
  - .1 Use S2S or S4S material.
  - .2 Board sizes: Eastern Spruce species, NLGA construction grade.
  - .3 Dimension sizes: SPF species, NLGA #1 grade.

2.2 Fastenings and Hardware
- .1 In accordance with the Ontario Building Code (OBC) as supplemented by following requirements except where specific type is indicated.
- .2 Nails, spikes screws and staples, length and type to OBC except:
  - .1 Use common spiral nails and spiral spikes except where indicated otherwise.
  - .2 Use hot galvanized finish steel min. 600g/m^2 zinc coating for exterior work and high humidity areas.
- .3 Bolt, nut, washer, screw and pin type fasteners: with hot-dip galvanized finish to CSA G164 for exterior work and for interior high humidity areas; elsewhere with primer paint finish where installed on sight-exposed surfaces.
- .4 Use surface fastenings of following types, except where specific type is indicated or specified.
  - .1 To panel surfaces use toggle bolt.
  - .2 To concrete use expansion shield with lag screw, jute fibre or lead plug with wood screw.

2.3 Insulation: per Section 07213.

PART 3- EXECUTION

3.1 Installation

.1 Install nailers, blocking, furring, backing, and other fastening supports required for the attachment of subsequent materials, equipment, fixtures, and finishes, whether or not specifically indicated on the Drawings. Verify locations with the Work of other Sections and coordinate installation to suit site conditions.

.2 Install blocking as required to space-out and support surface applied shop fabricated assemblies.

.3 Align and plumb faces of furring and blocking to tolerance of 1:600.

.4 Securely fasten all items to the existing or new structure using appropriate fastening methods to provide rigid, durable, and adequate support for the intended loads and applications. Install members plumb, level, true to line, and accurately positioned to receive the finished Work.

3.2 Insulation

.1 Refer to Section 07213.

- END OF SECTION -

SECTION 06200 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 Working Included
- .1 Provide finish carpentry as shown on Drawings and specified herein, including but not limited the following:
  - .1 Provision of new built-up plywood sills at kitchen pass-throughs.
  - .2 Modification of existing bi-fold kitchen pass-through doors, jambs, trim, and related components to suit the revised opening configuration indicated on the Drawings.
  - .3 Installation of blocking, fastening materials, adhesives, and accessories required for a complete installation.

1.2 Related Sections
- .1 Painting . . . . . Section 09900.

1.3 Reference Standards
- .1 CAN/CSA O151 – Canadian Softwood Plywood.
- .2 Perform millwork to Architectural Woodwork Quality Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC) Eighth Edition Version 1.0, 2003.

1.4 Site Conditions
- .1 Verify existing dimensions and conditions prior to fabrication.
- .2 Report discrepancies to the Consultant before proceeding.
- .3 Do not fabricate or modify existing components until field dimensions have been confirmed.

1.5 Shop Drawings
- .1 Submit shop drawings in accordance with Contract Documents.
- .2 Clearly indicate details of construction, profiles, jointing, fastening and other related details.

PART 2 - PRODUCTS

2.1 Materials
- .1 Hardwood lumber: to National Hardwood Lumber Association (NHLA) requirements, moisture content of maximum 6% of interior, Poplar species to AWMAC premium grade.
- .2 Softwood plywood: to CSA 0151-M, sanded grade, solid two sides, minimum 3/4" (19mm) thickness unless otherwise indicated.
- .3 Edge Banding: Provide extruded PVC edge banding at exposed edges of plywood backing, 3mm thick, in colour to match laminate.
- .4 Adhesives: As recommended by laminate manufacturer.
- .5 Nails and staples: to CSA B111-1974; stainless steel round wire moulding type.
- .6 Plastic Laminate: Furnish plastic laminate as manufactured by Formica as specified herein. Furnish postforming laminate grade 12/HGP plastic laminate 0.9mm (0.035") thick decorative grade, to ANSI/NEMA LD3-2005, in matte texture finish.
  - .1 Furnish profile plastic laminate endcap closures on open-end of counters with solid wood blocking.
  - .2 Colour: Formica - 6698-58, Paloma.

2.2 Fabrication
- .1 Plywood Sills:
  - .1 Fabricate built-up sills from exterior glue Canadian softwood plywood, minimum 3/4" (19mm) thick, laminated to the thickness required to suit adjacent construction.
  - .2 Provide smooth, square, and true surfaces suitable for the application of plastic laminate.

PART 3 - EXECUTION

3.1 Preparation
- .1 Protect adjacent finishes from damage.
- .2 Remove only those portions of existing trim necessary to complete the Work.

3.2 Installation
- .1 Built-Up Plywood Sills
  - .1 Fabricate and install new built-up plywood sills at each kitchen pass-through opening as indicated on the Drawings.
  - .2 Secure sills to the supporting construction using concealed screws and construction adhesive to provide a rigid, level, and true installation.
  - .3 Cover all exposed horizontal surfaces and exposed edges of the plywood sills with high-pressure plastic laminate. Apply laminate using the adhesive recommended by the laminate manufacturer and in accordance with the manufacturer's written instructions.
  - .4 Install 3 mm PVC edge banding on all exposed sill edges using hot-melt adhesive or the edge banding manufacturer's recommended method. Provide tight-fitting joints and corners, with edge banding flush to adjacent laminate surfaces.
  - .5 Trim laminate neatly and finish exposed edges smooth, tight-fitting, and free of chips, voids, bubbles, or visible adhesive. Finished surfaces shall be flush, uniform in appearance, and suitable for service.
  - .6 Protect completed laminate surfaces from damage during the remainder of the Work and replace damaged laminate at no additional cost to the Owner.
- .2 Existing Bi-Fold Pass-Through Doors
  - .1 Modify the existing bi-fold kitchen pass-through doors to suit the revised opening dimensions indicated on the Drawings.
  - .2 Cut existing door leaves accurately to the required height, maintaining straight, square, and clean edges free of splintering or damage to the door faces.
  - .3 Fabricate and install new solid wood edge rails matching the existing door construction. Secure edge rails using waterproof wood adhesive and concealed pins or brads to produce a rigid, durable, and seamless assembly. Clamp components as required to ensure proper bond and alignment.
  - .4 Sand, fill, and finish modified door edges to provide a smooth, flush surface suitable for the specified clear-coat finish. Ensure repaired areas are not visible after painting.
  - .5 Modify and reinstall existing hinges, pivots, tracks, guides, and associated hardware as required to accommodate the revised door size. Replace damaged or unserviceable hardware with matching components.
  - .6 Adjust completed door assemblies to provide smooth, quiet operation with uniform clearances and proper alignment throughout the full range of movement.
- .3 Existing Jambs and Trim
  - .1 Shorten existing pass-through jambs, stops, casings, and trim as required to suit the revised opening dimensions.
  - .2 Cut existing jambs and trim accurately using methods that prevent splitting or damage. Reinstall components plumb, true, and securely fastened.
  - .3 Fill joints, fastener holes, and minor imperfections with an approved wood filler. Sand smooth and prepare all modified surfaces for painting to provide a continuous, uniform appearance.
  - .4 Replace any existing jamb, trim, or door component damaged during modification that cannot be restored to the satisfaction of the Consultant at no additional cost to the Owner.

- END OF SECTION -

SECTION 07121 - MOISTURE CONTROL SYSTEM & UNDERLAYMENT

PART 1 - GENERAL

1.1 Work Included
- .1 Testing of Relative Humidity in Concrete Floor Slabs performed by manufacturer's Technical Representative.
- .2 Provide moisture control system, primer and cementitious underlayment for concrete slab-on-grade receiving slip-resistant safety flooring, as shown on Drawings and specified herein.

1.2 Related Section
- .1 Slip Resistant Safety Flooring . . . . . Section 09663.

1.3 Quality Assurance
- .1 Applicator Qualification: The work of this Section shall be carried out by applicators skilled in this work, who have successfully completed training classes by the product manufacturer and are acknowledged by the product manufacturer. Submit proof of experience for Consultant review.
- .2 The process shall be in inspected and approved by manufacturer's technical representative.
- .3 Pre-Installation Conference: Prior to commencement of work, convene and installation meeting at the site, including manufacturer's technical representative, installer, General Contractor and Consultant to establish procedures to maintain optimum working conditions and to coordinate the work with related and adjacent work.
  - .1 Review methods and procedures for installation of moisture control system and underlayments, including existing substrate conditions.
  - .2 Manufacturer's representative to perform concrete floor slab moisture testing in accordance with ASTM F2170-02 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
  - .3 Review drawings, specifications, submittals and other Contract Documents.
  - .4 Review construction schedule verifying availability of all materials, personnel and equipment needed to proceed and avoid delays.
  - .5 Complete the manufacturer pre-installation Checklist to assess the suitability of a project to qualify for the ARDEX Moisture Control System Extended Warranty. This checklist must be submitted and approved prior to installing the job.

1.4 Delivery, Storage, Environmental Conditions and Handling
- .1 Deliver products in original packaging, labeled with product identification, manufacturer, batch number and shelf life.
- .2 Store products in a dry area with temperature maintained between 50° and 85° F (10° and 29° C) and Protect from direct sunlight.
- .3 Handle products in accordance with manufacturer's printed recommendations.

1.5 Submittals
- .1 Submit manufacturer's product data for specified system to confirm system installation confirmation.

1.6 Site Conditions
- .1 Ensure that environmental requirements comply with requirements of product manufacturer.

1.7 Scheduling
- .1 Schedule the work to allow for cure times as required by each product system.

1.8 Warranty
- .1 Certified applicator must file a pre-installation checklist with the manufacturer and receive written confirmation of the approval to proceed in order to obtain the extended 10-year ARDEX MC™ RAPID Warranty.

PART 2 - PRODUCTS

2.1 Materials

.1 Moisture Control System: Furnish Ardex “MC Rapid” a two component, solvent-free, fluid-applied breathable epoxy coating, as per appended product data.

.2 Dormant Cracks and Saw-cut Joint Repair: Furnish Ardex “Ardifix” two part, low viscosity rigid crack and joint filler, as per appended product data.

.3 Primer: Furnish Ardex “P 82” high-strength, solvent-free water based epoxy primer for application between the moisture control system and the cementitious underlayment, per appended product data.

.4 Cementitious Underlayment: Furnish Ardex “Feather Finish“ a portland cement-based underlayment per appended product data.

PART 3 - EXECUTION

3.1 Preparation

.1 Provide shot blast profiling of existing concrete floor slab substrate utilizing a "Blastrac" machine, or approved equivalent, with vacuum take-off to a separation cannister (separating steel shot from the concrete residue). Mechanical preparation of the surface is required to obtain a minimum ICRI concrete surface profile of 3 (CSP 3). The unit to filter and trap +- 98% of dust created by the process leaving a clean and profiled finish, free from previous adhesive residue. Hepa-vacuum areas and inspect surface prior to application of the moisture control system.

.2 Provide ventilation through work area.

.3 Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas from contact due to mixing and handling of materials.

.4 Inspect concrete substrate for dormant cracks and saw-cuts.

3.2 Installation

.1 Fill saw-cuts and cracks with “Ardifix” epoxy filler and shave excess material flush with top of slab in accordance with manufacturers installation instructions.

.2 Install one coat of moisture control system to achieve a minimum thickness of 14 mils. (350 microns), in accordance with manufacturers installation instructions.

.3 Provide “P 82 Ultra Prime” water-based epoxy primer between the moisture control coating and the cementitious underlayment in accordance with manufacturers installation instructions.

.4 Provide trowel applied cementitious underlayment in accordance with appended product data. Apply 1/8" to 1/4" thickness worked to level finish surface.

.5 Comply with manufacturer’s specifications.

3.3 Clean-Up & Protection

.1 Promptly as the work proceeds and on completion, clean-up and remove from the site all debris and surplus materials resulting from the forgoing work.

.2 Protect the surface of the underlayment from abuse by other trades by the use of plywood, Masonite or other suitable protection course prior to the installation of the finish flooring.

- END OF SECTION -

ARDEX ARDIFIX™

Low Viscosity Rigid Polyurethane Crack and Joint Repair

Two-part polyurethane

Extremely low viscosity allows for deep penetration

Repairs very fine cracks

Mix with sand for larger cracks or repair of spalls and pop-outs

Use interior or exterior

Ideal for filling cracks and control joints (saw cuts) prior to the installation of ARDEX MC™ Moisture Control Systems, Underlayments and Toppings

Ultra fast setting - starts setting in as little as 2 minutes

Put into service in 10 to 15 minutes

Grind smooth in 45 minutes

100% solids, no VOC's, non-flammable

ARDEX Engineered Cements
400 Ardex Park Drive
Aliquippa, PA 15001 USA
Tel: 724-203-5000
Toll Free: 888-512-7339
Fax: 724-203-5001
www.ardexamericas.com

ARDEX ARDIFIX™

Low Viscosity Rigid Polyurethane Crack and Joint Repair

Description and Usage

ARDEX ARDIFIX™ is a two-part polyurethane repair compound for cracks, control joints, spalls and pop-outs on interior or exterior applications. It is ideally suited to seal off cracks and saw-cuts prior to the installation of ARDEX MC™ Moisture Control Systems, Underlayments and Toppings. ARDEX ARDIFIX is ultra fast setting allowing the installation to proceed within minutes of application. ARDEX ARDIFIX is 100% solids for no shrinkage and cures to a rigid hardness. It also has a wide service temperature range of 0°F to 110°F (-17 to 43°C), making it suitable for applications from freezers to warehouses.

Subfloor Preparation

All concrete must be structurally sound, solid, dry, and free of laitance, dirt, debris, coatings, sealers and any contaminant that may act as a bond breaker. A dry diamond blade may be used to prepare cracks and create a clean surface for bonding. Do not use sweeping compounds, solvents or acid etching to prepare the surface. A wire brush or twisted wire wheel may be used to remove any loose concrete or dirt. Cracks or joints should be free of dust, dirt, oils and any other debris. New concrete should be fully cured and free of movement. ARDEX ARDIFIX can be "feathered" into an existing concrete surface.

Recommended Tools

Commercial grade 22 oz. dual cartridge dispenser, recommended static mixing nozzle, razor scraper.

Application

PRECAUTION: This is a fast setting material. The following procedures will minimize waste and achieve the desired results. Failure to follow these procedures can cause isolated soft spots and subsequent failure.

IMPORTANT: During set-up of cartridge (purging air and balancing) and initial dispensing of material, keep cartridge and nozzle assembly pointed straight up. AFTER purging/ balancing and initial shot of material, always keep the cartridge and nozzle pointed downward to prevent material in the nozzle from flowing back into the cartridge.

Prepare joints and cracks prior to starting a new cartridge. If at all possible, schedule dispensing to consume an entire cartridge with no interruption of material flow.

Shake the cartridge vigorously for 10 seconds and then stand the cartridge upright for about a minute. Insert the cartridge into the dispenser, making sure it is properly positioned with the shoulder of the cartridge flush with the front bracket of the dispenser. Remove the plastic cap from the top of the cartridge. **IMPORTANT!** Before attaching the static mixing nozzle, dispense a small amount of material onto a disposable surface until both components flow evenly from the cartridge. After purging and balancing always point cartridge downward when not dispensing to prevent mixed material in the nozzle from flowing back into the cartridge.

Place the nozzle onto the cartridge and secure it by tightening in a clock-wise direction. Make sure the nozzle and cartridge assembly is secure before proceeding.

ARDEX ARDIFIX has a pot life of only 2 minutes. Apply continuously once opened to prevent the tip from becoming clogged. Place the mixing nozzle directly over the crack, joint or repair area. Dispense material using full smooth trigger pulls (no short choppy strokes) and allow material to gravity feed into the crack, joint or repair area.

For installations to receive an ARDEX Moisture Control System, Underlayment or Topping, immediately broadcast clean sand size #30 or #35 into the freshly applied material.

For installations where no further work will be done, overfill the crack, joint or repair area so the material is slightly higher than the face of the concrete slab. Allow the ARDEX ARDIFIX to set for approximately 10 to 15 minutes at 75° F (28.3° C), and then use a sharp razor scraper to shave excess material from the top of the slab.

For filling spalls and pop-outs, mix ARDEX ARDIFIX 1:1 with dry sand to a paste-like consistency, then fill and smooth with a trowel or putty knife. Repairs can be put into service in 10 to 15 minutes and ground smooth in as little as 45 minutes.

For clean up, use MEK or similar while the material is still fresh, carefully following all instructions and warnings on the solvent container. Once ARDEX ARDIFIX cures, it can only be removed by grinding or similar.

Curing

ARDEX ARDIFIX will be tack free in approximately 10 minutes, at which time it can be exposed to light traffic and non-harsh chemicals. ARDEX ARDIFIX can be opened to full use after a minimum cure of 45 minutes at 70°F (21°C).

Notes

For interior or exterior use over dry substrates only. ARDEX ARDIFIX should be applied at temperatures between 50°F to 85°F (10°C to 32°C). Substrate temperatures must be a minimum of 5°F (2.8°C) above dew point. Warm or hot weather will shorten pot life and working time.

When mixing with sand, make sure the sand is completely dry to prevent the ARDEX ARDIFIX from swelling due to contact with moisture.

Always install an adequate number of properly located test areas to evaluate the suitability of the product for the intended use.

Do not mix with additives. Do not thin.

Precautions

ARDEX ARDIFIX contains polymer resins. Use appropriate personal protective equipment (PPE) when handling, and provide for adequate ventilation during and immediately after application. This material is for professional use only. KEEP OUT OF REACH OF CHILDREN. Carefully read and follow all cautions and warnings on the product label. Read the Material Safety Data Sheet prior to use. It is available online at www.ardexamericas.com.

Technical Data According To ARDEX Quality Standards

Test data based on neat resin at 70° F (21°C) at a mixing ratio of 1:1 by volume. Physical properties are typical values and not specifications.

Recommended Thickness:	No limits
Coverage:	Varies with depth of fill area
Pot Life:	Approx. 2 minutes
Percent Solids:	100% by weight
Tensile Strength (ASTM D638):	Approx. 4150 psi (292 kg/cm^2)
Compressive PSI (75°F) ASTM D638:	45 min: 3,500 24 hrs: 5,000
Elongation (ASTM D638):	6%
Die C Tear (ASTM D624):	243 pli
Shore D Hardness:	70
Viscosity:	60 cps
Tack Free:	Approx. 10 minutes
Full Service:	45 minutes
VOC:	0 g/L, calculated SCAQMD 1168
Storage:	Store in a dry area between 65 and 90°F (18 to 32°C). Do not leave containers exposed to sun. Keep from freezing. Keep away from heat.
Packaging:	22 oz. dual cartridge
Shelf Life:	1 year if unopened
Warranty:	ARDEX Engineered Cements Standard Limited Warranty applies

© 2012 ARDEX, L.P. All rights reserved.
AT333 (ENG. 02/12)

ARDEX MC™ RAPID

One-Coat Moisture Control System For Concrete to Receive ARDEX Underlayments

One-coat epoxy resin system

No sand broadcast required for underlayment applications of 1/4" (6 mm) or less

Ready to prime in just 4 hours

Solvent free, alkali resistant

Tenacious bond to substrate

Reduces moisture vapor emissions to acceptable levels for floor coverings

For RH readings up to 100%

ASTM E96 perm rating ≤ 0.10

Use under all standard commercial and residential floor coverings on interior substrates only

ARDEX Engineered Cements
400 Ardex Park Drive
Aliquippa, PA 15001 USA
Tel: 724-203-5000
Toll Free: 888-512-7339
Fax: 724-203-5001
www.ardexamericas.com

ARDEX MC™ RAPID

One-Coat Moisture Control System for Concrete to Receive ARDEX Underlayments

Description and Usage

The ARDEX MC™ RAPID Moisture Control System is a one-coat, 100% solids epoxy moisture management system formulated to suppress excessive moisture vapor emissions in new or existing concrete prior to installing an ARDEX underlayment with flooring. It is especially suited to treat areas of new concrete in critical installations, such as health care and institutional applications where the construction schedule does not allow adequate drying of the concrete. ARDEX MC RAPID is also recommended over existing concrete where the level of moisture emissions from the slab exceeds the maximum allowed by the manufacturer of the finished floor covering. Designed specifically for fast-track installations, ARDEX MC RAPID can be primed to receive an ARDEX underlayment in as little as 4 hours.

The ARDEX MC RAPID system is based on a reactive epoxy that produces a hard surface and tenaciously bonds to the substrate. Once cured, ARDEX MC RAPID is able to reduce any level of moisture emissions to an acceptable level, even over new concrete that is only 7 days old. No sand broadcast is used for underlayment layers of 1/4" (6 mm) thick or less. For thicker applications, apply a second coat of ARDEX MC RAPID with a sand broadcast, or use the ARDEX MC™ PLUS Moisture Control System or the ARDEX MC™ ULTRA Moisture Control System.

Substrate Preparation

When installed in accordance with our written recommendations, ARDEX MC RAPID is suitable for moisture levels up to 100% RH.

Please note that very high RH levels (above 98%) could be indicative of external water infiltration from inadequate drainage, leaks, broken pipes, etc. Verify that all external sources of water are controlled sufficiently prior to installation.

The surface of the concrete must be completely dry at the time the ARDEX MC RAPID is installed. For RH levels above 98% and for spaces that are not acclimated, verify concrete surface dryness by mat testing in conformance with ASTM D4263. The test must be conducted for at least 4 hours, which is the time required for ARDEX MC RAPID to be set sufficiently. To ensure that condensation does not form, it is extremely important to check the surface temperature of the concrete just prior to installation to verify that this temperature is at least 5°F (3°C) higher than the dew point for the given temperature and humidity in the space and rising. For example, if the dew point temperature in the space is 60°F (16°C), the slab temperature must be 65°F (19°C) or higher and rising.

All concrete substrates must be structurally sound and solid, surface dry and thoroughly clean and free of oil, wax, grease, asphalt, paint, latex compounds, curing and sealing compounds and any contaminant that could act as a bond breaker. The concrete must have a minimum tensile strength of 150 psi (10.5 kg/cm^2) for areas to receive normal foot traffic and 200 psi (1.38 kg/cm^2) for areas of heavy commercial traffic when tested in accordance with ASTM C1583.

Mechanical preparation of the surface is required to obtain a minimum ICRI concrete surface profile of 3 (CSP 3). Substrate preparation must be by mechanical means, such as shot blasting. Broom sweep and vacuum the prepared surface. Acid etching, solvents, sweeping compounds, adhesive removers and sanding are not acceptable means of cleaning the substrate.

If the concrete substrate is too uneven to provide a uniform film thickness of the ARDEX MC RAPID (typically CSP 6 or higher), the substrate can be pre-smoothed using ARDEX K 301™ Self-Leveling Exterior Concrete Topping, ARDEX MRP™ Moisture Resistant Patch or ARDEX K 60™ ARDITEX. Please note, if either ARDEX K 301 or ARDEX K 60 is installed, it must be prepared to a minimum CSP #3 (maximum CSP #5) by mechanical methods, such as shot blasting. Thoroughly sweep and vacuum prior to proceeding with the installation. No additional preparation is required where ARDEX MRP is installed if the ARDEX MRP is clean and was troweled to a minimum CSP #3 during installation. If using ARDEX K 60 as a pre-smoothing compound beneath ARDEX MC RAPID, please contact the ARDEX Technical Service Department for instructions on substrate preparation and installation. Please refer to the appropriate ARDEX technical brochure for installation instructions and necessary cure times.

Where full-depth slab repair and/or pre-leveling is needed prior to installing ARDEX MC RAPID, ARDEX TRM™ Transportation Repair Mortar Fast-Setting, Horizontal Concrete Repair Mortar can be used. The surface of the ARDEX TRM must be prepared to a minimum ICRI concrete surface profile of 3 (CSP #3). Proper profile can be achieved as the ARDEX TRM is roughed in or via mechanical preparation methods, such as shot blasting, once the product is cured. Thoroughly sweep and vacuum prior to proceeding with the installation.

While the minimum cure time for ARDEX TRM is 6 hours, it is important to note that any heat generated by the hydration reaction of the ARDEX TRM must dissipate prior to installing MC RAPID.

Recommended Tools

Epoxy mixing paddle, low speed drill, short-nap paint roller or notched squeegee (smoother surfaces), long-nap paint roller (more uneven surfaces) and a paintbrush.

Dormant Cracks and Dormant Saw Cut Joints

To achieve a continuous moisture barrier, dormant control joints and dormant cracks greater than a hairline (1/32" / 0.79 mm) must be pre-filled with a two-part, low viscosity, 100% solids, rigid crack and joint filler, such as ARDEX ARDIFIX™. Dormant cracks and dormant saw cuts must be filled in strict accordance with the installation instructions provided by the ARDEX Technical Service Department. Once the dormant cracks and dormant saw cuts have been filled properly, broadcast sand to refusal, and allow these areas to cure thoroughly. Remove all excess sand prior to proceeding with the ARDEX MC RAPID installation.

Moving Joints and Moving Cracks

All moving joints and moving cracks must be honored up through the ARDEX MC RAPID, the ARDEX underlayment and the floor covering by installing a fully flexible sealing compound designed specifically for use in moving joints, such as ARDEX ARDISEAL™ RAPID PLUS.

ARDEX cannot be responsible for issues arising from expansion and isolation joints, saw cuts or new or existing cracks that may develop, widen or become more narrow after the system has been installed.

For questions regarding the appropriateness of specific joint treatment compounds, please contact the ARDEX Technical Service Department at 888-512-7339.

Mixing and Application

Each individual unit of ARDEX MC RAPID comes in a 22 lb. (10 kg) unit containing separate, pre-measured quantities of hardener (Part B) and resin (Part A). After opening each container, mix the resin (Part A) thoroughly before blending.

For blending, the hardening agent (Part B) is added to the resin (Part A). Pour all of the hardener into the resin portion, and mix thoroughly for a minimum of 3 minutes using a low speed drill and an epoxy mixing paddle. Once mixed, pour some of the epoxy back into the hardener container, mix for 10 seconds, and then pour all of the contents back into the resin container. This step ensures that no hardener residue remains unreacted. Mix for an additional 30 seconds before applying.

CAUTION! *Once the ARDEX MC RAPID is mixed thoroughly, immediately pour the entire contents of the container onto the prepared concrete surface. Due to its high reactivity, this epoxy has a tendency toward intense heat buildup when in mass, such as when left in the original container. If this occurs, do not touch the container. Close the lid loosely and transport the container by the handle to a cool room or outdoors until it sets and cools.*

Apply the freshly mixed ARDEX MC RAPID to the prepared concrete surface without interruption and in a uniform direction at a minimum thickness of 10 mils / 250 microns, which equates to an approximate application rate of 250 - 270 sq. ft. (23 - 25 sq. m) per unit, depending on concrete surface profile, texture and porosity. Use a short-nap paint roller or notched squeegee with back-rolling for smoother surfaces, and a longer nap roller for more uneven substrates. To minimize the potential for pinhole formation, work the ARDEX MC RAPID into the surface with the roller to ensure maximum penetration. ARDEX MC RAPID can also be worked into the surface with a paintbrush for hard to reach areas and corners. Once an area has been coated completely, allow this to dry for a minimum of 4 hours (max. 16 hours).

For ARDEX underlayment applications of 1/4" (6 mm) or less, prime the surface of the ARDEX MC RAPID with ARDEX P 82™ Ultra Prime. Allow the ARDEX P 82 to dry thoroughly (min 3 hours; max. 24 hours) before installing the underlayment.

For underlayment installations greater than 1/4" (6 mm), or, if the ARDEX MC RAPID was not worked into the surface sufficiently enough to prevent pinholes, you must apply another coat of ARDEX MC RAPID with a sand broadcast. No ARDEX P 82 is required. Apply the second coat of ARDEX MC RAPID at a 90° angle to the direction the first coat was applied. While this coat is still in a fresh state (maximum 20 minutes), broadcast an excess of fine sand (less than 1/50" in grain size or 98.5% passing sieve size #30 or #35) consistently over the entire area. When broadcasting the sand, use a NIOSH-approved dust mask in conformance with OSHA requirements regarding the handling of sand (crystalline silica). Do not stand or walk on the freshly applied epoxy when broadcasting the sand. Once an area has been covered completely with sand, the surface of the sand can be walked on, being careful not to expose or disturb the epoxy at any time. Use approximately 1 lb. of sand per sq. ft. of area. Once the sand broadcast is complete, avoid all general traffic over the surface for a minimum of 4 hours.

After 4 hours, broom sweep and vacuum the surface to remove all loose sand. The clean, prepared surface of the sand is the priming system for the ARDEX underlayment. No additional priming is required. There is no limit to how long the sanded surface can remain open before installing the ARDEX underlayment provided that the surface does not become contaminated. If the underlayment will not be installed immediately, protect its surface from construction traffic, dirt and debris using Masonite or similar. Install the ARDEX underlayment in accordance with the printed instructions found in the corresponding ARDEX technical brochure.

It is not necessary to re-test the substrate for moisture emissions prior to installing the floor covering.

Notes

FOR PROFESSIONAL USE ONLY.

The installation of ARDEX MC RAPID does not require calcium chloride testing of the concrete per ASTM F1869, nor does this ASTM standard permit this test over the top of concrete that has been treated with a moisture remediation system.

ARDEX MC RAPID has a working time of approximately 20 minutes at 70°F (21°C). Lower temperatures will lengthen the working time, while higher temperatures will shorten it dramatically. Do not apply ARDEX MC RAPID if the surface temperature is below 50°F (10°C).

Dispose of container and residue in accordance with federal, state and local waste disposal regulations. Do not flush material down drains.

Precautions

Carefully read and follow all precautions and warnings on the product label. For complete safety information, please refer to the Safety Data Sheet (SDS) available at www.ardexamericas.com.

Made in the USA.

Technical Data According to ARDEX Quality Standards

All data based on 70°F (21°C) installation temperatures. Physical properties are typical values and not specifications.

Mixing Ratio:	Add entire pre-measured contents of Part B (Hardener) into Part A (Resin).
Coverage:	Approx. 250 - 270 sq. ft. (23 - 25 sq. m) per mixed unit of ARDEX MC RAPID (Will vary with concrete surface profile, porosity and texture)
Permeability (ASTM E96):	1 coat at 10 mils - 0.06 perms 2 coats, each at 10 mils with sand in 2nd coat - 0.06 perms
Effect of 14 pH Solution (ASTM D1308):	No effect
Working Time:	20 minutes
Pot Life:	20 minutes; however, material should be poured onto the substrate and applied after mixing.
Walkable:	4 hours
Prime and install underlayment:	Min. 4 hours Max. 16 hours
VOC:	19.9 g/L, A+B, ASTM D2369
Packaging:	One 22 lb. (10 kg) unit
Storage:	Store in a cool dry area. Do not leave containers exposed to sun. Keep from freezing. Keep away from heat.
Shelf Life:	1 year, if unopened
Warranty:	ARDEX Engineered Cements Standard Limited Warranty applies. Extended system warranty is available. Please note that training by the ARDEX Technical Service Department is required for extended warranty eligibility. Please contact the ARDEX Technical Service Department for details.

© 2014 ARDEX Engineered Cements, L.P. All rights reserved.

AT301

Updated 07-02-2014. Supersedes all previous versions. Check www.ardexamericas.com for updates.

ARDEX Engineered Cements
400 Ardex Park Drive
Aliquippa, PA 15001 USA
Tel: 724-203-5000
Toll Free: 888-512-7339
Fax: 724-203-5001
www.ardexamericas.com

ARDEX P 82™
Ultra Prime

For wood, cutback, metal and other non-porous substrates

Waterborne two-component primer

Seals the substrate

Improves the bond of ARDEX Underlayments and Toppings

Use for interior use only

ARDEX ENGINEERED CEMENTS
400 Ardex Park Drive
Aliquippa, PA 15001 USA
Tel: 724-203-5000
Toll Free: 888-512-7339
Fax: 724-203-5001
www.ardex.com

ARDEX P 82™
Ultra Prime

Description And Usage

ARDEX P 82™ is a high-strength, solvent-free primer that improves the adhesion of ARDEX products over smooth, non-absorbent substrates such as ceramic and other stone tiles, terrazzo, epoxy and metal decking. ARDEX P 82 is also used over wooden subfloors, including plywood and strip wood, as well as over cutback and other non-water-soluble adhesive residues.

Standard absorbent concrete substrates, and also other substrates in specialized applications, must be primed with ARDEX P 51™ PRIMER. Please refer to the ARDEX Technical Brochure for more information.

Specific substrate preparation requirements are provided in the individual Technical Brochures for each ARDEX product. Please refer to the ARDEX Technical Brochures for further information.

Substrate Preparation

All existing substrates must be solid, thoroughly clean and free of oil, wax, grease, asphalt, patching materials and any other contaminant that might act as a bond breaker. For further information, please refer to the ARDEX Substrate Preparation Brochure.

Mixing And Application

ARDEX P 82 is supplied as a two-component unit that consists of two 1/2-gallon containers: PART A (liquid is red in color) and PART B (liquid is white in color). Mix the entire contents of ARDEX P 82 PART A with ARDEX P 82 PART B using a mixing paddle. Apply to substrate with a squeegee or a short-nap or sponge paint roller, leaving a coat of primer no heavier than a thin coat of paint. Do not leave any bare spots. Brush off puddles and excess primer. Allow primer to dry to a thin, slightly tacky film (min. 3 hours, max. 24 hours).

ARDEX P 82 must be applied in a thin layer within one hour of mixing. A thick coat will produce a soft and rubbery surface, which can result in cracking of the ARDEX underlayment.

Notes

Low substrate temperatures and/or high ambient humidity require longer drying times for ARDEX primers. Do not install the ARDEX Underlayment or Topping before the primer has dried thoroughly.

Precautions

Avoid eye and skin contact. Adequate ventilation of the work area should be maintained during the installation process. **Do not sand or grind adhesive residue, as harmful dust may result. Inhalation of asbestos dust may cause asbestosis or other serious bodily harm.** See the current edition of the Resilient Floor Covering Institute's publication "Recommended Work Practices for Removal of Resilient Floor Coverings" for instructions on removing all resilient floor covering structures. Close container after each use. Do not reuse container. Dispose of container and primer residue in accordance with federal, state and local waste disposal regulations. Do not flush primer down drains, sewers or waterways. KEEP OUT OF REACH OF CHILDREN. Carefully read and follow all cautions and warnings on product label. For complete safety information, please refer to the Material Safety Data Sheet, or visit our web site at www.ardex.com.

Do not install below 50°F (10°C) surface or air temperature. ARDEX P 82 is non-toxic, non-explosive and non-flammable.

Technical Data According To Ardex Quality Standards

All data at 70°F (21°C)

Mixing Ratio:	Mix entire pre-measured contents of PART A (red) with PART B (white)
Coverage:	200-400 sq. ft. per gallon using short-nap or sponge paint roller
Drying Time:	Min. 3 hours, max. 24 hours at 70°F/21°C
Packaging:	One unit contains two ½ gallon (1.9 liters) liquid containers
Storage:	Store in a cool dry area. Do not expose container to sun. Keep from freezing.
Shelf Life:	One year unopened

© 2008 ARDEX, L.P. All rights reserved.

AT141 (ENG. 04/08)

ARDEX ENGINEERED CEMENTS
400 Ardex Park Drive
Aliquippa, PA 15001 USA
Tel: 724-203-5000
Toll Free: 888-512-7339
Fax: 724-203-5001
www.ardex.com

ARDEX FEATHER FINISH®

Self-Drying, Cement-Based Finish Underlayment

Self-drying, finishing underlayment

Provides a smooth surface prior to the installation of floor covering over a variety of substrates

A blend of Portland cement and other hydraulic cements

Exceptional bond strength

Easy to mix and apply

Mixes with water only

True featheredge

Superior coverage - up to 300 sq. ft. per bag*

Mold and mildew resistant

Install floor coverings in as little as 15 minutes

Interior use only

SystemOne™

ARDEX ENGINEERED CEMENTS
400 Ardex Park Drive
Aliquippa, PA 15001 USA
Tel: 724-203-5000
Toll Free: 888-512-7339
Fax: 724-203-5001
www.ardexamericas.com

ARDEX FEATHER FINISH®

Self-Drying, Cement-Based Finish Underlayment

Description and Usage

ARDEX FEATHER FINISH® is an underlayment formulated from a blend of Portland cement and other hydraulic cements that provides a smooth, permanent finish for a variety of substrates prior to the installation of today's demanding floor coverings, including sheet vinyl and VCT (vinyl composition tile). ARDEX FEATHER FINISH allows the installation of most types of floor covering in as little as 15 minutes over all types of interior concrete, masonry, wood, terrazzo, and ceramic and quarry tile - as well as properly prepared residues of cutback and other non-water-soluble adhesives on concrete - all without the need for priming or the use of a latex additive.

ARDEX FEATHER FINISH mixes with water only to a creamy, smooth consistency, for easy application. Engineered around a self-drying matrix, all of the mix water is chemically combined within the product itself. Using this unique technology, flooring installation problems associated with disbonding, crumbling, mold, mildew and staining are eliminated, thus preserving the floor manufacturer's full product warranty.

ARDEX FEATHER FINISH also may be used as an embossing filler when mixed with ARDEX P 82™ ULTRA PRIME. Please read the instructions under "Embossing Filler."

Substrate Preparation

For all of the substrates listed below, acid etching, adhesive removers, solvents and sweeping compounds are not acceptable means for cleaning the substrate. Substrate and ambient temperatures must be a minimum of 50°F (10°C) for the installation of ARDEX products. For more detailed information on substrate preparation, please refer to the ARDEX Substrate Preparation Brochure at www.ardexamericas.com.

CONCRETE: All concrete substrates must be solid, thoroughly clean and free of oil, wax, grease, asphalt, latex and gypsum compounds, curing compounds**, sealers and any contaminant that might act as a bond breaker. If necessary, mechanically clean the floor down to sound, solid concrete by shot blasting, grinding or similar. Over-watered, frozen or otherwise weak concrete surfaces must also be cleaned down to sound, solid concrete by mechanical methods. Acid etching, adhesive removers, solvents and sweeping compounds are not acceptable means for cleaning the substrate. Sanding equipment is not an effective method to remove curing and sealing compounds.

****NOTES ON CURING COMPOUNDS:** Test areas of ARDEX FEATHER FINISH can be installed and evaluated over concrete slabs that have been treated with either silicate or acrylic resin curing compounds. These compounds must be installed in strict accordance with the compound manufacturer's written recommendations. If a silicate type has been used, all residual salts must be removed. For instructions on priming concrete with acceptable curing compounds, please refer to the Priming section of this brochure.

Please be advised, however, that there are a number of curing compounds sold today that are wax- or petroleum-based emulsions. These are permanent bond breakers that must be removed completely prior to patching or leveling. Dissipating compounds must also be removed completely by mechanical means prior to installing any ARDEX material.

It is imperative to be able to determine the type of curing compound that was used before proceeding. Any curing compound that cannot be identified should be completely, mechanically removed.

ADHESIVE RESIDUES ON CONCRETE: ARDEX FEATHER FINISH also can be installed over non-water-soluble adhesive residue on concrete only. The adhesive must first be tested to make certain it is not water-soluble. Water-soluble adhesives must be removed mechanically down to clean concrete. The existing adhesive also must be tested to verify that it does not interact with the new flooring adhesive, and the new flooring must be tested to ensure it is not susceptible to bleed through of the existing adhesive. If adhesive interaction and/or migration are a concern, install an ARDEX self-leveling material such as ARDEX K 15® Premium Self-Leveling Underlayment.

Non-water-soluble adhesives should be prepared to a thin, well-bonded residue using the wet-scraping technique as recommended by the Resilient Floor Covering Institute (www.rfci.com) to remove thick areas and adhesive build-up, as well as any areas that are weak or not well bonded to the concrete. Any existing patches below the adhesive must be removed completely.

OTHER NON-POROUS SUBSTRATES: ARDEX FEATHER FINISH also can be applied over other clean, sound and solidly bonded non-porous substrates, including terrazzo, burnished concrete, epoxy coating systems, and ceramic and quarry tile. The substrate must be clean, including the complete removal of existing waxes and sealers, dust, dirt, debris and any other contaminant that may act as a bond breaker. Substrate preparation must be by mechanical means, such as shot blasting.

GYPSUM: ARDEX FEATHER FINISH can be installed over gypsum underlayments that are sound, solid, well bonded and properly primed. For instructions on priming gypsum underlayments, please refer to the Priming section below. The gypsum must be thoroughly clean and free of dirt, debris, sealers and any contaminant that might act as a bond breaker. If necessary, mechanically clean the floor down to sound, solid gypsum by shot blasting, grinding or similar.

Please be advised, however, that the fact remains that the substrate is gypsum, and therefore has inherent weakness. ARDEX FEATHER FINISH will provide a solid surface to which new flooring can bond, but cannot change the fact that a weak substrate lies below.

The wood subfloor must be constructed according to prevailing building codes and must be solid and securely fixed to provide a rigid base free of undue flex. Any boards exhibiting movement must be re-nailed. The surface of the wood must be clean and free of oil, grease, wax, dirt, varnish, shellac and any contaminant that might act as a bond breaker. If necessary, sand down to bare wood. A commercial drum sander can be used to sand large areas. Do not use solvents, strippers or cleaners. Vacuum all dust and debris. It is the responsibility of the installation contractor to ensure that the wood subfloor is thoroughly clean and properly anchored prior to the installation of any ARDEX material.

Some flooring manufacturers recommend a finish-grade wood underlayment be installed over the existing wood subfloor. If necessary, ARDEX FEATHER FINISH can be used to smooth fasteners and/or joints in the wood underlayment. Please note that the wood underlayment must be suitable for the installation of the specific floor covering and must be installed in accordance with the wood underlayment manufacturer's recommendations.

METAL: Metal substrates must be rigid, well supported, properly anchored, and free of undue flex and vibration. They must also be clean, including the complete mechanical removal of rust, corrosion and any contaminant that may act as a bond breaker. It is the responsibility of the installation contractor to ensure that this is so. To prevent rust from recurring, steel surfaces must be coated with an anticorrosive epoxy coating and allowed to dry thoroughly. The coating must be installed in strict accordance with the coating manufacturer's written recommendations and allowed to cure fully. Lead, copper and aluminum do not need to be coated with an anticorrosive coating.

NOTE ON ASBESTOS-CONTAINING MATERIALS: Please note that when removing existing flooring, any asbestos-containing materials should be handled and disposed of in accordance with applicable federal, state and local regulations.

For all of the above cases, acid etching, adhesive removers, solvents and sweeping compounds are not acceptable means for cleaning the substrate. Substrate and ambient temperatures must be a minimum of 50°F (10°C) for the installation of ARDEX products.For more detailed information on substrate preparation, please refer to the ARDEX Substrate Preparation Brochure at www.ardexamericas.com.

Recommended Tools

ARDEX T-2 Ring Mixing Paddle, mixing bucket, margin trowel, steel trowel, razor scraper, and a 1/2" (12 mm) heavy-duty drill (min. 650 rpm).

Priming

NOTE: ARDEX primers may require longer drying time with low surface temperatures and/or high ambient humidity. Do not install ARDEX FEATHER FINISH before the primer has dried thoroughly.

GYPSUM: If the substrate is a gypsum underlayment that will not be removed, double priming of the gypsum is necessary to consolidate what may be a dusty surface prior to installing ARDEX FEATHER FINISH. Make an initial application of ARDEX P 51™ PRIMER mixed with 3 parts water, and apply using a soft push broom. Do not leave any bare spots. Remove all puddles and excess primer. Allow thorough drying such that the film of primer does not re-emulsify in water (approximately 1 to 3 hours) before proceeding with the second application of ARDEX P 51 diluted 1:1 with water. Allow thorough drying to a clear, thin film (min. 3 hours, max. 24 hours).

NON-POROUS SUBSTRATES: ARDEX FEATHER FINISH will bond to some non-porous substrates, such as burnished concrete, terrazzo, and ceramic and quarry tile, without the use of a primer. Other non-porous substrates, such as epoxy coating systems and concrete treated with silicate compounds, must be primed with ARDEX P 82 ULTRA PRIME. Follow the mixing instructions on the container, and apply with a short-nap or sponge paint roller, leaving a thin coat of primer. Do not leave any bare spots. Brush off puddles and excess primer. ARDEX P 82 should be applied within 1 hour of mixing. Allow primer to dry to a thin, slightly tacky film (min. 3 hours, max. 24 hours).

NOTE: If an approved acrylic curing compound is used, test the surface for porosity. If the concrete is porous, no primer is needed. If it is non-porous, prime with ARDEX P 82.

METAL: Prime the prepared metal with ARDEX P 82 ULTRA PRIME. Follow the mixing instructions on the container, and apply with a short-nap or sponge paint roller, leaving a thin coat of primer. Do not leave any bare spots. Brush off puddles and excess primer. ARDEX P 82 should be applied within 1 hour of mixing. Allow primer to dry to a thin, slightly tacky film (min. 3 hours, max. 24 hours).

Joints and Cracks

Under no circumstances should ARDEX FEATHER FINISH be installed over any moving joints or moving cracks. All existing expansion joints, isolation joints and construction joints, as well as all moving cracks, must be honored up through the underlayment and flooring.

Please be advised that while dormant control joints and dormant cracks in the slab may be filled with a trowel-grade material such as ARDEX FEATHER FINISH prior to installing finish flooring, this filling is not intended to act as a repair method that will eliminate the possibility of joints and cracks telegraphing. ARDEX FEATHER FINISH is a non-structural material and is, therefore, unable to restrain movement within a concrete slab. This means that while some dormant joints and dormant cracks may not telegraph up into the finish flooring, cracks will telegraph in any area that exhibits movement, such as an active crack, an expansion or isolation joint, or an area where dissimilar substrates meet. We know of no method to prevent this telegraphing from occurring.

Mixing and Application

For one 10 lb. (4.5 kg) bag of ARDEX FEATHER FINISH, use 2 1/2 quarts (2.4 L) of clean water. Pour the water in the mixing container first, and then add the ARDEX FEATHER FINISH. For best results, mix with an ARDEX T-2 Ring Mixing Paddle and a 1/2" (12 mm) heavy-duty drill (min. 650 rpm). Mechanical mixing will produce a creamier, smoother consistency without the need for additional water. **DO NOT OVERWATER!** Additional water will weaken the compound and lower its strength. To mix smaller quantities by hand, use 2 parts of powder to 1 part of water by volume. Use a margin trowel and mix vigorously for 2 to 3 minutes. Just prior to application on the substrate, the mixture should be stirred again to ensure a creamy, smooth, lump-free consistency. The pot life of ARDEX FEATHER FINISH is approximately 15-20 minutes at 70°F (21°C). If stiffening or surface skinning occurs within this time, remix before using. **Do not add more water.**

After mixing, apply the ARDEX FEATHER FINISH to the substrate with the flat side of a steel trowel to obtain a solid mechanical bond before applying the desired thickness. Apply sufficient pressure to fill all defects and to feather the product onto the subfloor surface.

EMBOSSING FILLER: Existing felt-backed embossed residential sheet vinyl must be clean and free of any waxes or other dressings. The flooring must be solidly bonded, must be installed over a suitable substrate, and must not show any signs of moisture, mold, mildew or alkaline salts. Do not use embossing filler over cushioned-backed flooring that is thicker than 0.080", or over perimeter-bonded flooring.

To use ARDEX FEATHER FINISH as an embossing filler, mix one part of ARDEX P 82 Part A with one part of ARDEX P 82 Part B by volume and blend to a uniform consistency. Add two parts of ARDEX FEATHER FINISH by volume and mix as above.

For example, mix 1 cup (8 oz.) of ARDEX P 82 Part A with 1 cup of ARDEX P 82 Part B. Blend this to a uniform color and consistency, and then add 2 cups (16 oz.) of ARDEX FEATHER FINISH. For best results, mix the embossing filler with an ARDEX T-2 Ring Mixing Paddle and 1/2" heavy-duty drill to a creamy consistency, or use a margin trowel and mix vigorously for 2 to 3 minutes. Apply the filler to the prepared residential sheet vinyl with the flat side of a trowel in the thinnest possible layer to fill in the existing pattern. (Coverage of above mix is approx. 50 sq. ft., depending upon the depth of the embossing pattern.) If additional filling or smoothing is required after the pattern is filled, use ARDEX FEATHER FINISH mixed with water only.

The embossing filler blend will typically require 90 minutes of drying time prior to the installation of the new residential sheet vinyl. The surface is ready when a twist of a shoe does not affect the bond of the embossing filler. When dried, the surface of the filled vinyl is considered a non-porous substrate, and the adhesive should be selected accordingly.

Thickness of Application

ARDEX FEATHER FINISH can be installed from a true featheredge up to 1/2 in. (12.7 mm) over large areas. It can also be installed up to any thickness in small, well-defined areas, such as thresholds and birdbaths, as well as for height transitions. There is no minimum thickness requirement for this product. Use the least amount possible to attain the desired smoothness. The thickness of the application should be calculated based on the surface profile of the substrate and the specified tolerances of the floor covering.

Wear Surface

ARDEX FEATHER FINISH is not to be used as a permanent wear surface, even if coated or sealed. ARDEX FEATHER FINISH must be covered by a suitable floor covering material such as carpet, vinyl flooring, ceramic tile, etc. For resurfacing and leveling indoor concrete floors in warehouses, storage areas, hallways or other areas where a wear surface is required, use ARDEX SD-M™ DESIGNER FLOOR FINISH™.

Installation of Flooring

As soon as the ARDEX FEATHER FINISH can be worked on without damaging the surface (15-20 minutes), standard floor coverings such as ceramic tile, VCT, sheet vinyl and carpeting can be installed. If installing wood flooring, or, if high-performance adhesives will be used, such as epoxies or urethanes, please note that the ARDEX FEATHER FINISH must first be allowed to cure for 16 hours. All flooring adhesives that are compatible with concrete are compatible with ARDEX FEATHER FINISH.

Drying time is a function of jobsite temperature and humidity conditions, as well as the installation thickness. Low substrate temperatures and/or high ambient humidity will extend the drying time. Adequate ventilation and heat will aid drying.

It is important to note that many different types of adhesives are used to install floor coverings, and their absorbency into cementitious substrates can vary significantly. If it is found that the adhesive being used is drying more quickly over the ARDEX FEATHER FINISH than over adjacent concrete, we recommend that the surface of the underlayment be primed with ARDEX P 51 PRIMER diluted 1:3 with water. Allow the primer to dry thoroughly (1 to 3 hours), and proceed with the installation of the adhesive. The use of the primer will even out the open time of the adhesive without affecting the bond or the long-term performance.

Notes

FOR PROFESSIONAL USE ONLY.

This product is intended for interior use over dry substrates only. Do not use in areas of constant water exposure or in areas exposed to permanent or intermittent substrate moisture, as this may jeopardize the performance of the underlayment and the floor covering. This product is not a vapor barrier, and will allow free passage of moisture. **Follow the directives of the floor covering manufacturer regarding the maximum allowable substrate moisture content and test the substrate prior to installing ARDEX FEATHER FINISH.** Where substrate moisture exceeds the maximum allowed, ARDEX recommends the use of ARDEX Moisture Control Systems. For further information, please refer to the ARDEX Technical Brochures.

Always install an adequate number of properly located test areas, including the finish flooring, to determine the suitability of the products for the intended use. As floor coverings vary, always contact and rely upon the floor covering manufacturer for specific directives, such as maximum allowable moisture content, adhesive selection and intended end use of the product.

Never mix with cement or additives other than ARDEX-approved products. Observe the basic rules of concrete work. Do not install below 50°F (10°C) surface and air temperatures. Install quickly if the substrate is warm, and follow warm weather instructions available from the ARDEX Technical Service Department.

To preserve its freshness, ARDEX FEATHER FINISH must be protected from air while not in use. Protect unused material by removing the air from the bag and sealing tightly. Open and reseal as necessary.

Precautions

Carefully read and follow all precautions and warnings on the product label. For complete safety information, please refer to the Material Safety Data Sheet (MSDS) available at www.ardexamericas.com.

Technical Data According to ARDEX Quality Standards

All data based on a mixing ratio of 2 parts powder to 1 part water by volume at 70°F (21°C). Physical properties are typical values and not specifications.

Mixing Ratio:	2 1/2 quarts (2.4 L) of water per 10 lb. (4.5 kg) bag
	For smaller batches, use 2 parts powder to 1 part water by volume
***Coverage:**	16.7 sq. ft. per bag at 1/4" (1.5 sq. m at 6 mm)
	33.3 sq. ft. per bag at 1/8" (3.09 sq. m at 3 mm)
	100-300 sq. ft. (9.2-27.8 sq. m) per bag at a skim coat
	Coverage will vary depending on the texture of the surface being smoothed.
Install Flooring:	15-20 minutes at 70°F (21°C)
VOC:	0
Packaging:	10 lb. (4.5 kg) net weight bag
Storage:	Store in a cool, dry area. Do not leave bags exposed to sun. Protect unused material by removing air from bag and sealing tightly.
Shelf Life:	9 months, if unopened
Warranty:	ARDEX Engineered Cements Standard Limited Warranty applies. Also eligible for the ARDEX/HENRY SystemOne™ Warranty when used in conjunction with select HENRY® Flooring Adhesives.

© 2012 ARDEX, L.P. All rights reserved.
AT127 (10/17/12)

ARDEX ENGINEERED CEMENTS
400 Ardex Park Drive
Aliquippa, PA 15001 USA
Tel: 724-203-5000
Toll Free: 888-512-7339
Fax: 724-203-5001
www.ardexamericas.com

SECTION 07213 - INSULATION

PART 1 - GENERAL

1.1 Work Included
- .1 Provide insulation as shown on Drawings and specified herein.

1.2 Related Work
- .1 Rough Carpentry . . . . . Section 06100.
- .2 Modified Bitumen Sheet Roofing . . . . . Section 07536.

1.3 Submittals
- .1 Submit insulation manufacturer's MSD sheet, product data and installation instructions for each insulation product to be incorporated into the building.

PART 2 - PRODUCTS

2.1 Cavity Wall Insulation: Rockwool ComfortBatt™, non-combustible, lightweight, semi-rigid stone wool batt insulation to CAN/ULC-S702, Type 1 of thicknesses and locations as shown on Drawings.
- .1 Alternative: John Mansville "Formaldehyde-Free™ Fibreglass Insulation - UNFACED, non-combustible, lightweight, semi-rigid fibreglass batt insulation to CAN/ULC-S702, Type 1.

PART 3 - EXECUTION

3.1 Installation - General
- .1 Install insulation in accordance with manufacturer's written recommendations.
- .2 Install insulation to maintain continuity of thermal protection of building elements and spaces.
- .3 Fit insulation closely around objects within or passing through the insulation.
- .4 Do not enclose insulation until before inspection and receipt of Consultant's written approval.
- .5 Verify that conditions of substrate are acceptable for insulation installation in accordance with manufacturer's written recommendations. Ensure surfaces are free of snow, ice, frost, grease and other deleterious materials. Proceed with installation only after unacceptable conditions have been remedied.
- .6 Make certain air/vapour barrier membrane are in-place and inspected prior to insulation installation. If deficiencies are observed, i.e. tears, delamination, etc., report to the General Contractor and Consultant prior to covering.

3.2 Batt Insulation Installation
- .1 Install batt insulation in accordance with ASTM C 1320.
- .2 Fluff insulation to full thickness before installation. Do not compress insulation to fit into spaces.
- .3 Install batts to fill entire cavity. Cut lengths to friction-fit against adjacent structures. Insulate miscellaneous gaps and voids.

- END OF SECTION -

SECTION 07536 - MODIFIED BITUMEN SHEET ROOFING

PART 1 - GENERAL

1.1 Work Included
- .1 Removal of existing roof materials as required for localized repair.
- .2 Preparation of existing roof membrane surfaces.
- .3 Roofing at perimeters of new premanufactured mechanical curbs, using modified bitumen sheet roofing system, as shown on Drawings and specified herein, including the following:
  - .1 Vapour retarder membrane
  - .2 Roof insulation system
  - .3 Overlay board
  - .4 Two ply membrane system
- .4 Sequence work with general trades work to ensure that weather does not enter occupied area of building and does not enter the existing roofing system.

1.2 Related Work
- .1 Wood Framing, Nailers and Plywood Sheathing: . . . . . Section 06100.

1.3 References

.1	OIRCA	-	Ontario Industrial Roofing Contractors Association
		-	Manufacturer's printed instructions.
.2	CGSB	-	Canadian Government Specification Board
.3	CSA	-	Canadian Standards Association
.4	CSA A123.4-M	-	Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems
.5	CGSB 37-GP-9Ma	-	Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing
.6	CGSB 37-GP-56M	-	Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing
.7	CSA B-111	-	Wire Nails, Spikes and Staples

1.4 Submittals
- .1 Submit manufacturer's product data for systems, materials, and methods of installation proposed for use. Such literature shall identify systems, each component, and shall certify compliance of each component with applicable CSA, ASTM, FM and ULC Standards.
- .2 Submit manufacturer's product data for the following, if required for assembly:
  - .1 Exterior gypsum sheathing.
  - .2 Vapour barrier.
  - .3 Insulation board types.
  - .4 Overlay board type.
  - .5 Two-ply roofing membrane system
- .3 Submit written certificates on bill of lading from manufacturer with regard to physical properties of bitumen delivered to the site, as specified herein.
- .4 Submit shop drawings for tapered insulation showing plans and Sections of required slope to roof scupper and drain locations.
- .5 Applicator Qualifications
  - .1 Applicator shall be a member, in good standing, of the Ontario Industrial Roofing Contractors Association (OIRCA) and have a minimum of 10 years experience in installing the specified roofing system, and shall have specialized equipment in proper operating condition to perform the work in accordance with manufacturer's printed instructions.

.2 Perform work using skilled, competent and experienced roofing tradesmen and foremen supervisors fully conversant with standards, methods and techniques required for the installation of roofing system specified herein.

.3 Ensure torching is performed only by skilled roofers who have successfully completed a course of instruction in torch applied membrane techniques.

.6 Review During Construction

.1 Consultant will provide for review of roofing assembly installation during construction.

1.5 Delivery, Storage & Handling

.1 Deliver and store materials undamaged, in original containers with manufacturer's labels and seals intact. Storage of material will be limited and not necessary for quantity of roofing work.

1.6 Protection

.1 Protection Covering: Provide 13mm (½") thick plywood underlaid with 25mm (1") thick polystyrene insulation board adhered to plywood sheathing. Provide protection covering over roofed areas when working from, or over, such roof surfaces.

.2 Provide fire extinguishers at installation and storage locations of proper type for materials being used and stored. Have a 9 kg (20lb) dry chemical fire extinguisher fully charged and in operable condition at every location where open flames are used.

.3 An on site safety person shall remain on site for a minimum of two (2) hours after torching work has ceased. During this time, personnel is to check the area with a hand held infra-red scanner for localized hot spots and/or smoke. Localized hot spots are to be investigated for potential fire hazards by cut test. The safety person shall take the appropriate action to prevent further spreading of the hot spot and notify the appropriate agency. A full and complete Incident Report is to be forwarded to the Consultant and Owner.

1.7 Environmental Requirements

.1 Do not install materials in rain, cold, moisture, frost, snow or other climatic conditions which could incorporate moisture into roof materials, prevent proper application and adhesion of bitumen, jeopardize proper application of other materials. Refer to and comply with manufacturer's recommendations and limitations relative to this subject.

.2 When ambient air temperature is less than 0°C (32°F) taking into account wind chill factor, work will be permitted only upon written approval from Consultant, and then only after receipt of written assurance from the Contractor that cold weather precautions will be implemented (such as insulating of piping and luggers, etc.) and that materials will be installed properly and in full compliance with the Specifications.

1.8 Coordination, Sequencing, Scheduling

.1 Prior to start of work on site, a project site meeting of all parties concerned will be arranged, to review Specifications for work included in this Section, its requirements and responsibilities.

.2 Coordinate roofing work with that of other trades whose work affects, or is affected by, work of this Section, to conform to construction sequence and project schedule.

1.9 Warranties

.1 At completion of this work, provide to Owner a written warranty covering defects of workmanship and materials for a period of 2 years commencing from date of Substantial Performance of the work, and agree to make good promptly any defects which occur or become apparent within warranty period in conjunction with membrane manufacturer's warranty, such defects to include but not to be restricted to leakage, failure to stay in place, lifting and deformations. Warranty shall be on Ontario Industrial Roofing Contractors Association standard form of guaranty.

PART 2 - PRODUCTS

2.1 Exterior Gypsum Sheathing: Furnish Georgia-Pacific fibreglass mat-faced gypsum sheathing “DenGlass Gold”, ½" thick.

2.2 Vapour Retarder: Furnish Soprema “Sopravap R” self-adhesive vapour barrier membrane over gypsum sheathing substrate.

2.3 Roof Insulation Board: Furnish the following roof insulation boards:
- .1 Base Layer Insulation: Polyisocyanurate foam insulation board single layer, 4" (102 mm) thickness each and one of the following:
  - .1 Soprema “Sopra-Iso Plus”.
  - .2 Atlas Roofing Corporation "AC Foam-III".
  - .3 Johns Manville "ENRGY 3".
  - .4 Carlisle SynTec Systems “InsulBase Polyiso”.
- .2 Fill Layers: Furnish ½" fibreboard insulation.

2.4 Overlay Board: Furnish Soprema “Sopraboard” support panel, consisting of two asphalt-saturated glass mat reinforcement covering a mineral-fortified asphaltic core, 1/4" thick.

2.5 Accessories
- .1 Fasteners: Soprema “Soprafix Fasteners/Plates” consisting of #14 self-tapping screws, with washer of 50 mm (2 in) in diameter and in length required by infill material assembly plus minimum 19mm (3/4").

2.6 Membranes
- .1 Furnish SBS modified bitumen reinforced and torchable membranes, comprised of base sheet and cap sheet, complying with CGSB 37-GP-56M.
- .2 Roof System Base Sheet: Soprema " Sopraply Base Plus P/P 3.0".
- .3 Cap Sheet: Soprema "Sopralene Flam 250GR" in light gray colour.

PART 3 - EXECUTION

3.1 Examination
- .1 Verify the location and dimensions of the new prefabricated mechanical curb prior to commencing Work.
- .2 Examine the existing roofing assembly and substrate. Notify the Consultant of any deteriorated or unsuitable conditions that may affect the installation before proceeding.
- .3 Do not commence roofing modifications until the curb has been securely installed and anchored by others.

3.2 Preparation
- .1 Remove pea stone ballast from the Work area for a minimum distance of 600 mm (24 in.) beyond the perimeter of the new curb, or as required to complete the roofing modifications.
- .2 Carefully remove and dispose of existing built-up roofing membrane, insulation, and associated roofing materials as required to expose a sound substrate suitable for the installation of the new roofing system.
- .3 Protect exposed roof areas from water infiltration at all times. Provide temporary watertight protection whenever the roofing system is left incomplete or during adverse weather conditions.

3.3 Installation - General
- .1 Perform work as per membrane manufacturer's printed installation instructions for systems as specified herein.

3.4 Gypsum Sheathing
- .1 Install gypsum sheathing to metal roof deck. It is the intent to secure entire infill roofing board assemblies with screw-and-plate fasteners. Keep fasteners to a minimum ensuring assembly is secured.

3.5 Vapour Barrier
- .1 Roll out membrane over clean dry substrate. Ensure suitable overlap of adjacent vapour barrier. While holding membrane tight, peel off removable film by pulling diagonally. Overlap joints 75mm (3") minimum and roll with weighted roller.

3.6 Insulation
- .1 Cut a full size insulation board matching area of replacement. Place insulation in tight contact at joints between boards and at abutting surfaces. When cutting insulation board, cut completely through the board thickness and trim to provide plain butt joints; do not break or tear insulation board to fit detail. Any areas of insulation system having voids will be rejected.
- .2 Install base layer of insulation over self-adhered vapour barrier. It is the intended to secure entire infill roofing board assemblies with screw-and-plate fasteners. Keep fasteners to a minimum ensuring assembly is secured.
- .3 Install fibreboard insulation filler over base insulation.
- .4 Install overlay board flush with adjacent existing roof membrane. Secure entire system with screw-and-plate fasteners.

3.7 Roofing
- .1 Comply with manufacturer's torch application recommendations. Do not overheat membrane as to burn it or destroy reinforcement within membrane.
- .2 Ensure sheet membrane asphalt is melted during application, forming an asphalt bead pushed out in front of membrane to substrate interface as sheet is laid.
- .3 Provide 75mm (3") side laps and 150mm (6") end laps in base and cap sheet application. Lay membrane without air pockets, wrinkles, fishmouths or tears.
- .4 Base Sheet Installation
  - .1 Unroll base sheet on the substrate.
  - .2 Weld the base sheet onto prepared substrate.
  - .3 Avoid the formation of wrinkles, swellings or fishmouths.
- .5 Cap Sheet Installation
  - .1 Unroll cap sheet membrane dry over base sheet for alignment. Both surfaces to be simultaneously melted during this application, forming asphalt bead pushed out in front of membrane interface as cap sheet is layed.
  - .2 Stagger cap sheet seams from base sheet seams minimum of 300mm (12"). Provide 75mm (3") side laps and 150mm (6") end laps. Embed surface granules on end laps by heating and use of round-nosed roofing trowel, prior to installation of following sheet.
  - .3 During installation, take care to avoid asphalt seepage greater than 5mm (3/16") at seams.

3.8 Completion / Field Quality Control

.1 Check completed membrane welds for continuity, after cooling, by use of a screw driver run along welded seams. Joints shall indicate an uninterrupted extrusion of melted asphalt material from the joint.

.2 Inspect completed membrane and flashing for punctures, tears and discontinuous weld seams. Apply additional layer of cap sheet membrane over punctures and tears, extending beyond damaged area or open seam in all directions, torch in-place.

.3 Reinstate pea stone ballast around the completed Work to match the depth and distribution of the existing roof, taking care not to damage the new curbs and flashing.

.4 Remove excess materials and debris from the roof upon completion of the Work.

.5 Repair any damage to the existing roofing system resulting from the Work at no additional cost to the Owner.

.6 Submit roofing membrane manufacturer representative's site visit report to the Consultant for each such visit.

- END OF SECTION -

SECTION 09100 - METAL SUPPORT SYSTEMS

PART 1 - GENERAL

1.1 Work Included
- .1 Provision of lightweight steel framing metal support systems, including interior stud wall framing.

1.2 Related Work
- .1 Wood blocking . . . . . Section 06100.
- .2 Gypsum board . . . . . Section 09250.

1.3 Design Criteria for Exterior Steel Framing
- .1 Structural properties to be computed in accordance with CSA Standard CAN 3-S136-M84 Cold Formed Steel Structural Members (Limit States Design).
- .2 Furnish steel meeting requirements of ASTM A446 Standard Specification for Steel Sheet, Zinc Coated Grade A, 33 ksi (228 MPa) minimum yield.
- .3 Maximum allowable single span height shall be limited by L/360 deflection.
- .4 Provide minimum two rows of horizontal bridging for lateral support.

PART 2 - PRODUCTS

2.1 Materials
- .1 Interior non-loadbearing channel stud framing: to ASTM C645; required stud sizes as shown; roll formed from 0.53mm thickness electrogalvanized steel sheet; for screw attachment of gypsum board. Knock-out service holes at 460mm centres.
- .2 Floor and ceiling tracks: to ASTM C645; in widths to suit stud sizes. Furnish expansion tracks as required for deflection of structure.
- .3 Fasteners & Anchors
  - .1 Screws: 5mm x 25mm (No. 6 gauge x 1") long for metal furring to stud application and 5mm x 32mm (No. 6 gauge x 11/4") long for metal stud application. Furnish self-drilling, self-tapping, case hardened, with socket countersunk heads to ASTM C1002. Also furnish self-tapping galvanized screws for attachment of tooled metal sections to structural steel members into pre-drilled holes.

PART 3 - EXECUTION

3.1 Erection
- .1 Install metal stud framing in accordance with the manufacturer's written instructions, ASTM C754, ASTM C1007, and the requirements of the Ontario Building Code.
- .2 Align wall and partition runners (tracks) accurately at floor and roof or ceiling structures as indicated on the Drawings. Secure tracks to the supporting construction at a maximum spacing of 24" (600 mm) on centre using fasteners suitable for the supporting substrate.
- .3 Place steel studs vertically at 16" (400mm), as shown, and not more than 2" (50mm) from abutting walls and at each side of openings and corners. Position studs in tracks. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.
- .4 Erect metal studding to tolerance of 1:1000.
- .5 Coordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.
- .6 Provide 40mm stud or furring channel secured between studs for attachment of fixtures.
- .7 Install steel studs or furring channel between studs for attaching electrical and other boxes.
- .8 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use 50mm leg ceiling tracks, where required.

- END OF SECTION -

SECTION 09250 - GYPSUM BOARD

PART 1 - GENERAL

1.1 Work Included
- .1 Provide gypsum board work as shown on Drawings and specified herein including but not limited to the following:
  - .1 Gypsum partitions, non fire-rated.
  - .2 Repair of existing gypsum board substrates.
  - .3 Corner beads, tear-way L-beads and corner reinforcement.
  - .4 Taping and filling.

1.2 Related Work
- .1 Rough Carpentry . . . . . Section 06100.
- .2 Metal Support Systems . . . . . Section 09100.
- .3 Painting . . . . . Section 09900.

1.3 Submittals
- .1 Submit manufacturer's product data for gypsum board and accessories.

1.4 Examination
- .1 Examine the Drawings and Specifications to determine the extent of the work involved, together with other necessary data affecting the work. In no circumstances will any claims against the Owner be allowed resulting from failure to ascertain the extent of such work herein described or implied.

1.5 Reference Standards
- .1 This work shall be done by workers skilled in gypsum board work in accordance with the requirements of this Specification and the latest printed directions and specifications of the manufacturer.

PART 2 - PRODUCTS

2.1 Materials
- .1 General
  - .1 All materials shall be manufactured or supplied by CGC Inc. or CertainTeed Gypsum Canada Inc., unless specifically stated otherwise.
- .2 Gypsum Board
  - .1 ½" (13mm) Sheetrock® Brand Gypsum Panels, with tapered edges for joint filling, to conform to CSA A82.27 and ASTM C1396/C1396M-22. Gypsum board shall be in 48" (1200 mm) wide sheets of maximum practical lengths to minimize end joints.
- .3 Fastenings and Adhesives
  - .1 Nails, screws and staples: to CSA A82.31-M.
- .4 Accessories
  - .1 Joint Reinforcement Tape: perforated paper tape conforming to ASTM C475.
  - .2 Trims: Furnish vinyl trims for gypsum board, manufactured by Trim-Tex Inc., as follows:
    - .1 Mud Set Rigid Corner Bead, in longest possible lengths.
    - .2 Tear-Away® L Bead - ½", Stock Number: 9008.
      - .1 Trim Accessories:
        - .1 Adhesive: 847 Spray Adhesive.
        - .2 ½" Divergent Staples.
- .5 Joint Compound: Conform to requirements of ASTM C475. Drying-type (ready-mixed);: equivalent to CGC SHEETROCK® brand taping joint compound and topping joint compound, asbestos-free.

PART 3 - EXECUTION

3.1 Gypsum Panel Application
- .1 Do not apply gypsum board until bucks, anchors, blocking, electrical and mechanical work are approved.
- .2 Apply single layer of gypsum board to steel framing and wood blocking, as shown, using screw fasteners. Maximum spacing of screws 12" (300mm) o.c.

3.2 Accessories
- .1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at maximum 150mm o.c.
- .2 Install fill type Beads at locations shown on Drawings and where gypsum board butts against surfaces having no trim, concealing junction. Seal joint between adjacent materials with small sealant bead.
  - .1 Beads
    - .1 Measure and cut the bead to length. Dry fit to test proper cut.
    - .2 Spray the bead and substrate with 1 coat each of Trim-Tex 847 Spray Adhesive and position the bead into place.
    - .3 Once in position, pressure the leg using handle of your taping knife.
    - .4 Staple the mud leg into place every at maximum 6" with ½" staples.
    - .5 Apply joint compound providing smooth transition between bead and gypsum board surface.
    - .6 Remove tear-off strips, if equipped, after mudding but before sanding. Sand as usual.

3.3 Taping, Filling and Finishing
- .1 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.
- .2 Finish corner beads and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
- .3 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after painting is completed.
- .4 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
- .5 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for painting.
- .6 Provide the following levels of gypsum board finish:
  - .1 Walls and partitions, provide Level 4 finish: All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges.

- END OF SECTION -

SECTION 09511 - ACOUSTIC LAY-IN CEILINGS

PART 1 - GENERAL

1.1 Work Included
- .1 Provide acoustical lay-in ceiling system complete with suspension system, accessories, trims, etc., as specified herein.
- .2 Modification of existing ceiling tile and grid system, to accommodate new aluminum screen install.
- .3 Localized tile replacement.

1.2 Reference Standards
- .1 Installation: to ASTM C636 except where specified otherwise.

1.3 Design Criteria for Suspension System
- .1 Maximum deflection: 1/360th of span to ASTM C635 deflection test.

1.4 Samples
- .1 Submit duplicate full size samples of each acoustical unit type in accordance with Contract Documents.

1.5 Environmental Conditions
- .1 Permit wet work to dry before commencement of installation.
- .2 Maintain uniform minimum temperature of 15°C and humidity of 20 - 40% before and during installation.
- .3 Store materials in work area 48 hours prior to installation.
- .4 Commence installation after dust generating activities completed.

1.6 Maintenance Materials
- .1 Deliver one carton of acoustic tile panels for maintenance purposes, by Owner.
- .2 Maintenance materials to be same production run as installed materials.

PART 2 - PRODUCTS

2.1 Acoustic Tile
- .1 Acoustic Tile: Armstrong “Kitchen Zone™”, #672, 15/16" square lay-in, 24" x 48" x 5/8".

2.2 Suspension System
- .1 Prelude ML (24mm) Exposed Tee Grid system as manufactured by Armstrong World Industries Inc. Intermediate duty, white, two directional exposed tee bar grid, including:
  - .1 Main Beams
  - .2 Cross Tees
  - .3 7/8" Hemmed Angle Molding
- .2 Components: Commercial grade cold-rolled steel, zinc coated, shop painted satin sheen white, die cut. Main tee with double web, rectangular bulb and 25mm 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.
- .3 Hanger wire: galvanized soft annealed steel wire, 2.6mm thick.
- .4 Hanger inserts: purpose made.
- .5 Accessories: splices, clips, wire ties, retainers, hold down clips, as detailed to complement suspension system components, as recommended by system manufacturer.

PART 3 - EXECUTION

3.1 Suspension System Installation

.1 Installation: to ASTM C636, except where specified otherwise, and in accordance with manufacturer's directions.

.2 Establish ceiling elevations using laser level. Install wall mould to provide correct ceiling height. Finished ceiling system to be level with 3mm in 3.5M.

.3 Support suspension system main runners at 1200mm o.c., maximum with hanger wire from building structural system. Completed assembly to support all superimposed loads, such as lighting fixtures, diffusers, and grilles.

.4 Attach ceiling hanger to structure only.

.5 Support around light fixtures and diffusers with additional ceiling suspension hangers within 150mm of each corner and at maximum 600 mm around perimeter of fixture.

.6 Interlock cross member to main runner to provide rigid assembly.

.7 Install suspension system to manufacturer's instructions.

.8 Frame at openings for light fixtures, air diffusers, speakers, etc.

.9 Touch up galvanized hangers with galvanized primer where scratched or abraded during installation to provide completely corrosion-free surfaces.

3.2 Acoustical Tile Installation

.1 Ensure suspended system are coordinated with location of related components.

.2 Install acoustic units parallel to building lines with edge unit not less than 50% of unit width. Refer to mechanical and diffuser layout and electrical lighting layouts.

.3 Scribe acoustic units to fix adjacent work. Butt joints tight, terminate edges with moulding.

.4 Install flush edge moulding at junction of acoustic unit ceilings and other materials around entire length of joint. Secure to construction. Butt joints neatly, square and true in alignment.

.5 Do not install acoustical panels and tiles until mechanical and electrical work above ceiling have been inspected by Consultant and Authorities.

3.3 Cleaning

.1 Keep acoustic installation and all components clean.

.2 Touch up scratches, abrasions, voids and other defects in painted surfaces.

.3 Remove and replace damaged or improperly installed units and members.

- END OF SECTION -

SECTION 09663 - SLIP-RESISTANT SAFETY FLOORING

PART 1 - GENERAL

1.1 Work Included
- .1 Supply and installation of slip-resistant sheet vinyl safety flooring system.
- .2 Integral coved base installation including flash cove, inside and outside corners, and transitions.
- .3 Adhesives, seam welding, accessories, and finishing required for a complete flooring installation.

1.2 Related Work:
- .1 Moisture Control System & Underlayment. . . . . Section 07121.

1.3 References
- .1 ASTM D2047 Standard Test Method for Static Coefficient of Friction
- .2 ASTM E648 Standard Test Method of Critical Radiant Flux
- .3 ASTM E662 Standard Test Method of Specific Optical Density of Smoke
- .4 ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
- .5 ASTM F970 Standard Test Method of Static Load Limit
- .6 ASTM F1482 Standard Guide of Wood Underlayment Products Available
- .7 ASTM F1303 Standard Specification for Sheet Vinyl Floor Covering with Backing
- .8 ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- .9 ASTM F 3010 Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings
- .10 DIN 51130 Slip Resistance Test
- .11 ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials)
- .12 RFCI Recommended Work Practices for Removal of Resilient Floor Covering

1.4 Submittals
- .1 Product Data: Submit manufacturer's current printed product literature, specifications, installation instructions, and field reports.
- .2 Shop Drawings: Submit shop drawings to indicate materials, details, and accessories including but limited to the following:
  - .1 Submit a cut diagram indicating seam locations and roll direction. Use mitered seam layouts for corners when changing directions 180 degrees (e.g., when running material down corridors which bisect at a right angle), unless approved otherwise.
- .3 Samples: Submit duplicate 12" x 12" (300 mm x 300 mm) sample pieces of sheet material, 12" (300 mm) long.
- .4 Closeout Submittals: Submit the following:
  - .1 Operation and maintenance data for installed products in accordance with Section 01780. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.
  - .2 Warranty: Warranty documents specified herein.

1.5 Quality Assurance
- .1 Installer Qualifications: Experienced in performing work of this section and who is specialized in the installation of work similar to that required for this project.
- .2 Pre-installation Meeting: Conduct pre-installation meeting, including Owner's Representative and Consultant, to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

1.6 Delivery, Storage & Handling
- .1 Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- .2 Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- .3 Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer.

1.7 Product Conditions
- .1 Substrate Conditions: Methods described below determine the dryness, as required, ensuring initial and long-term success.
  - .1 ASTM F1869-98 Standard Test Method for Measuring Moisture Vapour Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
  - .2 Moisture emissions from concrete subfloors must not exceed 8 lbs per 1000sf per 24 hours via the Calcium Chloride Test Method (ASTM F1869).
  - .3 Alkalinity: A pH test must be conducted on the concrete floor prior to installation with results less than or equal to 9. If the test results are not within the acceptable range, then installation must not proceed until the problem has been corrected.

1.8 Site Conditions
- .1 Temperature Requirements: Maintain air temperature and structural base temperature at flooring installation area between 65ºF (18.3ºC) and 85ºF (29.4ºC) for 48 hours before, during installation and 24 hours after installation.
- .2 Maintain the ambient relative humidity between 40 percent and 60 percent during installation.

1.9 Warranty
- .1 Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- .2 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 Owner may have under Contract Documents.
  - .1 Limited 20-Year Commercial Warranty for Manufacturing Defects: Tarkett warrants from the date of purchase for a period of twenty (20) years of Commercial use that vinyl sheet and/or tile flooring products conform to written specifications and are free of manufacturing defects, subject to the terms and conditions specified herein.
  - .2 The customer must notify Tarkett of any obvious visual defects prior to installation; otherwise, this warranty will not apply. If the defect is found and Tarkett is notified in writing prior to installation, Tarkett will replace any defective product, at no charge. If the customer believes the product to be defective after installation, the customer must promptly notify Tarkett and permit an inspection of the product. If, upon inspection, Tarkett determines that the product is defective, Tarkett will replace or repair the defective product at its own cost, subject to the limitations in this warranty, and prorated as follows:
    - .1 Material and 100% Reasonable Labor Costs (Year 1).
    - .2 Material and 50% Reasonable Labor Costs (Year 2-3).
    - .3 Material and 25% Reasonable Labor Costs (Year 4-5).
    - .4 Material Only (Years 6-10).
    - .5 50% Material Only (Years 11-15).
    - .6 25% Material Only (Years 16-20).
  - .3 Tarkett warrants that the products will not wear through for the warranty period of twenty (20) years of Commercial use. For claims based on wear-through, the customer must notify Tarkett and permit an inspection of the flooring. If Tarkett determines that the original flooring is worn through, Tarkett will replace or repair the worn flooring at its own cost; however, labor costs will be the customer’s responsibility except as provided on the prorated basis described in the prior paragraph.

PART 2 - PRODUCTS

2.1 Manufacturer
- .1 Tarkett, Inc., 30000 Aurora Rd., Solon, Ohio 44139, Toll Free: (877) 436-6267, Web: www.tarkettna.com, E-mail: info@johnsonite.com.

2.2 Slip-Resistant Resilient Sheet Flooring and Integral Wall Base
- .1 VSF - Tarkett “Granit Safe-T Flooring – Rolls” (GRTSFT-R)
  - .1 Colour: As selected by the Consultant from the manufacturer's standard colour range.
  - .2 Thickness: 0.080" (2.0 mm).
  - .3 Packaging: Available in 6’ 6” (2 m) wide and approximately 82’7” linear feet (25 m) per roll.
  - .4 Adhesive: Tarkett 975 Two-Part Urethane Adhesive.
  - .5 Vinyl Weld Rod: Provide solid color vinyl weld rod as produced by Tarkett Inc., and intended for heat welding of seams. Color shall be compatible with field color of flooring. Color selected from the range currently available from manufacturer.

2.3 Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation. White gypsum materials are not acceptable. Comply with patching materials per Section 07121.

PART 3 - EXECUTION

3.1 Manufacturer's Instructions
- .1 Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog, installation instructions and product label instructions for installation.

3.2 Examination
- .1 Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.
- .2 Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- .3 Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 Preparation
- .1 Safety flooring shall be installed over subfloors conforming to ASTM F710 for concrete.
- .2 Moisture emissions from concrete subfloors must not exceed 8 lbs per 1000sf per 24 hours via the Calcium Chloride Test Method (ASTM F1869).
  - .1 Note: Resilient sheet flooring is installed over a moisture control and underlayment system. Do not proceed with work until moisture control and underlayment systems manufacturer submits, in writing, confirming that the system is installed in accordance with the approved application instructions and acknowledgment that a full extended 10-year system warranty is forthcoming.
- .3 When patching, comply with patching materials per Section 07121.
- .4 Do not install resilient products until they are same temperature as the space where they are to be installed.
  - .1 Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- .5 All subfloors must be permanently dry, clean, smooth, and structurally sound. The surface must be free of all dust, loose particles, solvents, paint, grease, oil, wax, alkali, sealing/curing compounds, old adhesive, and any other foreign material, which could affect the installation Permanent and non-permanent markers, pens, crayons, paint, or similar marking tools used to mark the substrate or the back of the resilient flooring material will cause migratory staining. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.4 Installation

.1 Vinyl Safety Flooring:

.1 Install rolls in sequential order following roll numbers on the labels.

.2 Reverse sheets.

.3 Cut pieces to length allowing approximately 3" (76 mm) excess for trimming.

.4 Cut the first piece to fit by freehand knife, direct scribing or pattern scribing method.

.5 Trim 1/2" (13 mm) off selvage edge on the seam side of the sheet using an edge trimmer or straight edge and knife. Cut must be perpendicular, do not angle the knife blade.

.6 Establish all relevant reference marks on the sheet and the subfloor to ensure sheets are aligned at seams and have not shifted.

.7 Position dead weight like a 100 lbs. floor roller or adhesive pails onto half of the sheet to prevent unintentional movement. Fold back the first half of the sheet.

.8 Using a straight edge and pencil or a white chalk line, mark a parallel glue line onto the substrate at the fold in the sheet. This line will serve as the guideline for straight adhesive application.

.9 Apply the adhesive to the substrate starting at the guideline established in 1.h. and working away from the guideline. Allow proper open time. Note: Open and working times are dependent on the ambient temperature, humidity, substrate porosity and temperature, and air movement. It is the installer's responsibility to modify the open and working time for jobsite conditions.

.10 Ensure proper techniques are used to eliminate telegraphing of adhesive at the fold of the sheet.

.11 Install the first half of the sheet into the adhesive and roll the flooring in both directions using a 100 pound three-section roller. Avoid allowing the weight of the roller to contact the sheet flooring closer than 6" (152 mm) from the previously established adhesive guideline (1.g.) and stay 3" (76 mm) away from the seams where the flooring sheets will overlap.

.12 Remove the dead weight from the unglued half of the sheet and fold this half back from the substrate.

.13 Apply adhesive carefully at the adhesive guideline to avoid overlapping previously applied adhesive and/or voids in coverage and in the remainder of the open area of the substrate. Allow proper open time.

.14 Install the second half of the sheet and roll in both directions, repeating steps 2.c. above for rolling the flooring and staying 3" (76 mm) away from seams. The adhesive guideline area may be rolled at this time.

.15 Seams:

.1 Inspect the floor surface, especially seams, and remove any adhesive on the surface.

.2 Position all remaining sheets so that the top sheet overlaps the previous sheet by ½" to ¾" (13 mm to 19 mm). Trim ½" (13 mm) off opposite seam edge using an edge trimmer or straight edge and knife. Cut must be perpendicular, do not angle the knife blade.

.3 Recess-scribe the seam to achieve a proper fit. It may be necessary to file down the guide on the underscribes to avoid displacing adhesive along the finished seam edge. Vinyl sheet flooring must be heat welded as outlined below. Wait a minimum of 24 hours after installation before heat welding seams.

.4 Recess scribe the seam with a slight gap not to exceed 1/64" (0.4mm) to help guide the router. It may be necessary to file down the guide on the underscribes to avoid displacing adhesive along the finished seam edge.

.5 Insert a scrap piece of material under the scribe mark to protect the seam edge of the first piece.

.6 Use a sharp knife to cut the seam following the scribe mark. Cut must be perpendicular, do not angle the knife blade.

.7 Remove the scrap material and seam trimmings before rolling the seam with a small hand roller.

.8 Roll the seam area with a 100 pound three-section roller.

.9 Rout approximately 2/3 of the thickness of the material.

.10 Use Tarkett vinyl weld rod to complete the welding process.

.2 Integral Coved Base
  .1 Extend sheet flooring vertically to form integral coved base at walls and partitions where indicated.
  .2 Install cove former strips at floor/wall intersections to provide smooth, continuous radius.
  .3 Form flooring neatly around inside and outside corners without tearing, stretching, or distortion.
  .4 Heat weld vertical seams and corner joints to provide a continuous, sealed, and hygienic finish.
  .5 Secure top edge of coved base with manufacturer's recommended stainless steel cap strip.
  .6 Ensure completed coved base is straight, continuous, and free of gaps, bubbles, wrinkles, or open joints.

3.5 Field Quality Requirements
.1 Manufacturer's Field Services: Provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.6 Post Installation Floor Protection
.1 Immediately after installation:
  .1 All traffic must be restricted for a minimum of 24 hours after installation.
  .2 All heavy traffic, rolling loads, pallet jacks, and furniture or appliance placement must be restricted for a minimum of 72 hours after installation.
  .3 Flooring must be swept or vacuumed to remove loose dirt and grit prior to the application of proper floor protection. (Do not trap dirt and grit under floor protection.)
  .4 Apply floor protection suitable for construction foot traffic such as: undyed heavy Kraft paper, Ram Board, 1/8” Masonite panels, or similar product designed for resilient floor protection.
.2 72 hours after installation:
  .1 Areas that will receive heavy traffic, rolling loads, pallet jacks, and furniture or appliance placement must be protected with ¼” thick Masonite or similar wood panels.
  .2 The floor must be swept or vacuumed prior to the placement of the floor protection panels. (Lightly damp mop if necessary.)

3.7 Cleaning
.1 Comply with manufacturer's written instructions for cleaning and protection of resilient products.
.2 Perform the following operations immediately after completing resilient product installation:
  .1 Remove adhesive and other blemishes from exposed surfaces.
  .2 Sweep and vacuum surfaces thoroughly.
  .3 Damp-mop surfaces to remove marks and soil.
  .4 Replace damaged installed material.
.3 Wait 72 hours after installation before performing initial cleaning.

- END OF SECTION -

SECTION 09772 - FIBREGLASS REINFORCED PLASTIC (FRP) PANELS

PART 1 - GENERAL

1.1 Work Included
- .1 Fibreglass reinforced plastic (FRP) wall panels.
- .2 FRP trims and mouldings.
- .3 Adhesives and mechanical fasteners.
- .4 Sealants required for complete installation.

1.2 Related Sections
- .1 Gypsum Board . . . . . Section 09250.
- .2 Painting . . . . . Section 09900.

1.3 References
- .1 ASTM D5319 – Standard Specification for Glass-Fiber Reinforced Polyester Wall Panels.
- .2 ASTM E84/CAN/ULC-S102 – Surface Burning Characteristics.
- .3 ASTM D638 – Tensile Properties of Plastics.
- .4 ASTM D790 – Flexural Properties of Plastics.

1.4 Submittals

- .1 Submit in accordance with Section 01330.
- .2 Product Data:
  - .1 Manufacturer's literature.
  - .2 Installation instructions.
  - .3 Physical properties.
  - .4 Cleaning recommendations.
- .3 Shop Drawings:
  - .1 Panel layout.
  - .2 Trim details.
  - .3 Joint locations.
  - .4 Fastener locations where applicable.
- .4 Samples:
  - .1 300 x 300 mm panel sample.
  - .2 Full range of trim profiles.

1.5 Quality Assurance
- .1 Manufacturer shall have minimum five years documented experience manufacturing FRP wall panels.
- .2 Installer shall have demonstrated experience installing FRP panel systems.

1.6 Delivery, Storage and Handling
- .1 Deliver materials in original unopened packaging.
- .2 Store flat in dry enclosed location.
- .3 Protect from sunlight, moisture, dirt and physical damage.

1.7 Project Conditions
- .1 Do not install until building is enclosed.
- .2 Maintain ambient temperature between 16°C and 32°C for 48 hours before, during and after installation.
- .3 Substrates shall be dry, smooth, clean and structurally sound.

PART 2 - PRODUCTS

2.1 Manufacturer
- .1 Basis of Design: Glasliner AM Antimicrobial Panels – 1200 Series, manufactured by Glasteel, a Division of Stabilit America Inc.
  - .1 Distributed in Canada by:
    Graham / Stabilit Canada Inc.
    Inglewood, Ontario
    Telephone: 1-800-268-7410
- .2 No substitutions permitted without approval in accordance with Division 01.

2.2 Fibreglass Reinforced Panels
- .1 Glasliner AM Antimicrobial Panels – 1200 Series.
- .2 Material: Fibreglass reinforced thermosetting polyester resin.
- .3 Finish: Factory embossed texture.
- .4 Colour: Silver.
- .5 Thickness: 2.3 mm (0.090 inch) nominal.
- .6 Panel Size: Maximum manufacturer's standard size.
- .7 Performance:
  - .1 Moisture resistant.
  - .2 Impact resistant.
  - .3 Stain resistant.
  - .4 Chemical resistant.
  - .5 Mold and mildew resistant.
  - .6 Factory incorporated antimicrobial protection.

2.3 Accessories
- .1 Provide manufacturer's standard accessories including:
  - .1 Inside corners.
  - .2 Outside corners.
  - .3 End caps.
  - .4 Divider bars.
  - .5 Edge mouldings.
  - .6 Transition mouldings.
  - .7 Reveal trims where indicated.
  - .8 Colour to match panel.

2.4 Fasteners
- .1 Nylon rivets as recommended by manufacturer.
- .2 Colour coordinated where exposed
- .3 Corrosion resistant.

2.5 Adhesive
- .1 Manufacturer's recommended solvent-free FRP panel adhesive compatible with substrate.

2.6 Sealant
- .1 Silicone sealant recommended by FRP manufacturer.
- .2 Colour matching panel and trim where exposed.

PART 3 - EXECUTION

3.1 Examination
- .1 Verify substrates are smooth, dry, plumb, structurally sound and free of contaminants.
- .2 Do not begin installation until deficiencies have been corrected.

3.2 Preparation
- .1 Clean substrates.
- .2 Remove loose material.
- .3 Fill depressions and sand projections.
- .4 Lay out panels to minimize joints.

3.3 Installation
- .1 Install strictly in accordance with manufacturer's written instructions.
- .2 Cut panels neatly using appropriate tools.
- .3 Apply adhesive in manufacturer's recommended pattern.
- .4 Roll panels firmly to obtain complete adhesive transfer.
- .5 Install trims true and level.
- .6 Install nylon rivets where required by manufacturer.
- .7 Allow recommended expansion space at panel edges.
- .8 Install accessories to provide a complete finished installation.
- .9 Seal exposed joints, penetrations and trim intersections with colour matched silicone sealant.

3.4 Tolerances
- .1 Install plumb and level.
- .2 Maintain straight, uniform joints.
- .3 Fit accessories tightly with no visible gaps.

3.5 Cleaning
- .1 Remove excess adhesive immediately.
- .2 Clean exposed surfaces using manufacturer's recommended cleaners.
- .3 Replace damaged materials.

3.6 Protection
- .1 Protect installed work from damage until Substantial Performance.
- .2 Replace damaged panels, trims or accessories at no additional cost to the Owner.

- END OF SECTION -

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 Work Included
- .1 Surface preparation of substrates as required for acceptance of painting, including cleaning, small crack repair, patching, caulking, and making good surfaces and areas.
- .2 Provide painting and clear-coat finishes, as shown on Drawings and specified herein, including but not limited to the following:
  - .1 Interior bifold pass-through doors.
  - .2 Interior hollow metal door frames.
  - .3 Gypsum board walls and bulkheads.
  - .4 Other substrates as shown on Drawings.

1.2 Related Work
- .1 Gypsum Board . . . . . Section 09250.

1.3 Quality Assurance
- .1 This Contractor shall have a minimum of five (5) years proven satisfactory experience and shall show proof before commencement of work that he will maintain a qualified crew of painters throughout the duration of the work.
- .2 All materials, preparation and workmanship shall conform to requirements of the latest edition of the Architectural Painting Specification Manual by the Master Painters Institute.

1.4 Submittals
- .1 Four (4) weeks before commencement of painting, submit manufacturer product data for each paint coating as specified, for review by Consultant.
- .2 After receipt of Colour Schedule from Consultant, submit a 150mm x 200mm sample drawdown of each finish colour and colour sheen to Consultant for review.
- .3 Submit two samples of each type of wood having stained and clear-coat finish for review by Consultant.

1.5 Product Delivery, Storage and Handling
- .1 Deliver all painting materials in sealed, original labeled containers bearing manufacturer's name, brand name, type of paint or coating and color designation, standard compliance, materials content as well as mixing and/or reducing and application requirements.
- .2 Store all paint materials in original labeled containers in a secure (lockable), dry, heated and well ventilated single designated area meeting the minimum requirements of both paint manufacturer and authorities having jurisdiction and at a minimum ambient temperature of 45 F (7 C). Only material used on this project to be stored on site.

1.6 Project / Site Requirements
- .1 Unless specifically pre-approved by the specifying body, perform no painting when the ambient air and substrate temperatures are below 50° F (10° C) for both interior and exterior work.
- .2 Perform no interior painting work unless adequate continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above minimum requirements for 24 hours before, during and after paint application. Provide supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
- .3 Perform no painting or decorating work when the relative humidity is above 85% or when the dew point is less than 5° F (3° C) variance between the air / surface temperature.

.4 Perform no painting work when the maximum moisture content of the substrate exceeds:
.1 12 % for gypsum board.
.5 Conduct all moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple cover patch test.
.6 Apply paint only to dry, clean, properly cured and adequately prepared surfaces in areas where dust is no longer generated by construction activities such that airborne particles will not affect the quality of finished surfaces.
.7 Perform no painting or decorating work unless a minimum lighting level of 323 Lux (30 foot candles) is provided on surfaces to be painted or decorated. Adequate lighting facilities shall be provided by the General Contractor.

1.7 Work Excluded
.1 Stainless steel, vinyl, plastic laminate, and other factory finished products.

1.8 Protection
.1 Protect all adjacent interior surfaces and areas, including rating and instruction labels on doors, frames, equipment, piping, etc., from painting operations and damage with drop cloths, shields, masking, templates, or other suitable protective means and make good any damage caused by failure to provide such protection.
.1 Post signs immediately following application of paint. Exercise proper care to completely protect fixtures, and cabinets that will be installed before painting operations are complete.
.2 Do not use fixtures or finished building construction of any type for scaffolding or support of scaffolding.
.2 In the event finish materials which require no painting should be accidentally splashed with paint or otherwise disfigured by unauthorized application of paint, and if the paint cannot be removed without damage to the material involved, then these materials shall be removed and replaced with new materials, and all costs incidental thereto shall be paid by the Contractor. Cleaning and removal of unauthorized paint or other such materials shall be accomplished with materials and procedures which are non-injurious to the surface, all as approved by the Consultant.
.3 After completion and acceptance of the painter's work in any area, the Contractor shall be responsible for provision and maintenance of such forms of protection that may be required to protect finished work from damage from any cause prior to acceptance of the job by the Owner. Schedule the work, and exclude traffic and unauthorized personnel from finished areas, to the extent necessary to prevent damage.

PART 2 - PRODUCTS

2.1 Materials
.1 Qualified products: only paint materials listed on the CGSB Qualified Products List are acceptable for use on this project. Formulas specified herein are based on Benjamin Moore numbers; equivalent paints by ICI, Glidden, Sherwin-Williams, Colour Your World, Sico, Pratt & Lambert or other quality product manufacturer is acceptable, however, must be approved by Consultant.
.2 Paint materials for each coating system to be products of a single manufacturer as possible.

2.2 Equipment
.1 Painting and Decorating Equipment: to best trade standards for type of product and application.

2.3 Mixing and Tinting
.1 Unless otherwise specified herein or pre-approved, all paint shall be ready-mixed and pre-tinted. Re-mix all paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and color and gloss uniformity.
.2 Paste, powder or catalyzed paint mixes shall be mixed in strict accordance with manufacturer's written instructions.
.3 Where thinner is used, addition shall not exceed paint manufacturer's recommendations. Do not use kerosene or any such organic solvents to thin water-based paints.

2.4 Finish Schedule
.1 Colors shall be as selected by the Consultant from a manufacturer's full range of colors. A Finish Schedule will be furnished after award of the Contract by the Consultant.

PART 3 - EXECUTION

3.1 Manufacturer's Instructions
.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 Condition of Surfaces
.1 Prior to commencement of work of this section, thoroughly examine (and test as required) all conditions and surfaces scheduled to be painted and report in writing to the Contractor and Consultant any conditions or surfaces that will adversely affect work of this section.
.2 No painting work shall commence until all such adverse conditions and defects have been corrected and surfaces and conditions are acceptable to the Painting Subcontractor.
.3 Commencement of work shall not be held to imply acceptance of surfaces except as qualified herein. Such gypsum board surfaces, shall not be the responsibility of the Painting Subcontractor.
.4 The Painting Subcontractor shall not be responsible for the condition of the substrate or for correcting defects and deficiencies in the substrate which may adversely affect the painting work except for minimal work normally performed by the Painting Subcontractor and as indicated herein. It shall always, however, be the responsibility of the Painting Subcontractor to see that surfaces are properly prepared before any paint or coating is applied.

3.3 Preparation of Surfaces
.1 Remove and securely store all miscellaneous hardware and surface fittings / fastenings (e.g. electrical plates, mechanical louvers, door and window hardware (e.g. hinges, knobs, locks, trim, frame stops), removable rating / hazard / instruction labels, washroom accessories, light fixture trim, etc. from wall and ceiling surfaces, doors and frames, prior to painting. Carefully clean and replace all such items upon completion of painting work in each area. Do not use solvent or reactive cleaning agents on items that will mar or remove finishes (e.g. lacquer finishes).
.2 Doors shall be removed before painting to paint bottom and top edges and then re-hung.
.3 Prepare each substrate in accordance with paint manufacturer's written published recommendations for such substrate and condition.
.4 Properly prepare all surfaces to receive the finishes herein specified or as Scheduled. In general, all such work of preparation shall be as follows:
.1 Finish woodwork: Additional sanding required for first class finishes shall be done under this Section. Open joints, cracks, nail holes, etc., shall be filled flush and smooth using plastic wood or putty as best adapted to the condition. Knots and permissible pitch pockets shall be shellacked or otherwise suitably sealed prior to further application of material thereon. Woodwork scheduled for transparent finish shall be free of all surface defects.
.2 Gypsum board drywall surfaces: Taped and filled joints shall have been finished smooth and flush and left ready for application of painted finish by the Gypsum Board Contractor. Any unsatisfactory conditions, such as raised or depressed surfaces, or scuffed paper finish, shall be corrected.

3.4 Interior Paint Systems
.1 System No. 1: Wood surfaces to receive paint:
.1 one coat latex Fresh Start® Undercoater & Primer/Sealer K032,
.2 two coats acrylic latex Ultra Spec Scuff-X Pearl K486.

.2 System No. 2: Gypsum board walls:
.1 two coats latex Fresh Start® High-Hiding All Purpose Primer K046,

.3 System No. 4: Gypsum board bulkheads:
.1 one coat latex Fresh Start® High-Hiding All Purpose Primer K046,
.2 two coats acrylic latex Ultra Spec Scuff-X Matte K484.

.4 System No. 5: Interior Hollow metal frames:
.1 one coat latex Fresh Start® High-Hiding All Purpose Primer K046,
.2 two coats acrylic latex Ultra Spec Scuff-X Pearl K486.

3.5 Interior Stain and Clear-coat System
.1 System No. 1: Wood surfaces to receive clear topcoats:
.1 three coats polyurethane Lenmar Satin 1Y.354.

3.6 Application
.1 Do not paint unless substrates are acceptable and/or until all environmental conditions (heating, ventilation, lighting and completion of other subtrade work) are acceptable for applications of products.
.2 Apply paint and decorating material in a workmanlike manner using skilled and trade qualified applicators as noted under Quality Assurance.
.3 Apply paint and coatings within an appropriate time frame after cleaning when environmental conditions encourage flash-rusting, rusting, contamination or the manufacturer's paint specifications require earlier applications.
.4 Painting coats specified are intended to cover surfaces satisfactorily when applied at proper consistency and in accordance with manufacturer's recommendations.
.5 Mix materials thoroughly before application, apply evenly under adequate illumination and free from sags, runs, crawls and other defects. Do cutting-in neatly. Furnish drop cloths and protection to adjacent surfaces.
.6 When the primer-sealer coat is dry, touch up all visible suction spots before the next coat is applied and do not proceed with the work until all suction spots are sealed.
.7 Apply coats of the proper consistency as received from the container, and brush well showing a minimum of brush marks.
.8 Sand and dust between each coat to provide an anchor for next coat and to remove defects visible from a distance up to 1000 mm (39").
.9 Apply coats only when the previous coat is thoroughly dry. Ensure that the number of coats required have been applied. The number of coats specified is minimum that shall be applied. It is intended that paint finishes of even, uniform color, free from cloudy or mottled surfaces, be provided. The work shall be "spot-coated" or undercoated as necessary.
.10 Final finishes shall provide uniform colour and sheen across the full surface area.
.11 Apply materials in accordance with the directions and instructions of the manufacturers of the various materials. Do not use adulterants.

3.7 Field Quality Control / Standard of Acceptance
.1 All surfaces, preparation and paint applications shall be inspected.
.2 Painted exterior and interior surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent:
.1 brush / roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.
.2 evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.
.3 damage due to touching before paint is sufficiently dry or any other contributory cause.
.4 damage due to application on moist surfaces or caused by inadequate protection from the weather.
.5 damage and/or contamination of paint due to blown contaminants (dust, spray paint, etc.).

.3 Painted surfaces shall be considered unacceptable if any of the following are evident under natural lighting source for exterior surfaces and final lighting source (including daylight) for interior surfaces:
  .1 visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 1000 mm (39").
  .2 visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 1000 mm (39").
  .3 visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.
  .4 when the final coat on any surface exhibits a lack of uniformity of color, sheen, texture, and hiding across full surface area.

.4 Painted surfaces rejected by the Consultant shall be made good at the expense of the Contractor. Small affected areas may be touched up; large affected areas or areas without sufficient dry film thickness of paint shall be repainted. Runs, sags of damaged paint shall be removed by scraper or by sanding prior to application of paint.

3.8 Clean-Up

.1 Remove all paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

.2 Keep work area free from an unnecessary accumulation of tools, equipment, surplus materials and debris.

.3 Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.

.4 Clean equipment and dispose of wash water / solvents as well as all other cleaning and protective materials (e.g. rags, drop cloths, masking papers, etc.), paints, thinners, paint removers / strippers in accordance with the safety requirements of authorities having jurisdiction.

- END OF SECTION -

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 This Section and Division 1 - General Requirements applies to and governs the work of all Sections of Division 15.

1.2 **VISITING SITE**

1.2.1 Visit the site and be familiar with working conditions and work involved before submitting Bids. No extras will be granted due to lack of a thorough preliminary investigation of the site.

1.2.2 Where applicable, remove and replace existing ceiling tile to inspect ceiling space for existing Mechanical, Electrical and Structural obstructions. Include cost of all necessary changes in Bid Price. No extras will be granted due to lack of a thorough preliminary investigation of accessible ceiling spaces.

1.2.3 For renovation projects, Contractors visiting for site investigation must sign in at the facility's main office and register with facility staff. Where required by the Owner, review and sign any on-site Designated Substances Reports prior to site investigation in any area potentially containing Designated Substances or Hazardous Materials.

1.3 **CONTRACT DRAWINGS**

1.3.1 Mechanical Drawings show Mechanical work only and are not intended to show Structural details, Electrical details, or Architectural features. Take building dimensions and details from Architectural or Structural Drawings or from job measurements. Any dimensions shown on Drawings are approximate. Verify dimensions by reference to Shop Drawings and field measurement.

1.3.2 Only the general location and route of piping and ductwork is shown. Install all piping and ductwork neatly to conserve headroom. All piping and ductwork to be installed parallel to building lines unless shown otherwise.

1.3.3 The Consultant reserves the right to revise the locations of equipment and outlets within any given room without altering the Contract Price provided Notice of Change is given prior to roughing-in.

1.3.4 In case of conflict between work of other trades and work of this Division, clarify the location of these items with the Consultant before roughing-in.

1.3.5 In the event of any discrepancies or ambiguity of any symbol, note, abbreviation, etc., used in this Specification or on the Contract Drawings, obtain clarification, in writing, from the Consultant prior to submitting Bid. No allowance will be made for additional costs arising from failure to obtain proper clarification of conflicting information before Bid.

1.3.6 Quantities or lengths indicated in any of the Contract Documents are approximate only and will not be held to gauge or limit the work. No adjustment to the Contract Price will be allowed to complete the work.

1.3.7 Verify equipment access and coordinate with equipment supplier to ensure equipment can be physically transported to installation location. Under no circumstances will any

claim be allowed for extra cost to disassemble and/or assemble equipment at the final location which will be considered as part of equipment installation.

1.3.8 Provide labour, products, and services specified, but not shown on Drawings and vice versa, and all other labour, products, and services necessary for completion of the work.

1.3.9 Where dimensions and sizes are presented in the documents in SI units, generally, units are in millimetres. All exceptions to this are noted. Pipe sizes on Drawings and within Specifications refer to nominal pipe size (IP) and/or nominal diameter (SI) and are in accordance with ANSI Standards.

1.4 SHOP DRAWINGS

1.4.1 Submit manufacturers' Shop Drawings, electrical wiring diagrams and control system drawings to the Consultant for review, prior to ordering any equipment or devices. Prior to submission of any Shop Drawings, provide a complete list of Shop Drawings to be submitted, in Microsoft Excel format. List all Shop Drawings, as well as approximate date of submission.

1.4.2 Provide title sheet for each Shop Drawing submitted. Include project name, Shop Drawing item (including Specification paragraph and subparagraph reference) and Contractor and Subcontractor approval stamps. The Consultant reserves the right to have samples submitted of any specified products.

1.4.3 Submit all Shop Drawings electronically in PDF format. Email, file transfers and file links will be accepted. If multiple items are submitted in a single PDF file, Shop Drawings must be from the same Specification Section and each individual piece of equipment, report, document, etc, must be bookmarked, using equipment labels as per Design Drawings. Do not submit compressed files.

1.4.4 Catalogues, manuals, or price lists will not be accepted as Shop Drawings. Before submission, review and check Shop Drawings, make necessary corrections, apply stamp "Reviewed and Certified Correct", sign and date. The Contractor is to document any differences between the Shop Drawing submission and the description listed in the Specification. If there are no differences listed, the Contractor implicitly declares the Shop Drawing meets all requirements of the Specification.

1.4.5 The review of Shop Drawings by Chorley + Bisset Ltd. is for the sole purpose of ascertaining conformance with the general design concept. This review does not mean that Chorley + Bisset Ltd. approves the detail design inherent in the Shop Drawings, responsibility for which remains with the Contractor. Such review does not relieve the Contractor of his responsibility for errors or omissions in the Shop Drawings or of his responsibility for meeting all requirements of the Construction and Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation, and for coordination of the work of all subtrades.

1.4.6 Ensure at least one copy of the reviewed Shop Drawings is kept on site at all times for reference.

1.4.7 Shop Drawings are to be prepared and presented in either SI or IP units, as required to match the units presented on the Drawings. Shop Drawings that include both SI and IP units will also be accepted.

1.5 FIELD DRAWINGS

1.5.1 Submit, to the General Contractor, Drawings accurately showing all openings for ducts, pipes, etc. Drawings must include the size of openings and their locations by dimensions, including the location of the structural members framing these openings. Each trade will be responsible for detail layout of their own work.

1.5.2 Assume full responsibility for the detailed coordination of all Mechanical Trades work. Prepare Field Drawings to determine the exact location of each service. On these Drawings, include all mechanical and electrical services, architectural features, and structural details. If a conflict becomes apparent after the installation of services, pay all costs associated with removing and reinstalling these services.

1.5.3 For Buildings equipped with Sprinkler Systems, if the General Contractor separates the Fire Protection Sprinkler System work from the other work of Mechanical Trades, the General Contractor assumes full responsibility for this coordination work, including the preparation of the Field Drawings.

1.6 AS-BUILT DRAWINGS

1.6.1 General

1.6.1.1 The Contractor will be provided with Mechanical Drawing files used to produce the contract documents. The following digital formats were used and are to be maintained: PDF, AutoCAD and/or Revit. The Contractor is to print Drawings from the PDF files provided. A waiver will need to be signed by the Contractor before the Revit model will be transmitted.

1.6.2 Transfer of As-Built Information to Electronic Format

1.6.2.1 Revise and maintain the prints as work progresses. Show all revisions, relocations, and changes, to scale. Use colour markings. At the end of the project, provide a complete PDF redline mark-up set of As-Built Drawings to the Consultant, for record purposes. Printed hard copies will not be accepted.

1.6.2.2 For the purposes of Contract payments, the PDF redline mark-up set of As-Built Drawing files will be assumed to have a value of $2,500.00. This will not be released until As-Built Drawing files have been accepted as complete and acceptable by the Consultant. This amount is in addition to the normal 10% holdback required by the Construction Lien Act, 2018.

1.6.2.3 Refer to cash allowances Section of Division 1 Specifications. Where a cash allowance is included for the Consultant to transfer As-Built information to the AutoCAD files and/or Revit model, the Consultant will transfer As-Built information from the PDF redline mark-up set of As-Built Drawings to AutoCAD files and/or the Revit model.

1.6.2.4 If a cash allowance is not included in the Division 1 Specifications for the Consultant to transfer As-Built information the AutoCAD files and/or Revit model, the contractor will be responsible for doing so, in accordance with the instructions below.

1.6.3 **Electronic As-Built Deliverables**

1.6.3.1 Transfer information from the marked prints to AutoCAD and/or Revit files on a monthly basis to match the software version the original files were created in. Have the marked prints and updated AutoCAD and/or Revit prints on site for review by the Consultant at all times. Monthly draws will not be approved unless all changes have been shown.

1.6.3.2 Prior to testing, balancing and final commissioning, complete the transfer of marked prints to the AutoCAD and/or Revit files. Fill in the Owner's equipment numbering system in the Schedules on the Drawings and on the plans wherever blank placeholder tags have been shown.

1.6.3.3 AutoCAD and/or Revit files are to match exactly the layering system, format, and symbology of the Consultant. Bind all external references.

1.6.3.4 Mark Drawings with As-Built stamp, update revision column, and insert name and logo of Contractor. Submit one set of printed As-Built Drawings for review by the Consultant. Remove Engineer's Stamp.

1.6.3.5 Submit completed As-Built Drawings on USB memory sticks, DVDs, or electronic transfer, in the same digital data software program and version as original contract documents. Also provide one set of As-Built Drawings with the Operating and Maintenance Manuals.

1.6.3.6 For the purposes of Contract payments, electronic As-Built Drawing files will be assumed to have a value of $2,500.00. This will not be released until As-Built Drawing files have been accepted as complete and acceptable by the Consultant. This amount is in addition to the normal 10% holdback required by the Construction Lien Act, 2018.

1.7 **CONFLICTS AND PRECEDENCE**

1.7.1 Immediately upon discovery of any conflict, ambiguity, error, or omission in the Contract Documents, request clarification in writing from Consultant prior to starting the work in questions.

1.7.2 Failure to give such written notice will constitute an irrevocable waiver and release of any claim for additional compensation or delays incurred.

1.7.3 Where work fails to conform to Contract Documents, as clarified by Consultant, promptly remove and replace such work as directed, without adjustment to Contract Price.

1.8 **FIRESTOPPING**

1.8.1 Before starting any work on site, submit detailed Shop Drawings to the Consultant for review and comments. Include:

1.8.1.1 Manufacturer's technical product data and installation instructions for each specific type and location of penetration.

1.8.1.2 Certification that proposed firestopping materials and assemblies comply with latest version of CAN-ULC S115 "Standard Method of Fire Test for Firestop Systems".

1.8.1.3 For each specific type and location of penetration, provide installation instructions from a recognized independent testing agency.

1.8.2 Mark penetration and system number types and locations on set of white prints. At completion of project, transfer this information to As-Built Drawings.

1.8.3 Comply with all requirements of Ontario Building Code Clause 3.1.9, “Building Services in Fire Separations and Fire Rated Assemblies”.

1.8.4 Submit one sample of the components of each firestop system to the Consultant for review.

1.9 MAINTENANCE AND OPERATING INSTRUCTIONS

1.9.1 General

1.9.1.1 Assemble and provide Maintenance and Operating Instruction Manuals for the Owner, that are comprehensive and adequate to inform Owner of all maintenance and operating activities required for the project equipment and systems.

1.9.1.2 Submit manuals to Consultant for review and approval, prior to submittal to Owner. Make changes or submit additional information as required to obtain approval. Final Certificate of Completion will not be issued until Manuals have been approved by the Consultant and provided to the Owner or Consultant.

1.9.2 Manual Content

1.9.2.1 Maintenance and Operating Instruction Manuals are to include equipment literature (data sheets), installation instructions, operating instructions, maintenance instructions, pressure test results, certificates, other pertinent data, as well as Contractor’s Letter of Warranty. Include copies of approved Shop Drawings and name and address of Spare Parts’ Suppliers with manuals.

1.9.2.2 Divide the maintenance manuals into Sections, including both a General Section at the start of the manual, and remaining Sections which correspond with Specification Sections.

1.9.2.3 The following information is to be contained within the General Section: a comprehensive list of names, addresses and telephone numbers of the Consultants, General Contractor, Mechanical Contractor, and all mechanical subcontractors. Include the Mechanical Contractor’s Letter of Warranty for the Mechanical systems. Include a copy of all equipment extended warranties. Include a copy of the valve directory, which shows the valve number, location, normal valve position, and the purpose of the valve. Include a copy of all natural gas fitter’s tags for natural gas systems. Include a copy of owner’s asset tag information form for all equipment.

1.9.2.4 Each Section corresponding to a Specification Section is to include, as applicable, a list of names, addresses and telephone numbers of all suppliers, as well as a copy of all approved Shop Drawings for that Section. Include a copy of all pressure tests and operational tests for piping systems, leakage tests for duct systems, and startup reports for all equipment. Include all equipment warranties. Include a copy of report data for degreasing and flushing of heating, cooling and other piping systems, analysis of system water taken at time system was put into operation, hydrostatic or air tests performed on piping systems, equipment alignment certificates, valve tag identification, and pipe colour code chart. Include a complete list of all air filter sizes, quantities, and types, corresponding with unit designations. Include Testing and Balancing Report.

1.9.2.4.1 In each Section, provide a preventive maintenance schedule for each of the major components and equipment items. Include daily, weekly, monthly, semi-annual, and yearly checks and tasks. Include this information as a separate preventive maintenance schedule. Copies of manufacturer's Shop Drawings will not be accepted as the required preventive maintenance schedule. Provide lubrication information and instructions which will explain the varied bearings and lubrication procedures.

1.9.2.4.2 Controls Section is to include all items listed above, as well as complete As-Built control diagrams and drawings, wiring diagrams, points lists, final control sequences, descriptions of system functions and all commissioning, checkout and test reports.

1.9.3 **Manual Formats**

1.9.3.1 Refer to Division 1 Specifications for Operating and Maintenance Manuals required quantities and formats. If not specified in Division 1, provide three hardcopy sets of manuals and one electronic format set.

1.9.3.2 Include As-Built Drawing sets with the Operating and Maintenance Manuals, in matching format required by Owner (i.e. quantities of soft and hard copies matching manuals). Where hardcopies are provided, As-Built Drawing sets are to be printed and neatly bound.

1.9.3.3 Electronic manuals are to be prepared in PDF format. Manual to be provided as one file formatted with bookmarks, in accordance with the Sections of the hard copy manuals. Do not include separate files in sub folders. Submission is to be either on a USB Drive or through electronic transfer, in accordance with Owner's preference.

1.9.3.4 Where required, hardcopies of Maintenance and Operating Instruction Manuals are to be placed in three ring binders, complete with index pages, indexing tabs and cover identification at front and side.

1.9.3.5 Where required by Building Owners with multiple facilities, manuals and associated Drawings are to be supplied as a quality electronic publication on Optical Media (DVD ROM). DVD Optical Media will be write once and read only, containing all specified electronic files including index, and supplied in a protective storage case complete with printed details for case cover and spine as follows:

Front Cover of Case: Clearly print details including, Building Name, Project Name, Project Number, Date, Names of Consultants, Service Discipline and Name of Contractor(s).

Spine of Case: Clearly print Project Name and Service Discipline.

1.10 **REGULATIONS AND PERMITS**

1.10.1 Carry out all work in accordance with the latest editions of applicable municipal and provincial codes, regulations, bylaws, and requirements of local Authority Having Jurisdiction. In no instance, however, is the standard established by the Drawings and Specifications to be reduced by the codes referred to above. Apply for and obtain any necessary permits. Pay any necessary fees.

1.10.2 Enforce all prevailing Provincial and local safety regulations at all times. Abide by all Owner's safety and security policies and procedures and conform to all regulations of the current Occupational Health and Safety Act.

1.10.3 Submit copies of CRN Certificates for all boilers and registered pressure vessels. Arrange and pay for TSSA certification of all boilers with a heating surface area greater than 2.78 m^2 (30 ft^2).

1.10.4 Fill out TSSA forms and pay all costs associated with removal of existing boilers and other equipment, wherever equipment is currently registered with TSSA.

1.10.5 Arrange and pay for TSSA inspection and certification for all piping systems and equipment regulated by TSSA.

1.10.6 TSSA will forward certificates and invoice for certificates to Owner. Owner will forward certificates and invoice to certificates to this contractor. Pay TSSA invoice for the certificates. Insert a copy of each certificate into the Operating and Maintenance Manual. Frame and hang the original certificates in the Utility Room near the equipment.

1.11 **MATERIAL AND EQUIPMENT**

1.11.1 Where an item of material or any equipment is specifically identified by a manufacturer's trade name and/or catalogue number, make no substitution except as provided for in paragraphs 3, 4 and 5 below.

1.11.2 In the case of some items of equipment, one or more additional names of acceptable equal manufacturers are listed in the Clause describing an item or a group of items. The design, layout, space allocation, connection details, etc., are based on the products named first in the description of each item. The products named first in the description of each item establish the quality of manufacture and design standards for all other manufacturers of that item. The general approval indicated by listing the names of other manufacturers is subject to final review of Shop Drawings, performance data, test reports, production samples (if required) by Consultant, and equipment shipped to site. Ensure that the products used meet the requirements specified and as shown on the Contract Drawings.

1.11.3 Suppliers wishing to submit other items of equipment for approval as an equal to those specified must apply to the Consultant at least 8 working days before Bid closing date. Requests must be accompanied by complete description and technical data on the items proposed. Approval for substitution of equipment will only be given on the understanding that all details, accessories, features, and performance meet the Specifications unless otherwise stated. Deviations from the Specifications must be stated in writing at time of application for approval.

1.11.4 Include in the Bid, the equipment named in the Specifications or approved as an equal as in paragraph 3 above. This will form the Base Bid. Any number of alternative bids, as defined below, may be included in addition to the Base Bid.

1.11.5 Items of equipment by Manufacturers not named in the Specifications may be offered as alternatives to the manufacturers named in the Specifications. The alternative proposals must be accompanied by full descriptive and technical data, together with the statement of amount of addition or deduction from the Base Bid, if the alternative is accepted. Prior approval by the Consultant is not required on items submitted as alternative bids.

1.11.6 After execution of the Contract, substitution of equipment will be considered only if equipment accepted cannot be delivered in time to complete the work in proper sequence, or if the manufacturer has stopped production of the accepted item. In such cases,

requests for substitution must be accompanied by proof of equality and difference in price and delivery, in the form of Certified Quotations from Suppliers of both specified and proposed equipment. Credit any decrease in price involved in substitution to the Owner by reduction of the Contract Price. The Contractor will not be reimbursed for any such increase in price.

1.11.7 Where equipment other than the equipment used as a basis for design, layout and space allocation is used, produce and submit revised layouts of equipment, pipes, ducts, etc., in the areas affected. Submit these Drawings with the Shop Drawings. Failure to produce these Drawings is indication by the Contractor that they are not required and the original space allocations are adequate for the substituted equipment.

1.11.8 Name the Subcontractors and Manufacturers in the Bid as indicated in Clause “List of Mechanical Subcontractors and Manufacturers”.

1.12 INTERPRETATION OF CONTRACT DOCUMENTS

1.12.1 The decision as to which trade provides required labour or materials rests solely with the Contractor. Extra payments will not be considered based on a difference in interpretation of the Contract Documents as to which trade involved provides materials or labour for specific items of work. The Consultant will not enter into such discussions.

1.13 SITE VISITS

1.13.1 The Mechanical Contractor shall have an office representative (not site personnel) at each site meeting and deficiency review. Attendance at these meetings is mandatory.

1.14 PROGRESS DRAWS

1.14.1 Mechanical Contractor shall review all supplier and subcontractor draws submitted to their office to ensure they are fair and reasonable for the amount of work completed on site to date prior to submitting to the General Contractor. Mechanical Contractor will be responsible for the validity of supplier and subcontractor draw claims.

1.15 WARRANTY

1.15.1 Warranty all workmanship and make good any defects for one year after Ready for Takeover except where specified otherwise. Warranty material and equipment supplied by the manufacturers for one year after Ready for Takeover. Make good damage caused due to defects and workmanship.

1.15.2 Where equipment specified in Sections of Division 15 to have an extended warranty period, e.g. five years, the first year of the warranty period will be governed by the terms and conditions of the warranty in the Contract Documents, and the remaining years of the warranty will be direct from the manufacturer and/or supplier to the Owner. Submit signed and dated copies of the extended warranties to the Consultant before applying for a Certificate of Substantial Performance of the Work.

2 Products

2.1 **MATERIALS**

2.1.1 Use materials specified herein or approved equal as defined in Clause “Material and Equipment”.

2.2 **PIPING**

2.2.1 **Supports and Hangers**

2.2.1.1 Use Anvil beam clamps.

2.2.1.2 For horizontal piping 32 mm (1-1/4") and less, use line size adjustable wrought steel clevis type hangers. For copper pipe, wrap pipe with tape at all hangers or use Anvil Figure CT-99C adjustable tubing ring hangers.

2.2.1.3 For piping 40 mm (1-1/2") and larger, use adjustable wrought steel clevis type hangers large enough for pipe insulation. See Section 15260 for insulation shields.

2.2.1.4 For boiler feedwater and condensate and steam piping 75 mm (3") and larger, use adjustable roller hangers (Anvil Fig 181) or base-mounted pipe rollers (Anvil Fig 274). Use steel pipe covering protection saddle for each location.

2.2.1.5 The following manufacturers of the above equipment will be considered equal subject to requirements of Clause “Material and Equipment”:

Anvil
Taylor Pipe Supports

2.3 **ROOFTOP PIPING AND DUCTWORK SUPPORTS**

2.3.1 **Gas Piping**

2.3.1.1 Use UV stabilized Taylor Pipe Supports EcoBlok EB9-S, made from recycled rubber material. Provide pipe supports complete with galvanized Unistrut style fasteners mounted to the top of the support. All mounting hardware to be stainless steel.

2.3.1.2 The following manufacturer of the above equipment will be considered equal subject to requirements of Clause “Material and Equipment”:

C-Port
Portable Pipe Hangers

2.4 **BACKFILL**

2.4.1 Use backfill material in accordance with the requirements of General Trades Specification Sections, unless specified or shown otherwise.

2.5 **CONCRETE**

2.5.1 Use concrete in accordance with the requirements of General Trades Specification Sections, unless specified or shown otherwise.

2.6 **SLEEVES**

2.6.1 In general, sleeves are not required through walls or floors except for penetrations through Service Room walls or floors, foundation walls, or for steam and condensate piping system wall or floor penetrations.

2.6.2 For all pipes passing through foundation walls, use Link-Seal pre-engineered mechanical seals between sleeves and pipes.

2.6.3 For sleeves through mechanical room floors, use Schedule 40 steel pipes with annular fins continuously welded at midpoint.

2.6.4 For rated separation requiring a FT firestopping rating, use materials in conformance with manufacturer's recommendations.

2.7 **FIRESTOPPING**

2.7.1 Use only service penetration firestop components and assemblies tested in accordance with latest version of CAN/ULC S115 Fire Tests of Firestop Systems and listed in most recent ULC "List of Equipment and Materials" or by another recognized independent testing and certification agency acceptable to the Consultant.

2.7.2 All pipe insulation passing through the fire separation to be approved with the listing of the firestop system.

2.7.3 Fire stopping installers must be trained by the fire stopping manufacturer and be able to provide proof of training by providing Fit Level 1 certificate when requested, while working on site.

2.7.4 Pipe sleeves through fire separations requiring a rating are to be installed as per firestopping manufacturer's recommendations, as some firestopping manufacturers do not allow pipe sleeves within their approved system. Confirm pipe sleeve compatibility prior to starting work on site.

2.7.5 The following manufacturers of the above equipment will be considered equal subject to requirements of Clause "Material and Equipment":

STI

2.8 **FIRE RATED FOAM SEALANT**

2.8.1 Use ULC Classified fire rated foam sealants.

2.8.2 The following manufacturers of the above equipment will be considered equal subject to requirements of Clause "Material and Equipment":

3M Fire Barrier
Metacaulk
Dow Fire Stop

2.9 FIRE CLOSURES

2.9.1 Use only fire damper assemblies tested in accordance with CAN/ULC S115 Fire Tests of Firestop Systems and listed in most recent ULC “List of Equipment and Materials” or by another recognized independent testing and certification agency acceptable to the Consultant.

2.10 ESCUTCHEON PLATES

2.10.1 Provide one piece brushed aluminum escutcheon plates at all points where pipes pass into finished areas through walls, floors, or ceilings.

2.11 ACCESS DOORS

2.11.1 Access doors to be flush to edge of frame, concealed continuous hinge with screwdriver operated cam latch. Non fire-rated door construction to be minimum 14 gauge, with 16 gauge frame. Fire-rated door construction to be a minimum 20 gauge insulated door with 16 gauge frame. Insulation thickness to provide required rating.

2.11.2 Size doors to allow adequate operating/maintenance clearance for devices. Doors to be a minimum 600 mm x 600 mm (24" x 24") for body entry, and 300 mm x 300 mm (12" x 12") for hand entry, unless noted otherwise. Use the following access doors:

Masonry Walls	Acudor UF-5000
Drywall Walls and Ceilings	Acudor DW-5040
Fire-Rated	Acudor FW-5050/FB-5060 to match fire separation
All Other Locations	Acudor UF-5000 (stainless)

2.11.3 The following manufacturers of the above equipment will be considered equal subject to requirements of Clause “Material and Equipment”:

Cendrex
Elmdor

2.12 ELECTRICAL EQUIPMENT

2.12.1 In buildings equipped with automatic sprinkler systems, use sprinkler proof electrical equipment. Where electrical equipment provided by Mechanical Trades is not of sprinkler proof design, fabricate and provide galvanized steel shields and hoods to prevent sprinkler system water from entering the electrical equipment and/or interfering with its operation.

2.13 ELECTRIC MOTORS

2.13.1 Provide motors of adequate size and type for intended service. Use CSA approved motors with the following characteristics:

250 watts (1/3 hp) and under - 115 volt, 60 hertz, single phase.
370 watts (1/2 hp) and over - 60 hertz, three phase, voltage as shown on Drawings.

2.13.2 Motors are to be the voltage specified. Step down or step up transformers will not be accepted.

2.13.3 Motors 250 watts (1/3 hp) and under: Use continuously rated squirrel cage induction type with capacitor start, NEMA Design Class B with NEMA Class N or better starting characteristics and a minimum of Class B insulation, unless specified otherwise.

2.13.4 Motors 370 watts (1/2 hp) and over: Use continuously rated squirrel cage induction type, NEMA Design Class B with NEMA Class B or better starting characteristics and a minimum of Class B insulation. Where motor is installed in an area that could see higher ambient temperatures, higher insulation class will be required. Use a minimum of Class F insulation for 41 °C to 65 °C (106 °F to 149 °F) ambient temperature and a minimum of Class H insulation for 66 °C to 90 °C (150 °F to 194 °F) ambient temperature.

2.13.5 Use open drip-proof type motor with a 1.15 service factor for motors located in dry locations indoors, unless specified or required otherwise by the motor location.

2.13.6 Use totally enclosed motors outdoors and in locations subject to water spray. Totally enclosed motors must be fan cooled and have a 1.0 service factor.

2.13.7 Use totally enclosed explosion-proof (TEXP) motors where indicated to prevent ignition of external gas.

2.13.8 All enclosures shall be rolled steel band or cast iron construction. Motor nameplate shall be mounted on enclosure with stainless steel fastening pins and shall have, as a minimum, all information as described in CSA C22.2 No 100-04 (R2009).

2.13.9 Unless specified otherwise, starters for electric motors will be provided by Division 16. Where multi-speed motors are specified, ensure that motors are compatible with starters supplied under Division 16.

2.13.10 All two speed motors to be single winding, unless specified otherwise. Provide inverter duty motors where indicated on Drawings.

2.13.11 All motors 0.75 kW (1 hp) and above, use premium efficiency type motors in accordance with NEMA Premium efficiency standard.

2.13.12 Basis of design is Baldor motors, unless specified otherwise. Leeson/Marathon, WEG, or TECO will be considered equivalent. Acceptable motor manufacturers for equipment at Western University are Leeson/Marathon, WEG, or TECO only.

2.14 ELECTRICAL WIRING

2.14.1 Meet all requirements of Division 16 for all wiring included in Division 15 and pre-wired equipment provided by Division 15.

2.14.2 Ensure all pre-wired electrical equipment is CSA approved. Where this is not possible, arrange and pay for special Electrical Safety Authority approval.

2.14.3 All electrical wiring, both line voltage and low voltage, for equipment supplied by Division 15 is the responsibility of Division 15. Line voltage wiring from power panels to starters and from starters to motors will be supplied and installed by Division 16.

2.15 **IDENTIFICATION NAME LABELS**

2.15.1 Identification name labels, directional arrows, and colour bands for ductwork and piping to be plastic coated pressure sensitive “Brady” or “Westline” selfstick labels, waterproof, colourfast, dirt and grease resistant. For pipes up to and including 65 mm (2-1/2") diameter, use markers 28 mm (1-1/8") high. For pipes 75 mm (3") diameter and over, and all ductwork, use markers 57 mm (2-1/4") high. For all piping exposed to view, use Smillie McAdams Summerlin Coil - Mark pipe covers.

2.15.2 The following manufacturers of the above equipment will be considered equal subject to requirements of Clause “Material and Equipment”:

Visionmarker

2.16 **VALVE AND CONTROLLER TAGS**

2.16.1 Use brass valve and controller tags with 32 mm (1-1/4") stamped code lettering and numbers filled with black paint. Hang a copy of the valve chart in Mechanical Room.

2.17 **EQUIPMENT NAMEPLATES**

2.17.1 Use minimum size 90 mm x 40 mm x 2.4 mm (3-1/2" x 1-1/2" x 3/32") thick laminated phenolic plastic nameplates with black face and white lettering. Lettering to be minimum 6 mm (1/4") high.

2.18 **BELT AND MACHINE GUARDS**

2.18.1 Provide Ontario OHSA compliant expanded metal guards in steel frames to protect drives of all belt driven equipment and all equipment with exposed rotating or moving parts. Firmly bolt guards in place and make easily removable for servicing. Provide openings in metal guards to permit use of a tachometer without removing the guard.

2.19 **FLASHING**

2.19.1 For locations with multiple roof penetrations serving equipment, such as for roof mounted, split system condensing units, use Portals Plus, Inc. Alumi-Flash system consisting of 330 mm (13") high, one piece spun aluminum base with deck flange and EPDM rubber cap. Use caps suitable for required number and diameter of service penetrations. Flashing is for Division 15 and 16 use only. Coordinate with Division 16 to minimize the number of flashings required.

2.19.2 For plumbing vent roof penetrations, use Portals Plus, Inc. Alumi-Flash system consisting of 330 mm (13") high, one piece spun aluminum base with deck flange and EPDM rubber cap. Size cap to suit pipe diameter.

3 Execution

3.1 **GENERAL**

3.1.1 Instruct and supervise other Sections doing related work.

3.1.2 Supply the measurements of equipment to other Sections to allow for necessary openings to be left in the work of other Sections.

3.1.3 Install pipes, ducts, and tubing, which are to be concealed, neatly and close to building structure so that the necessary furring can be kept as small as possible.

3.1.4 Install all ceiling components in direct accordance with reflected ceiling plans.

3.1.5 Mechanical Drawings show approximate locations for wall-mounted devices and fixtures. Clarify exact location and mounting height with Consultant prior to roughing-in.

3.1.6 All serviceable equipment installed on the roof (including boiler vents) to be installed minimum 3 m (10'-0") from roof edge.

3.1.7 Pack all roof penetration flashings with mineral wool insulation after service installation is complete, to prevent condensation.

3.2 DISSIMILAR METALS

3.2.1 Separate dissimilar metals by means of gaskets or shims of approved material or use dielectric unions or flanges in order to prevent electrolytic action. Where piping of dissimilar metals is connected, use approved dielectric unions or couplings. A brass fitting or brass valve may also be used in making connections between copper and steel piping.

3.3 STORAGE OF MATERIALS

3.3.1 Provide proper weatherproof storage for the protection of materials and equipment on site. Blank off openings in all equipment until required for use. Consultant may require materials which are not properly stored to be discarded and removed from the site.

3.4 PIPING

3.4.1 General

3.4.1.1 Conceal all piping except in equipment rooms, unfinished areas, and where specifically noted. Unless shown otherwise, install all above ground piping parallel to building walls and partitions.

3.4.1.2 Where piping is exposed, install escutcheon plates at walls, floors, and ceilings. Install piping to conserve headroom.

3.4.1.3 In locations where space is provided for future or other equipment requiring connection to systems installed under this Contract, install services with isolation valves and caps to allow connection to the system without interruption.

3.4.2 **Drain Hose Connections:** Provide drain hose connections at the base of all risers, on the suction side of all pumps and in all locations shown on Drawings.

3.4.3 Supports and Hangers

3.4.3.1 Provide all hangers, supports and sway braces in accordance with ANSI B31.1 and the Ontario Building Code. Support all piping in accordance with the Ontario Building Code.

3.4.3.2 Where specified and/or shown on Drawings and in schedules, use spring hangers. See Drawings for details.

3.4.3.3 Unless specified otherwise, support piping at maximum spacing as shown and within 450 mm (18") of each side of all valves and bends.

3.4.3.4 Support horizontal cast iron drainage piping at 1.5 m (5') maximum spacing. Where the drain has successive fittings with no straight piping run between the fittings of at least 800 mm (32") in length, support the drain at intervals not exceeding 900 mm (3'). Where mechanical joints are used, provide double hangers and sway bracing.

3.4.3.5 Where cast iron pipe with mechanical joints is used, support piping on both sides of horizontal joints within 450 mm (18") of joint on each side, at all branch ends, and at all points where there is a change in direction. Where the pipe is 150 mm (6") or larger in horizontal runs, brace to prevent horizontal movement at each branch or change in direction. Use braces, blocks, rodding, or other suitable method outlined in pipe manufacturer's published installation instructions. For piping sizes of 150 mm (6") and larger, either provide Inspection Report from the manufacturer's representative certifying the installation is in accordance with their published installation data, or provide installation report prepared by contracting team that includes photos of typical joint restraint solutions implemented.

3.4.3.6 Do not support piping from other piping or equipment, or from metal roof decking.

3.4.3.7 **Schedule:**

Pipe Size mm	**20**	**25**	**32**	**40**	**50**	**65**	**75**	**100 to 200**	**250 & Over**
Max. Span m	1.8	2.1	2.4	2.4	3	3.4	3.7	4.3	6.1

Pipe Size in	**3/4**	**1**	**1-1/4**	**1-1/2**	**2**	**2-1/2**	**3**	**4 to 8 incl.**	**10 & Over**
Max. Span ft	6	7	8	8	10	11	12	14	20

3.4.4 **Anchors:** Install anchors where shown and where required. Use "U" bolts for piping 75 mm (3") in diameter and less. For piping over 75 mm (3") diameter, use steel fabricated anchors welded directly to pipe.

3.4.5 **Provision for Expansion:** Make proper allowance for thermal expansion and contraction whether shown on the Drawings or not. Use adequate offsets on all takeoffs to allow for expansion and contraction of mains. Weld all steel pipe forming an expansion loop regardless of size. Silver solder all copper pipe forming an expansion loop regardless of size. Use pipe alignment guides where shown and where required. Provide pipe guides for piping on either side of expansion loops, expansion joints and expansion compensators in accordance with "Standards of the Expansion Joint Manufacturers Association, Inc.".

3.5 **ROOFTOP SUPPORTS**

3.5.1 Mount all new ductwork and piping on elevated rooftop supports. Provide the services of a factory trained representative to visit the site and review the installation.

3.5.2 For piping and ductwork supports, use maximum 3 m (10') spacing. Install strictly in accordance with the manufacturer's published installation guidelines and installation details on Drawings. Obtain correct adhesive from roofing supplier.

3.6 EXCAVATION AND BACKFILL

3.6.1 Be responsible for any excavation and backfill required for work of Division 15. Slope or shore all trenching in accordance with all current regulations and safety standards. Where any pipes pass under building footings, backfill under footings with lean concrete.

3.6.2 Use materials and standards of compaction for backfill in accordance with General Trades Specifications, unless specified otherwise.

3.6.3 If changes are required in locations, depth of excavating or related data, advise the Consultant in reasonable time to avoid disruption of work sequence.

3.7 SUPPORTS AND BASES

3.7.1 Provide structural work required for installation of equipment provided under this Division.

3.7.2 Where piping and/or equipment is to be supported by steel stud walls, use brackets and supports which attach to steel studs. Support equipment independently of wall sheathing.

3.7.3 Set all floor-mounted equipment on concrete bases at least 100 mm (4") high. Provide bases, anchor bolts and any special isolation bases. Concrete bases for air handling equipment are to be sized to suit unit drain air seal requirements, but 100 mm (4") to remain as minimum. Size concrete equipment bases to suit the equipment actually supplied and in accordance with the Shop Drawings of such equipment. Do not start concrete work until anchor bolts and other embedded parts required for the complete installation, as well as Shop Drawings, are available at the site.

3.7.4 Carry out all concrete work in accordance with requirements of General Trades Specifications. Provide wire mesh, rebar, and all necessary reinforcing.

3.7.5 For new concrete bases or pads on existing floors, first scrape and remove existing floor finish. Scarify existing floor so that new concrete adheres to it. Dowel new pads to existing floors.

3.8 CONCRETE INSERTS

3.8.1 General

3.8.1.1 Anchors for the support of pipes, ducts, and equipment from the underside of suspended structural concrete systems may be either cast-in-place type, placed prior to the pouring of concrete, or wedge type anchors, placed in holes drilled after the forms are stripped. The use of inserts cast into the concrete is the preferred option.

3.8.1.2 The safe load capacity of concrete anchors is affected by a number of variables such as specific anchor type, embedment, spacing between individual anchors, edge distances, direction of loading, concrete strength and "prying action". Refer to the manufacturer's recommendations for each specific insert proposed, including any dynamic or vibratory loads.

3.8.1.3 Be responsible for the proper selection and installation of inserts, including number, type, spacing, and accurate placement to provide the necessary safe load capacity and satisfactory long term performance.

3.8.2 **Installation of Cast in Place Inserts:** Ensure that anchors are accurately placed and "fixed" in position with sufficient rigidity to maintain their position during the placement of concrete. Do not displace reinforcing to install anchors without the prior permission of the Consultant.

3.8.3 **Installation of Inserts in Hardened Concrete:**

3.8.3.1 Use inserts placed in pre-drilled holes. Do not use powder driven inserts or self-drilling inserts. Before drilling holes, accurately locate all reinforcing bars in the affected areas using an electro-magnetic locator.

3.8.3.2 Do not drill through or otherwise damage reinforcing bars. If reinforcing is encountered, the inserts must be relocated. Ensure that hole diameter, depth of penetration, spacing, etc., are in strict accordance with the insert manufacturer's recommendations for the specific insert type and load condition.

3.8.3.3 Due to the relatively close spacing of reinforcing bars in the bottom of many of the beams and girders, the preferred location of drilled-in-place anchors in beams and girders is into the sides of these members, rather than upwards into the bottom.

3.8.3.4 Inserts to be zinc plated female concrete anchors. Nylon or plastic anchors are not acceptable.

3.8.4 Concrete screws without anchors are not acceptable.

3.9 **SLEEVES**

3.9.1 Except as approved otherwise by the Consultant, install sleeves embedded in concrete in accordance with the following general guidelines:

3.9.1.1 Centre to centre spacing to be not less than 3 diameters of the maximum size adjacent sleeve.

3.9.1.2 Provide additional reinforcing at points of congestion as directed by the Consultant.

3.9.1.3 Sleeves through beams will be permitted only as directed by the Consultant.

3.9.1.4 The reinforcing in beams, slabs, and columns must not be displaced from its intended position under any circumstances unless prior written approval is obtained from the Consultant.

3.9.1.5 Within mechanical rooms and other service spaces, install floor sleeves with top of sleeve 20mm (3/4") above floor, to reduce the risk of water on floor draining through the sleeve to the level below.

3.9.2 Provide sleeves for insulated pipe large enough to permit free movement of pipe without crushing the insulation.

3.9.3 Provide sheet metal framing around ducts through masonry walls in exposed areas to ensure a clean finish around ducts.

3.10 FIRESTOPPING AND CLOSURES

3.10.1 Provide a listed firestop system in accordance with the Ontario Building Code to seal around all piping, tubing, ducts, conduits, electrical wires and cables, and other similar mechanical services which penetrate part of a building assembly required to have a fire resistance rating or a fire separation. All penetrations throughout the building are to be considered 2 hour rated, unless noted or specified otherwise.

3.10.2 Where applicable, refer to Architectural Drawings and/or Specification Section “Firestopping and Smoke Seals”, for building assembly and fire separation types and locations.

3.10.3 For all penetrations through fire separations required to have a fire resistance rating, use firestop systems with an F rating not less than the fire resistance rating for the fire separation. This includes the sealing of any sleeves provided for future uses.

3.10.4 Provide an FT rated firestop where required by the Ontario Building Code.

3.10.5 For all penetrations through a Service Room floor, provide a minimum W rating - Class 1 in addition to the fire resistance rating.

3.10.6 At each fire stopping penetrating location, provide a fire stopping identification label indicating the system number installed, products used, date installed and installer’s name. Locate label on penetrating service at the penetration location, on both sides.

3.10.7 All firestopping must be reviewed by the Consultant on site before any firestopping is concealed. Complete three destructive tests to confirm compliance with ULC listing, minimum one floor test and one wall test, third test to be Contractor’s choice. Contractor to replace fire stopping system after destructive test has been completed. Submit a copy of the testing report to the Consultant. Report to include as a minimum: confirmation fire stopping Shop Drawings were used during review, locations where destructive testing was completed, confirmation that all fire stopping locations were reviewed, and that installed systems meet the manufacturer requirements.

3.10.8 Install duct fire damper assemblies in strict accordance with manufacturer’s instructions provided with each assembly.

3.11 ACCESS DOORS

3.11.1 Supply access doors wherever equipment, valves, dampers, life safety devices, etc., are concealed behind walls or inaccessible ceilings. All devices installed requiring periodic maintenance to be made accessible. Doors will be installed by General Trades.

3.12 ELECTRICAL WORK

3.12.1 Perform all electrical work included in the work of this Division in accordance with the requirements of Division 16.

3.13 IDENTIFICATION

3.13.1 Piping and Ductwork

3.13.1.1 Identify all new piping and ductwork using name labels. Apply labels at 7 m (24') intervals and at all branch connections and access panel locations. Mark each pipe in a space or area less than 7 m (24') at least once with a name label. Apply flow directional arrows beside each name label. Identify fan system number at each ductwork label.

3.13.1.2 To ensure permanent bond, apply 3M Adhesive EC-1341, or equivalent, to the surface of the insulation or pipe material. Apply the label with its own adhesive on this surface. Remove any labels that are “lifting” or “peeling”. Clean the surface and repeat the procedure specified with a new label. Where labels do not adhere, use pipe banding tape spirally wrapped for full length of label. Apply label over the banding tape.

3.13.1.3 Provide colour bands on all piping. Use colours in accordance with current CGSB Publication for identification of piping systems. Submit list with all proposed colours and materials to the Consultant for review before ordering any materials.

3.13.2 Valves and Dampers

3.13.2.1 Identify all manual and automatic control valves on all systems using brass tags attached with non-ferrous chains. For existing buildings, obtain copies of the existing valve tag schedules and follow the existing numbering system format using higher numbering sequential to existing numbers. Prepare a schedule of all tags for each system showing designating number, service, and function. Include these schedules in the Operating and Maintenance Manuals and in the Mechanical Room.

3.13.2.2 Provide identification of all duct balancing dampers. Identify both support points of balancing damper and bottom of duct. Fluorescent orange spray paint is acceptable.

3.13.3 Equipment

3.13.3.1 Where equipment is concealed above accessible ceilings, indicate location using coloured-coded marking devices, approved by Consultant, fastened to the ceiling components.

3.13.3.2 Provide nameplate identifying equipment type, identification number, service, and area served on each piece of mechanical equipment. For heat pumps, exhaust fans, condensing units, roof top air handling units, etc. list the rooms served by each piece of equipment.

3.13.3.3 Contractor is to complete owner’s asset tag information form for all new and/or relocated equipment.

3.14 CUTTING AND PATCHING

3.14.1 Where pipes and ducts are shown on the Mechanical Drawings passing through existing walls, floor slabs, and roof, cut and patch the necessary openings.

3.14.2 Before drilling holes through floors or roof slabs, accurately locate and note sizes for each required hole. Obtain approval from Consultant before any cutting is started. Electrical

conduits with live wiring may be embedded in concrete floor slabs. Scan testing is required.

3.14.3 Flash holes through walls and roof to make weatherproof.

3.14.4 For penetrations through walls not required to have a fire rating, seal all spaces between pipe or pipe and surrounding wall construction with a fire-rated foam sealant. Do this as the work progresses, to avoid leaving inaccessible holes at completion of the job. For penetrations through parts of the building assembly required to have a fire resistance rating or acting as a fire separation, see Clause “Firestopping” in this Section.

3.14.5 Where equipment, ductwork, piping, or other service is removed, repair and patch wall, roof, ceiling, and floor openings to match existing materials and finishes.

3.14.6 Include the cost of all cutting and patching in the Lump Sum Contract Price for the work of Division 15. All cutting and patching to be done by the trade specializing in the materials to be cut.

3.14.7 Remove, modify, cut, patch, and replace ceilings where necessary to complete the work of this Division, unless this work is specifically included in another Division.

3.15 PAINTING

3.15.1 Refer to General Trades Specifications for materials and methods for painting of piping, ductwork, walls, floors, and ceilings. Primer and paint applied inside the building must comply with the VOC content limitations of Division 1 Section “Material and Product Requirements”.

3.15.2 Touch up minor damage to finish on equipment supplied with factory applied baked enamel finish. Completely refinish items suffering damage which, in the opinion of the Consultant, is too extensive to be remedied by touchup.

3.15.3 Paint all steel framework provided by this Division with a chromium oxide primer. Exposed non-galvanized hangers, racks, struts, and fasteners to be thoroughly degreased and primed, ready for painting. All steel framework outside the building is to be hot dipped galvanized.

3.15.4 Paint all exterior piping, including both new and existing natural gas piping. Use two coats of paint. Use colours as selected by the Consultant.

3.15.5 In existing mechanical rooms, where uninsulated piping, ductwork and conduit is painted, paint all new services to match.

3.15.6 Where walls are cut and patched for mechanical work, paint walls to match existing. For walls less than 9.3 m^2 (100 sq. ft), paint entire wall. For walls larger than 9.3 m^2 (100 sq. ft), paint area of patch. Painting to be completed by painting contractor.

3.15.7 Include the cost of all painting in the Lump Sum Contract Price for the work of Division 15.

3.16 WELDING

3.16.1 All pipe and pressure vessel welding and brazing (including for non-registered pipe systems) must be performed in accordance with TSSA approved Welding/Brazing

Procedure Specifications. All individuals performing welding or brazing must hold a valid TSSA Welding or Brazing Certificate, that is appropriate and approved for the welding and brazing procedures performed.

3.16.2 All other welding performed on the project is to be compliant with CSA W59-03 (for steel) or CSA W59.2-M (for aluminum). Welding and cutting tasks shall also be carried out in accordance with CSA 117.2. Welding is to be performed by tradesmen certified to CSA W47.1 (steel), or CSA W47.2 (aluminum) as appropriate. Welding inspectors shall be qualified to CSA W178.2. Provide proof of certification to Consultant upon request.

3.16.3 All welding of stainless steel to be performed in accordance with the requirements of the American Welding Society Standard AWS D1.6/1.6M. When provisions of this standard conflict with the provisions of the applicable CSA standards, the CSA standard requirements shall take precedence.

3.17 USE OF FANS

3.17.1 Do not use any fan supplied under this Contract for ventilation while the building is under construction. The building must be “broom clean” and all painting finished before permission will be granted for testing fans.

3.17.2 The Consultant reserves the right to use any piece of equipment, device, or material for such reasonable lengths of time and at such times as may be required to make a complete and thorough test of the same before final completion and acceptance of the work. Such tests are not to be construed as evidence of acceptance of the work, and it is agreed and understood that no claim for damage will be made for injury or breakage to any part or parts of the equipment and/or materials due to the aforementioned tests, where such injuries or breakage are caused by a weakness or inaccuracy of parts, or by defective materials and/or workmanship of any kind. Supply all labour and equipment required for such tests. Trial usage will not initiate or affect in any way the warranties required for devices being tested.

3.18 PIPING SYSTEMS INSPECTION AND TESTING

3.18.1 General

3.18.1.1 Inspect and test all piping systems. Do not cover, conceal, or close in piping until inspection and tests are completed. Thoroughly test all systems before making arrangements for the final demonstration in the presence of the Owner’s staff.

3.18.1.2 Coordinate and schedule all tests with the Consultant and/or Owner. Document all tests immediately after the work is completed. Note all deficiencies and malfunctions. Promptly rectify and complete testing before issuing reports. Provide completed approved test reports, signed by the technical representative doing the work.

3.18.1.3 At the completion of the work, demonstrate operation of all systems to the Owner’s representative and the Consultant. Promptly rectify any malfunction found and retest.

3.18.2 **Soil, Waste, Vent and Building Drains:** Seal all openings in section under test, then fill with water to a height of 3 m (10') above top of section. Maintain water level for at least

two hours. Test in sections as the work progresses. After all fixtures have been placed, apply a smoke test to the satisfaction of the local Plumbing Inspector.

3.18.3 **Water Systems**

3.18.3.1 Unless specified otherwise, apply a hydrostatic test of 1050 kPa (150 psig) or 1-1/2 times working pressure, whichever is greater, for two hours. High pressure steam piping to be tested at 2750 kPa (400 psig), unless specified otherwise.

3.18.4 **Natural Gas:** Test in accordance with latest version of CSA B149.1.

3.19 **PERFORMANCE VERIFICATION**

3.19.1 All major equipment and systems must be thoroughly tested by the Technical Representative of the equipment or system manufacturer. This testing will occur before arrangements are made for the final demonstration in the presence of the Owner's staff.

3.19.2 At the completion of the work, demonstrate operation of all systems to the Owner's representative and the Consultant. Promptly rectify any malfunction found.

3.19.3 Systems to be tested include air handling units, all major heating and cooling equipment, any specialty plant equipment such as air compressors or medical gas equipment, terminal units such as fan coils or heat pumps, and control system. The manufacturer's representative must be present for the test period and submit a Certificate of Operation to the Consultant.

3.20 **START-UP SERVICES**

3.20.1 Provide the services of a qualified person to be on call and available to the site within one hour, for four weeks after work of this Contract is taken over by the Owner. Assist Owner's staff to become familiar with the system operation. Provide a similar service for one week after switchover to the opposite air conditioning cycle (heating or cooling).

3.21 **PLACING IN OPERATION**

3.21.1 Upon completion of all work and before turning over the job, test each system for proper operation.

3.21.2 Flush through all drains and properly adjust flush valves and other fixtures.

3.21.3 Open and clean all new and existing traps, strainers, and scale pockets after two weeks' operation.

3.21.4 Clean out all new and existing room heating units, terminal heating and cooling units, volume boxes and all air handling equipment with a vacuum cleaner when building is completed.

3.21.5 Steam clean all existing convectors and wall-fin elements in the rooms where changes have been made. Do this after all other work has been completed.

3.22 **SPARE PART TURNOVER TO OWNER**

3.22.1 For each new filter bank, provide one extra set of filters.

3.22.2 Refer to equipment Specifications for provision of spare parts, terminal units, etc.

3.23 COOPERATION BETWEEN TRADES

3.23.1 Cooperate and coordinate with other trades as required for satisfactory and expeditious completion of work. Take field dimensions relative to work. Fabricate and erect work to suit field dimensions and field conditions. Pay cost of extra work caused by and make up time lost as result of failure to provide necessary cooperation information or items to be fixed to or built-in, in adequate time. Cost of labour and materials for rework, and costs arising from time delay, required due to lack of cooperation or coordination between trades, will not be compensated by owner.

3.23.2 Ensure required minimum service clearances for equipment and devices installed by other Trades, such as Electrical, are respected and accommodated. Do not install equipment or services within these required clearances, or blocking access to electrical junction boxes or pull boxes, access doors, etc. Notify consultant if clearance requirements cannot be met.

3.24 MAINTENANCE OF EXISTING SERVICES

3.24.1 Take every precaution to locate and protect existing services so that no unscheduled interruption occurs. If any existing service is damaged due to the work of this Division, arrange and pay for repair. Bear any costs due to interruption of existing services.

3.24.2 The operation of the building by the Owner for day-to-day activities takes precedence over all construction related activities, particularly those activities that require system or service shutdown, or that generate noise, dust, or odour. The Contractor may be asked to cease work immediately in these instances and directed to work at another time. Assume all construction related activities which will impact the day-to-day operations of the facilities will be performed after regular building occupied hours, either at night or on weekends. Include all costs associated with after hours and overtime hours in the Base Bid. Additional cost claims related to after hours or overtime hours after contract award, will not be entertained.

3.24.3 Permission from the Owner is required before making any connections to or rerouting of existing services. Before any interruptions of service or restriction of use of any service, provide seven days prior written notice to the Consultant and Owner.

3.25 PROTECTING AND MAKING GOOD

3.25.1 Be responsible for protection of Owner’s property, as well as finished and unfinished work, from damage due to execution of work under this Contract. Repair damage resulting from failure to provide such protection to the satisfaction of the Consultant, at no expense to the Owner.

3.25.2 Attach and fasten fixture and fittings in place in safe, sturdy, secure manner so that they cannot work loose or fall or shift out of position during occupancy of building, as the result of vibrating or other causes in normal use of building.

3.26 **REMOVAL OF EXISTING MATERIAL AND EQUIPMENT**

3.26.1 Remove existing material and equipment where shown or specified. Unless noted or specified otherwise, all material and equipment which is removed becomes the property of the Contractor and must be immediately removed from the site.

3.27 **CONNECTING TO EXISTING SERVICES**

3.27.1 Prior to starting the work, and prior to any related demolition work, field review and locate all points of connection to existing services. Investigate and determine existing services sizes, service locations and flow directions, and confirm compatibility with the work shown on the Drawings. Alert the Consultant to any conflicts or inconsistencies prior to proceeding with any work. Contracting team is responsible for connecting all new services to the correct existing piping and ductwork, in order to achieve correct flow direction and system operation.

3.27.2 For existing sewers, contractor to use a camera or complete a scan to confirm exact location of sewers prior to excavation. Prior to connecting to an existing sewer, the contractor is to perform dye test or camera investigation to confirm whether the sewer serves a sanitary or storm system. Connect to the appropriate sewer.

3.28 **EXAMINATION OF EXISTING EQUIPMENT**

3.28.1 Report all damaged, defective, and non-functioning equipment shown for reinstallation or relocation to the Consultant prior to removal and storage. All equipment will be assumed to be fully functional unless reported otherwise prior to removal.

3.28.2 Devices and equipment damaged during removal, storage, or reinstallation will be replaced at no cost to the Owner.

3.29 **PHASING**

3.29.1 The work on this project is to be phased to enable continuous operation of the Owner's facilities. See the Architectural Drawings and Specifications regarding the proposed phasing of the work. Provide for temporary services, connections, bypasses, etc. to enable the phasing as described. Carry all associated costs in the Bid.

3.30 **FIRE SAFETY IN EXISTING BUILDINGS**

3.30.1 Where temporary shutdown of sprinkler systems, standpipe systems, or other fire protection systems is required, do all work in compliance with Clause 1.1.1.1, Clause 2.8.2.1.5, and Subsections 6.4.1 and 6.5.2 of the Fire Code.

3.31 **INTEGRATED SYSTEMS TESTING OF FIRE PROTECTION SYSTEMS**

3.31.1 Coordinate and work with Electrical Trade and third party Integrated Testing Coordinator, to provide Integrated Systems Testing of Fire Protection and Life Safety Systems in accordance with CAN/ULC S1001, as required by the Ontario Building Code. Refer to Specification Section 16722 Appendix "Integrated Systems Testing of Fire Protection Systems". Promptly address and correct any related deficiencies or issues.

3.31.2 For phased projects, test report submission will be required at completion of each phase prior to turnover to Owner.

3.31.3 Systems to be tested include, but are not limited to:

- Cooking and Other Fire Suppression Systems

3.32 **DEFICIENCY REVIEW**

3.32.1 The Mechanical Contractor shall confirm in writing that the work is complete and ready for inspection. The Consultant will schedule a site visit to review the work and provide a written deficiency list. Once deficiencies have been corrected, the Mechanical Contractor shall confirm in writing to the Consultant that all deficiencies have been corrected. The Consultant will schedule a second site visit to review the correction of noted deficiencies. Should any noted deficiencies be found to be still outstanding, the Mechanical Contractor shall correct them and again notify the Consultant in writing. Charges to the Mechanical Contractor may result from repeat visits after the second visit.

3.32.2 The Mechanical Contractor is required to complete all work above ceilings and allow time for deficiency reviews and correction of noted deficiencies in a timely manner in order to accommodate the current Construction Schedule. This includes time for reinspection as required prior to concealing (drywall enclosures, drywall ceilings and acoustic tile ceilings) of any service. The Mechanical Contractor will be responsible for uncovering any concealed services for inspection.

3.33 **HOURLY LABOUR RATE**

3.33.1 Hourly labour rate shall be the actual rate paid to the worker as posted by the local Union Agreement plus a burden mark-up of 100% to compensate for contributions, assessments, employment insurance, health insurance, pension plans, WSIB, taxes, vacation pay, travel, parking, welfare, union package and membership dues, supervision, material handling, training, rest periods, down time, breaks, personal hygiene, small tools, clean up time, profit, other benefits paid to the worker and all other costs incurred by the Company including meetings, office time, project warranty updates and office project management time. Travel time to and from the site shall be at no charge to the Owner. For the purpose of mechanical work, the journeyman plumber union rate will be used for all trades completing any mechanical work.

3.34 **ALTERNATIVE, SEPARATE, UNIT AND IDENTIFIED PRICES**

3.34.1 Refer to Division 1 Specifications.

3.35 **CASH ALLOWANCES**

3.35.1 Include in the Base Bid price, cash allowances of:

3.35.1.1 $15,000.00 to cover the cost of having Union Gas Limited provide the natural gas service to the building.

3.35.2 Any amounts in excess of the cash allowances will be paid by the Owner. Return any unused portions of the cash allowances in full to the Owner.

3.36 **LIST OF MECHANICAL SUBCONTRACTORS AND MANUFACTURERS**

3.36.1 In the Bid documents, name the Subcontractors and Manufacturers for the items listed below. Use only one name for each item. See Clause “Material and Equipment”. Where the name of a manufacturer is not entered on the Bid Form, the Contractor will be required to use the base specified manufacturer.

3.36.2 **Subcontractors**

Controls
Insulation
Sheet Metal
Sprinkler System
Testing and Balancing
Water Treatment

3.36.3 **Manufacturers**

Fans - Return Air and Exhaust Air
Floor Drains
Grilles, Registers and Diffusers
Kitchen Hood and Makeup air unit
Plumbing Brass
Plumbing Fixtures

END OF SECTION

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 15001, “Mechanical General Provisions”.

1.1.2 The work to be performed under this Section includes the performance testing and balancing of all heating, ventilating, air conditioning and liquid system equipment installed or modified under this project, including all labour, materials and equipment required to carry out this work. Cooperate and collaborate with the Mechanical Contractor, who will operate the systems and, upon request from the Testing and Balancing Contractor, will make any required adjustments to the systems required in order to achieve the specified and intended performance.

1.1.3 The principal items of work are as follows:

- Performance testing and balancing of all equipment installed or modified under this project, including existing equipment serving renovated areas
- Provision of new sheaves and belts for existing fans as required to achieve specified air quantities
- Survey the installed automatic controls and verify their functional performance
- Test performance of all vibration isolation equipment
- Commissioning in accordance with Division 1 specifications

2 Products

2.1 **GENERAL**

2.1.1 Furnish all test equipment. All equipment will remain the property of the testing and balancing company. Use recently calibrated instruments. Provide verification of calibration to the Consultant when requested.

2.1.2 Approved testing and balancing companies for this project are:

Accu-Air Balance Co, Windsor
Air Audit, Cambridge
C. J. Zettler & Associates, London
Caltab Air Balance, Tecumseh
Design Test and Balance, Mississauga
Verify, Toronto

2.2 **MATERIALS**

2.2.1 Use materials specified herein or approved equal as defined in Section 15001, “Mechanical General Provisions”, Clause “Material and Equipment”.

2.3 **DUCT ACCESS HOLE PLUGS**

2.3.1 Use Duro Dyne Type IP 4 duct access hole plugs.

3 Execution

3.1 **GENERAL**

3.1.1 Include all labour, engineering, and test equipment required to test, adjust, and balance all equipment and systems installed or modified under this project.

3.2 **JOB CONDITIONS**

3.2.1 Prior to the start of work on the site, review with the Mechanical Contractor the location of balancing devices, test connections and access openings and configurations shown on the Drawings. Identify any issues which could compromise system performance. Submit to the Mechanical Contractor and the Consultant written guidelines concerning locations and configurations of equipment and devices involved in the Testing and Balancing work. The Mechanical Contractor is to obtain the approval of the Testing and Balancing Contractor before relocating any of these devices due to field conditions. During testing, ensure that all testing, balancing, and metering devices are installed properly and in the agreed locations. Report any errors, concerns, or issues to the Consultant.

3.2.2 Schedule the Testing and Balancing work in cooperation with other trades involved. Testing and Balancing Contractor is to cooperate with the Mechanical Contractor and provide adequate prior notification of all requests for services of tradesmen, and is to coordinate their efforts so that items requiring replacement or are subject to delivery delays (sheaves, motors, etc.) are tested as early as possible.

3.2.3 Do not begin testing and balancing until the systems have been completely installed, tested, and put in running order. Correct operation of equipment and system components and cleanliness of piping and ductwork is the responsibility of the appropriate trade.

3.3 **CO-OPERATION WITH OTHER TRADES**

3.3.1 The mechanical and electrical and other related trades are to cooperate with the Testing and Balancing Contractor and provide the following assistance and services:

- Schedule sufficient time so that the testing and balancing work can be completed in a timely manner, well in advance of Owner’s use or occupancy
- Inform the Testing and Balancing Contractor of any significant changes made during construction. Provide them with a set of up-to-date Drawings, and approved Shop Drawings
- Provide and install balancing devices, test connections, access openings, balancing probe inlets and plugs as required for Testing and Balancing
- Clean, start and pre-run all equipment, filters, etc. and place all HVAC systems into full operation, and continue same, during each working day of testing and balancing
- Provide immediate labour from pertinent trades, and tools, equipment, and materials to make equipment and system alterations and adjustments, as required, including control adjustments
- Make available all equipment data (shop drawing performance data and operating instructions) to the Testing and Balancing Contractor

3.3.2 As part of the coordination process, the Mechanical Contractor is to be fully responsible for construction and adjustment of the equipment and systems to achieve optimum performance. Any readjustments or re-testing required, as the result of spot checks by the Owner or Consultant, are to be performed promptly, at no additional cost to the Owner.

3.4 SUBMITTALS

3.4.1 Submit site visit reports, review and recommendation reports as the work progresses. Refer to Division 1 specifications and/or Drawings for work sequence and phasing. Provide a Testing and Balancing Report for each phase of work, at its completion.

3.4.2 Record all test data and submit reports in PDF format to the Consultant. A copy of the reviewed final report is to be included in the Operation and Maintenance Manual.

3.4.3 Use data sheets which are approved by the Consultant to record measurements. Include schematic diagrams of all systems identifying branches, inlets, outlets, and equipment. Submit sample sheets for review using same procedure as for Shop Drawings.

3.4.4 Provide a Deficiency List to the Contractor for all materials and installation methods which are found not to be complying with the Specifications and, where specified, quantities could not be achieved within the required tolerances. Submit copy of Deficiency List to the Consultant at the same time it is issued to the Contractor.

3.4.5 Reports are to be prepared and presented in either SI or IP units, as required to match the units presented on the Drawings. Reports that include both SI and IP units will also be accepted.

3.5 PROCEDURES

3.5.1 Review all pertinent plans, specifications, shop drawings, interference drawings and other documentation to become fully familiar with the systems and their specified and intended performance.

3.5.2 Check rotation of all fans and pumps. Advise appropriate trade if any corrections are needed. Ensure corrections are made before starting any testing or balancing.

3.5.3 Ensure that all control valves, devices, and equipment interlocks are operating in the manner required for the correct performance of the systems.

3.5.4 Report any objectionable noise or vibration and be prepared to locate cause by instrumentation and analysis.

3.5.5 Operate, test, and balance all systems over their entire design range of operation. Fully simulate both heating and cooling conditions. Record sufficient data to verify compliance with design requirements. Include minimum and maximum outside air, return air and supply air conditions.

3.5.6 Generally, balance pipework systems after the air systems are balanced. Balance systems to within the following tolerances:

3.5.6.1 For air flow rates lower than 70 L/s (150 cfm), adjust to ±10% of flow.

3.5.6.2 For air flow rates higher than 70 L/s (150 cfm), adjust to ±5% of flow.

3.5.6.3 For water flow rates, adjust to ±5% of flow.

3.5.7 Carry out testing and balancing under both extreme summer and extreme winter conditions. If you wish to simulate these conditions, obtain approval from the Consultant before beginning work.

3.6 **AIR SYSTEMS**

3.6.1 For each air handling unit which serves new or renovated areas, adjust fan speeds by changing drives to maintain existing air flow quantity to areas to remain. Measure total air quantities and fan performance both before and after the renovation work, so that original air quantities supplied and returned from non-renovated areas can be restored at the completion of the work.

3.6.2 Test and adjust fan speeds and dampers to deliver the required air quantities. For belt driven fans, determine size of sheaves required to properly balance systems and operate systems at minimum static pressures. Install selected sheaves. For new fans, sheaves and belts will be supplied by fan supplier. For existing fans, sheaves and belts are to be supplied and installed by the Testing and Balancing contractor.

3.6.3 For each indoor and rooftop air handling unit installed or modified in the project, and for each indoor and rooftop air handling unit which serves new or renovated areas, provide a static pressure profile, including pressure drop across each individual unit component (i.e. coils, filter banks, fans, energy recovery wheels, etc) as well as static pressure in intake plenums, discharge supply ducts and return air ducts. Include return fan pressure differential whether return fan is located within air handling unit or not.

3.6.4 For belt driven fans, variable frequency drives are not to be used for air balancing purposes.

3.6.5 Test and adjust each diffuser, grille, register, air terminal unit, fan coil unit, heat pump, etc to specified flow rate tolerances, and also adjust so as to minimize drafts in all areas.

3.6.6 **Constant Volume Systems:** Make pitot tube traverse of main supply and return air ducts to measure total air quantities.

3.6.7 **Variable Volume Systems:** Make pitot tube traverse of main supply and return air ducts to measure total air quantities. Do this for both maximum and minimum air flow rate conditions. Assist controls trade in setting static pressure setpoint at minimum required pressure. Assist controls trade in calibration of flow measuring stations. Record calibration results and static pressure settings. For each volume box or air terminal unit, measure minimum and maximum air flows, and inlet static pressure at each air flow measurement. Set minimum and maximum air flows as shown on the Drawings.

3.6.8 Seal duct access holes with plugs. Do not use duct tape to seal access holes.

3.6.9 Before starting any air pattern adjustments of individual diffusers, arrange to carry out air distribution tests in five rooms selected by the Consultant. These tests are intended to optimize the air pattern settings for best air distribution. Do tests on both minimum and maximum air volumes. Carry out all tests in the presence of the Consultant. The results of these tests will be used as a basis to adjust air patterns in all rooms.

3.6.10 Record data as specified in Clause “Balancing Data”.

3.7 **BALANCING DATA**

3.7.1 Include the following information in the test report:

3.7.1.1 **Motors:**

Manufacturer
Model and/or Serial Number
Rated and measured voltage
Rated and measured amperage
Corrected full load amperage
Rated and measured rpm
Rated and calculated power
Sheave size, type, and manufacturer

3.7.1.2 **Fans:**

Manufacturer
Model and/or Serial number
Rated and measured airflow rate
Rated and measured rpm
Rated and measured pressure rise
Pulley size, type, and manufacturer
Belt size and quantity
Performance curve by manufacturer
Flow Measuring Station Calibration Results (VAV Systems)

3.7.1.3 **Air Systems (including inlets and outlets):**

Volume Boxes (minimum flow and maximum flow)
Grille, register or diffuser reference number and manufacturer
Grille, register or diffuser location
Design air quantity
Effective area factor and size
Measured air quantity
Static Pressure Setpoint (VAV Systems)

3.7.1.4 **Heat Transfer Elements (Coils, Convertors etc.):**

Manufacturer and type
Measured flow rate (air and water side)
Design and measured inlet and outlet temperatures (air and water side)
Design and measured pressure drop (air and water side)

3.7.1.5 **Testing and Balancing Instruments:**

Types
Serial Numbers
Dates of calibration

3.8 **FINAL INSPECTION AND ACCEPTANCE**

3.8.1 After submission of balancing report, arrange a final inspection with the Consultant.

3.8.2 At final inspection recheck points or areas selected by the Consultant.

3.8.3 For each system, if more than 10% of the measurements at the selected recheck stations deviate by 10% or more from those in the Report, then the Report for that system will be rejected as unacceptable.

3.8.4 If Report is rejected, rebalance systems deemed to be unacceptable, submit new Reports, and make reinspection at no extra cost to the Owner.

3.8.5 Permanently mark settings of dampers and other adjustment devices so that adjustment can be restored if disturbed. Type of marking and method of application to be approved by the Consultant.

END OF SECTION

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 15001, “Mechanical General Provisions”.

1.1.2 All products used must have a flame spread rating less than 25 and a smoke developed classification not more than 50 when tested in accordance with CAN/ULC-S102.

1.1.3 **Environmental Requirements:** Maintain ambient temperature and conditions required by manufacturers of adhesives, mastics, and insulation cements.

1.1.4 **Quality Assurance:** Insulation materials must be manufactured at facilities certified and registered to ISO 9000 Quality Standard.

1.1.5 **Storage of Materials:** Protect materials from dirt, water, chemical and mechanical damage before, during and after installation. Provide and install waterproof sheeting to protect insulation in unfinished areas as required. Remove damaged materials from the site immediately and discard. Remove and replace at no additional cost any installed materials which are damaged.

1.1.6 **Delivery:** Deliver insulation, coverings, cements, adhesive coatings, etc., to the site in Manufacturer’s original containers with the manufacturer’s stamp or label affixed showing flame and smoke ratings of the products, name of manufacturer and brand.

1.1.7 **Insulating Contractor Qualifications:** Insulating contractors and thermal insulation installers for the work of this project must be members of the Thermal Insulation Association of Canada (TIAC).

1.2 **DEFINITIONS**

1.2.1 In this Specification, “exposed to view” means all surfaces of all services within Equipment Rooms, Service Corridors, plus all other areas of the building where the services are not enclosed within ceilings or shafts.

1.2.2 In this Specification, “exposed to weather” means all surfaces of all services located outdoors without an architectural enclosure. It also refers to ductwork inside horizontal and vertical architectural enclosures across the roof and down the faces of the building.

1.3 **SHOP DRAWINGS**

1.3.1 Provide shop drawings which include product description, list of materials and thickness for each service and manufacturers’ installation instructions.

1.3.2 Submit Shop Drawings in accordance with the Clause “Shop Drawings” in Section 15001 for all equipment and materials.

2 Products

2.1 **MATERIALS**

2.1.1 Use materials specified herein or approved equal as defined in Section 15001, “Mechanical General Provisions”, Clause “Material and Equipment”.

2.2 **PIPING INSULATION INSERTS**

2.2.1 Use Johns Manville Thermo-12 Gold calcium silicate rigid piping insulation inserts. Inserts to be equal in thickness to the adjoining insulation and to extend up to pipe centreline on both sides. Quarter diameter size inserts will be accepted for copper piping only. Use the following insert lengths:

Nominal Pipe Size		Insert Length	
mm	(inches)	mm	(inches)
40 - 65	(1-1/2 - 2-1/2)	250	(10)
75 - 150	(3 - 6)	300	(12)
200 - 250	(8 - 10)	400	(16)
300 and over	(12 and over)	550	(22)

2.3 **PIPING INSULATION INSERT SHIELDS**

2.3.1 Use minimum 18 gauge galvanized metal shields. Form shields to fit insulation and extend up to the pipe centre line. Shield length to be 100 mm (4") less than length of associated insert. Shield colour is to match pipe finish colour when exposed to view.

2.3.2 Use steel pipe covering protection saddles at roller hangers and pipe roll supports.

2.4 **PIPE INSULATION**

2.4.1 **All Piping Systems Except Refrigeration**

2.4.1.1 **Piping:** Use formaldehyde-free Knauf Earthwool 1000° glass fibre pipe insulation with factory applied ASJ+ all-service jacket. Insulation conductivity and thickness in accordance with Pipe Insulation Schedule. Jacket to consist of aluminum foil vapour barrier reinforced with glass scrim and laminated to a fire resistant kraft facing.

2.4.1.2 **Valves and Fittings:** Insulate valves and fittings with formaldehyde-free factory precut Johns Manville Zeston Hi-Lo Temp insulation inserts or Knauf Earthwool 1000° formaldehyde-free glass fibre pipe insulation 16 kg/m³ (1 lb/ft³) density glass fibre insulation.

2.4.1.3 The following manufacturers of the above equipment will be considered as equal, provided products are formaldehyde free, subject to requirements of Clause “Material and Equipment”:

CertainTeed
Johns Manville
Knauf
Manson

2.4.2 **Pipe, Valve and Fitting Insulation Covering for Piping Exposed to View (Including Refrigeration Piping)**

2.4.2.1 Use Proto LoSmoke or Johns Manville, Knauf or Walton Plastics equivalent, minimum 0.51 mm (20 mil) thickness PVC jacketing and fitting coverings. Use manufacturer’s solvent welding adhesive to permanently seal all PVC joints. Use white jackets unless specified otherwise in Execution Section below.

2.4.2.2 For soft copper refrigerant piping serving a single fan coil only, use Airtec Fortress, Diversitech or Rectorseal UV stable PVC lineset covers. Temperature range from -20 °C (-4 °F) to 60 °C (140 °F). Lineset to be sized to cover all services from equipment. Use white finish.

2.5 PIPING INSULATION THICKNESS SCHEDULE

Fluid Design Operating Temperature Range °C (°F)	Insulation Conductivity		Nominal Diameter mm (in)				
	Conductivity Range W/m°C (Btu·in/hr·ft²·°F)	Mean Rating Temperature °C (°F)	less than 25 (1)	25 (1) and 32 (1-1/4)	40 (1-1/2) to 75 (3)	100 (4) to 150 (6)	200 (8) and up
Domestic and Service Hot Water Systems							
40 and up (105 and up)	0.032 - 0.040 (0.22 - 0.28)	38 (100)	25 (1.0)	25 (1.0)	40 (1.5)	40 (1.5)	40 (1.5)
Domestic Cold Water (Sanitary, Storm and Condensate Drains)							
4 - 24 (40 - 75)	0.030 - 0.039 (0.21 - 0.27)	24 (75)	15 (0.5)	15 (0.5)	25 (1.0)	25 (1.0)	25 (1.0)

2.6 LAVATORY DRAIN INSULATION

2.6.1 Use McGuire ProWrap seamless lavatory insulation kits, manufactured of anti-microbial closed cell moulded vinyl material.

2.6.2 The following manufacturers of the above equipment will be considered as equal subject to requirements of Clause “Material and Equipment”:

Truebro

2.7 AIR DUCTS

2.7.1 Ductwork External Insulation

2.7.1.1 On all round ducts, and on rectangular ducts not exposed to view with both dimensions 600 mm (24") and smaller, use Knauf Atmosphere formaldehyde-free flexible blanket fibreglass insulation with FSK aluminum foil-scrim-kraft paper facing. Product must meet the requirements of ASTM C1290. Maximum thermal conductivity 0.042 W/m°C (0.29 Btu·in/hr·ft²·°F). Use 40 mm (1-1/2") thickness.

2.7.1.2 On rectangular ducts exposed to view, and on rectangular ducts not exposed to view with one dimension 650 mm (26") or larger, use Knauf Atmosphere formaldehyde-free rigid fibreglass insulation board, 48 kg/m³ (3 lb/ft³) density, with FSK aluminum foil-scrim-kraft paper facing. Product must meet the requirements of ASTM C1136. Maximum thermal conductivity 0.033 W/m°C (0.23 Btu·in/hr·ft²·°F) at 24 °C (75 °F) mean temperature. Use 40 mm (1-1/2") thickness.

2.7.1.3 On rectangular ducts exposed to weather, use Knauf Atmosphere formaldehyde-free rigid fibreglass insulation board 96 kg/m³ (6 lb/ft³) density, with FSK aluminum foil-scrim-kraft

paper facing. Product must meet the requirements of ASTM C1136. Maximum thermal conductivity 0.033 W/m°C (0.23 Btu·in/hr·ft²·°F) at 24 °C (75 °F) mean temperature. Use 75 mm (3") thickness. Two layers equalling a total of 75 mm (3") thickness will be acceptable, provided the inner layer does not include a vapour barrier.

2.7.1.4 The following manufacturers of the above equipment will be considered as equal, provided the products are formaldehyde-free, subject to requirements of Clause “Material and Equipment”:

CertainTeed
Johns Manville
Knauf
Manson

2.7.2 **Ductwork Insulation Covering for Ductwork Exposed to View**

2.7.2.1 **Canvas Covering:** Use UL listed fabric 220 g/m² (6.5 oz/yd²) fire retardant canvas covering.

2.7.2.2 **Laminate Cladding:** Use Venture Tape Model 1577CWWME zero permeability, 0.20 mm (8 mil) thick, self-adhesive multi-ply embossed white laminate cladding, or Victoryclad equivalent.

2.7.3 **Ductwork Insulation Covering for Ductwork Exposed to Weather**

2.7.3.1 Use 0.61 mm (24 mil) Johns Manville embossed aluminum jacket sheeting. Use sheet product only - rolled product will be accepted for round ductwork only.

2.7.3.2 The following manufacturers of the above equipment will be considered as equal, subject to requirements of Clause “Material and Equipment”:

Ideal Products

2.8 **DUCTWORK FIRE PROTECTION INSULATION**

2.8.1 Use Thermal Ceramics FireMaster FastWrap XL Duct Wrap non-combustible, flexible fireproof blanket, fully encapsulated in a foil scrim and supplied in a blanket roll form. Apply directly onto the installed ductwork strictly in accordance with the manufacturers’ instructions and the ULC Listing, Design No. FRD-3, Guide No. 40 U21, “Fire Resistant Ducts”, as tested to ISO Standard 6944 to provide 0 mm (0") clearance to combustibles.

2.8.2 Unless specified otherwise, provide sufficient thickness to achieve two hour fire rating. Use only two hour rating for all kitchen exhaust grease ducts, in accordance with NFPA 96 and ULC requirements.

2.8.3 The following manufacturers of the above equipment will be considered as equal subject to requirements of Clause “Material and Equipment”:

3M
CL4 Fire
Royal

2.9 **VAPOUR BARRIER MASTIC**

2.9.1 Use white Foster 30-33 or Childers CP-33 water based vapour barrier mastic. Permeance shall be 0.07 perms or less as tested by ASTM F 1249. Reinforcing mesh shall be Foster Mast a Fab or Childers Chil Glas #10.

2.10 **FINISHING CEMENT**

2.10.1 Use Ryder hydraulic setting finishing cement.

2.11 **LAGGING ADHESIVE**

2.11.1 Use white Childers CP-50AMV1 or Fosters 81-42/30-36 water based fire retardant lagging adhesive.

3 Execution

3.1 **GENERAL**

3.1.1 Install all insulation in strict accordance with manufacturer's published recommendations.

3.1.2 Install all insulation continuous through walls and sleeves. Insulate all components of insulated systems unless specifically excluded. Extend all surface finishes to protect all surfaces, ends, and raw edges of insulation.

3.1.3 Do not apply insulation until piping has been tested and approved.

3.1.4 Do not insulate unions or flanges at connections to equipment. In these locations, and in all other locations where insulation ends, finish with vapour resistant mastic.

3.1.5 Patch and make good any existing insulation and covering which is damaged during the work of this Contract. Use material of the same quality as existing.

3.2 **PIPING SYSTEMS**

3.2.1 **General Requirements**

3.2.1.1 **Other Piping Systems**

3.2.1.1.1 Insulate the following piping systems in their entirety:

- Domestic Cold Water (potable and non-potable)
- Domestic Hot Water (potable and non-potable)
- Domestic Hot Water Recirculating (potable and non-potable)
- Condensate Drains

3.2.2 **Insulation Application**

3.2.2.1 **General:** Seal all joints in accordance with manufacturer's recommendations.

3.2.2.2 **Firestopping:** Where an insulated pipe passes through a fire separation, use only ULC labelled piping insulation in accordance with ULC Listed firestop system being used. See Section 15001, Clause "Firestopping". Extend ULC labelled pipe insulation through fire

separation and 50 mm (2") beyond fire separation on both sides. Tightly butt joints and wrap with approved joint tape.

3.2.2.3 **Hanger Points:** Provide an insulation insert and shield at each hanger point on all piping 40 mm (1-1/2") and larger on all systems. On cold lines, vapour seal butt joints on each side of insert with vapour barrier mastic.

3.2.2.4 **Pipe:** Apply insulation over clean dry pipe. Butt all joints firmly together. Seal all jackets neatly in place. Wrap butt joints with a minimum 75 mm (3") wide strip of the jacketing material. Use a vapour barrier adhesive on all “cold” lines and dual temperature systems.

3.2.2.5 **Fittings and Valves**

3.2.2.5.1 For pipe sizes 40 mm (1-1/2") and smaller, insulate with fibreglass blanket wrapped firmly under compression (minimum 2:1) to a thickness matching adjoining insulation. Insulation ends may be mitred at elbows and sealed with tape.

3.2.2.5.2 For pipe sizes 50 mm (2") and larger, insulate with factory precut insulation inserts or with fibreglass blanket wrapped firmly under compression (minimum 2:1) to a thickness matching adjoining insulation. Insulation ends may be mitred at elbows and sealed with tape.

3.2.2.5.3 **Cold Systems and Dual Temperature Systems:** Apply vapour barrier mastic and reinforcing mesh on all cold service insulated elbows, fittings, flanges, valves, as well as on all cold service line size hangers less than 40 mm (1-1/2"). All vapour retarder jacket seams shall be vapour sealed with vapour barrier mastic in addition to jacket self-seal adhesive. Provide a continuous vapour barrier on the insulation for the following systems:

- domestic cold water (potable and non-potable)
- condensate drains

3.2.2.5.4 On components which require service, fabricate easily removable and reusable insulation sections e.g. suction guides for circulating pumps and pump casings. Test ports on balancing valves to be accessible outside of insulation.

3.2.3 **Pipe Insulation Finishes Exposed to View**

3.2.3.1 In all locations where the insulation will be exposed to view, including for refrigeration piping, finish with pipe insulation coverings. Follow strictly manufacturer’s installation procedures for cold and hot systems.

3.3 **LAVATORY DRAIN INSULATION**

3.3.1 Insulate drain and supply pipes on all barrier free lavatories. Use moulded offset drain and water supplies covers.

3.4 **AIR DUCTS**

3.4.1 **General**

3.4.1.1 Seal all vapour retardant jacket seams and penetrations with UL Listed tape and adhesive. Coat all taped seams with 100 mm (4") wide coating of vapour barrier mastic to prevent moisture ingress on cold systems.

3.4.1.2 Externally insulate all plenums not fabricated from insulated panels as well as all plenums specifically identified on the Drawings.

3.4.1.3 Externally insulate fire damper sleeve assemblies where duct system is internally lined.

3.4.1.4 Externally insulate all ductwork exposed to the weather or installed outside of the building insulated envelope.

3.4.1.5 Refer to Section 15800, “Air Distribution”, for ductwork internal lining materials and methods.

3.4.2 **System Specific Requirements**

3.4.2.1 **Supply Air Ductwork**

3.4.2.1.1 Externally insulate all supply air ductwork, including all supply air ductwork located in mechanical or electrical rooms, all supply air ductwork located in return air ceiling plenums, and all internally lined supply air ductwork.

3.4.2.1.2 Decorative low pressure ductwork exposed to view and located within the room it serves need not be externally insulated.

3.4.2.1.3 **Outside Air Intake Ductwork:** Externally insulate all outside air intake, combustion air intake, and all ductwork connected to outside air louvres or plenums.

3.4.2.2 **Return and Exhaust Air Ductwork:** Externally insulate all return and exhaust duct sections specifically identified on the Drawings. Insulate the first 1.5 m (5') of exhaust air ductwork located adjacent to outside walls or roof.

3.4.3 **Insulation Application**

3.4.3.1 On round and oval ducts, adhere insulation to ducts with a flame resistant, quick tacking adhesive. Apply adhesive in 100 mm (4") wide strips at 200 mm (8") centres. Butt all circumferential joints and overlap all longitudinal joints a minimum 50 mm (2"). Staple all joints on 150 mm (6") centres. Tape all joints with minimum 75 mm (3") wide reinforced vapour barrier tape as recommended by insulation manufacturer.

3.4.3.2 On rectangular ducts, use adhesive and impale insulation over mechanical fasteners. Provide 100% coverage of adhesive on sheet metal, all exposed insulation edges, and all transverse joints. Provide mechanical fasteners per manufacturer’s published recommendations. Insulate behind duct balancing damper operators.

3.4.4 **Insulation Finish for Ductwork Exposed to View**

3.4.4.1 In locations where the insulation will be exposed to view, finish with canvas. Provide 25 mm x 25 mm (1" x 1") galvanized steel sheet metal angle corner bead over duct insulation along all duct corners. Securely paste canvas on with a two coat application of lagging adhesive over the entire surface. Apply canvas between coats of adhesive, while first coat is still wet. Stretch canvas tight and smooth with overlapping seams located where least visible. Apply second coat of adhesive immediately following application of canvas. Do not use metal bands.

3.4.4.2 Seal canvas with off-white sizing to leave a smooth non-porous surface ready to receive paint application.

3.4.4.3 Self-adhesive aluminum covering will be acceptable in lieu of canvas for exposed to view ductwork within the building envelope only. Follow manufacturer's installation recommendations.

3.4.5 **Insulation Finish for Round Ductwork Exposed to Weather:** Apply aluminum jacketing continuously for all sides, with longitudinal joints on duct underside. Overlap all joints and provide stainless steel banding in accordance with manufacturer's instructions.

3.4.6 **Insulation Finish for Rectangular Ductwork Exposed to Weather**

3.4.6.1 Provide styrofoam sm rigid insulation wedge above insulation on top surface of duct, to create minimum 5% slope to prevent snow and water accumulation. Wedge to be same width as top of duct.

3.4.6.2 Apply aluminum jacketing continuously for all sides, with longitudinal joints on duct underside. Jacketing to be cross broken for all duct dimensions 600 mm (24") and larger, with minimum 6 mm (1/4") break. Overlap all joints and provide both #8 stainless steel screws and stainless steel banding in accordance with manufacturer's instructions.

3.5 **DUCTWORK FIRE PROTECTION INSULATION**

3.5.1 Insulate kitchen grease duct and ductwork designated on the Drawings as fire-rated ductwork with fire protection insulation.

3.5.1.1 Externally insulate all ducts forming part of stairwell or vestibule pressurization systems.

3.5.2 Apply insulation strictly in accordance with the manufacturer's published instructions and ULC Listing. Firestopping of duct penetrations through fire separations to be in accordance with the ULC listings.

3.5.3 Have the completed installation inspected by a manufacturer's representative, and submit a report of compliance with the ratings requirements.

3.5.4 All hangers, support rods, concrete anchors and firestopping of duct penetrations through fire separations to be in accordance with the ULC Listing and the manufacturers' instructions.

END OF SECTION

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 15001, “Mechanical General Provisions”.

1.2 **DESCRIPTION OF SYSTEMS**

1.2.1 **Fire Extinguishers:** Provide portable fire extinguishers meeting all requirements of the Ontario Building Code and the Ontario Fire Code. Provide fire extinguisher cabinets where shown on the Drawings.

1.3 **SHOP DRAWINGS**

1.3.1 Submit Shop Drawings in accordance with the Clause “Shop Drawings” in Section 15001 for all equipment and materials.

1.3.2 See requirements for Design Drawings in Part 3 of this Section.

2 Products

2.1 **MATERIALS**

2.1.1 Use materials specified herein or approved equal as defined in Section 15001, “Mechanical General Provisions” Clause “Materials and Equipment”.

2.1.2 Use only material and equipment which is Underwriters' Laboratories of Canada Listed and FUS approved for the application.

2.2 **FIRE EXTINGUISHERS AND CABINETS**

2.2.1 In Kitchens with commercial cooking equipment which includes automatic fire suppression systems, use National Fire Equipment Ltd. “Badger” Class K wet chemical extinguisher, 6 litre (1.6 gallon) capacity. Provide complete with wall bracket.

2.2.2 The following manufacturer of the above equipment will be considered equal subject to requirements of Clause “Material and Equipment”:

Wilson & Cousins

3 Execution

3.1 **FIRE EXTINGUISHERS**

3.1.1 Install fire extinguishers and cabinets in accordance with the manufacturer's recommendations.

END OF SECTION

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 15001, “Mechanical General Provisions”.

1.2 **SHOP DRAWINGS**

1.2.1 Submit Shop Drawings in accordance with Section 15001, “Shop Drawings” for all equipment and materials.

2 Products

2.1 **MATERIALS**

2.1.1 Use materials specified herein or approved equal as defined in Section 15001, “Mechanical General Provisions” Clause “Material and Equipment”.

2.2 **PIPE AND FITTINGS**

2.2.1 Select the most economical use of the materials named below. Unless specified or shown otherwise, either material may be used or a combination of materials, whichever provides the greatest economy.

2.2.2 For all piping systems, use only solder and fluxes containing no lead.

2.2.3 In Kitchen and Servery areas, chrome plate all exposed piping.

2.2.4 **Above Grade Domestic Water Piping (Hot, Cold, HW Recirc. System, Potable, Non-potable, and Soft Water)**

2.2.4.1 For all sizes, use hard drawn copper, Type “L” to ASTM B88, with soldered or flanged joints and bronze or copper fittings.

2.2.5 **Above Grade Sanitary Drainage Piping (Including Vent Piping):**

2.2.5.1 **Cast Iron/Copper:** Use cast iron pipe and fittings to CSA B70, with mechanical joints, or seamless copper Type DWV pipe to ASTM B306 with cast or wrought copper fittings and soldered joints. Mechanical joint couplings to be heavy duty Husky model HD2000 or equivalent, rubber compression gasket type with minimum four stainless steel gear clamps and stainless steel hardware. For 75 and 100 mm (3" and 4") pipe sizes, use a liquid neoprene adhesive/lubricant to fill any gaps between pipe ends within the couplings. All sanitary drainage above ground in vertical shafts (vertical service spaces) shall be cast iron.

2.2.5.2 **PVC:** Use IPEX System 15 DWV pipe and fittings certified to CAN/CSA B181.2 and having a Flame Spread Rating not more than 25 when tested to CAN/ULC-S102.2. System 15 shall not be permitted inside Plenums, or High Buildings. Within Plenums or High Buildings, use IPEX System XFR DWV pipe and fittings certified to CAN/CSA B181.2 and having a Flame Spread Rating not more than 25 and Smoke Development Classification not more than 50 when tested to CAN/ULC-S102.2. Use solvent welded joints or MJ Grey mechanical joint couplings certified to CAN/CSA B602 and having a Flame Spread Rating not more than 25 and a Smoke Development Classification not more than 50 when tested

to CAN/ULC-S102.2. Firestop all pipe penetration using firestop listings tested in accordance with ULC-S115.

2.2.6 **Below Grade Sanitary Drainage Piping:** Use PVC pipe and fittings to CSA B181.2 or B182.2 – B182.1 piping will not be accepted. For pipe sizes 75 mm (3") and smaller, use IPEX System 15 Schedule 40 PVC DWV piping and fittings certified to B181.2, with solvent weld joints. For 100 mm (4") or 150mm (6”), use either gasketed joint PVC piping, IPEX Ring-Tite **SDR 28** certified to B182.2, or IPEX System 15 PVC DWV piping and fittings with solvent weld joints. For larger sizes, use gasketed joint PVC piping, IPEX Ring-Tite **SDR 35** certified to B182.2, or equivalent.

2.2.7 **Indirect Drainage and Condensate Drainage Piping:** Use seamless copper Type DWV pipe to ASTM B306 with cast or wrought copper fittings and soldered joints.

2.2.8 **Natural Gas Piping:** Above grade, both inside and outside the building, use Schedule 40 black steel pipe with malleable iron or steel fittings. Below grade, outside the building, use plastic piping complying with CSA B137.4. Transition to steel piping 150 mm (6") above grade. Protect plastic piping above grade with a certified metallic sheathing to a depth of 150 mm (6") below grade. All materials must meet the requirements of CSA B149.1.

2.3 **ROOFTOP PIPING SUPPORTS**

2.3.1 See Section 15001 “Mechanical General Provisions” Clause “Rooftop Supports”.

2.4 **CLEANOUTS**

2.4.1 Use cleanouts of the same size as drainage pipe on piping up to 100 mm (4") diameter, not less than 100 mm (4") on size 150 mm (6") and 200 mm (8"), and not less than 150 mm (6") on larger size pipe. No aluminum components will be permitted.

2.4.2 For line cleanouts, use Watts CO-450-RD epoxy coated cast iron cleanout ferrule complete with countersunk threaded brass plug, stainless steel wall access cover and stainless steel vandal resistant screw.

2.4.3 For stack cleanouts, use Bibby Ste Croix cast iron Barret style stack cleanout with gasketed cast iron cover.

2.4.4 In porcelain, ceramic, and other quarry tile floors, and in floors with vinyl or similar finish, use Watts CO-200-S-1-34 epoxy coated cast iron floor cleanout with square adjustable nickel bronze access cover and frame, and secondary closure plug.

2.4.5 In concrete floors, use Watts CO-200-RX-4-34 epoxy coated cast iron floor cleanout with round adjustable heavy duty ductile iron access cover and frame, and secondary closure plug.

2.4.6 In floors with membranes use Watts CO-100 series epoxy coated cast iron floor cleanouts with membrane clamps.

2.4.7 In floors with surface membranes, use Watts CO-100-C-RFC-7-1-34 epoxy coated cast iron cleanout with anchor flange, cast iron reversible membrane clamp, and RFC satin nickel bronze cleanout top with surface membrane clamp.

2.4.8 The following manufacturers of the above equipment will be considered equal, subject to requirements of Clause “Material and Equipment”:

Enpoco
Jay R. Smith
Mifab
Zurn

2.5 **FLOOR DRAINS**

2.5.1 **General:** Use floor drains equipped with trap primer tappings. No aluminum components will be permitted. Provide flashing clamps on all drains installed in floors with membranes. Confirm membrane floor locations with Division 1.

2.5.2 **Floor Drains in Finished Areas Not Specifically Designated (Drawing Reference FD):** Watts FD-200-5-1 cast iron floor drain with XH, adjustable 140 mm (5-1/2") diameter Type NB, heavy duty nickel bronze strainer with clear epoxy coating. Provide separate cast iron “P” trap.

2.5.3 **Mechanical Room (Drawing Reference FD):** Watts FD-300-50 cast iron floor drain with adjustable 180 mm (7") diameter CI strainer and heavy duty cast iron grate.

2.5.4 **Porcelain, Ceramic, and other Quarry Tile Floor Square Drains (Drawing Reference FD):** Watts FD-100-C-L cast iron, with adjustable 130 mm x 130 mm (5" x 5") square, polished nickel bronze strainer membrane clamp and separate “P” trap.

2.5.5 **Vinyl or Similar Finish Floor Square Drains (Drawing Reference FD):** Watts FD-100-C-L cast iron, with adjustable 130 mm x 130 mm (5" x 5") square, polished nickel bronze strainer membrane clamp and separate “P” trap.

2.5.6 **Funnel Floor Drains in Millwork (Drawing Reference FFD):** Watts FD-200-EF-1 cast iron floor drain with adjustable heavy duty cast iron grate. Provide separate cast iron “P” trap and Type NB, 100 mm (4") round funnel.

2.5.7 In floors with surface membrane, use Watts FD-100-C-FC7-1 with strainer and surface membrane clamp.

2.5.8 The following manufacturers of the above equipment will be considered equal, subject to requirements of Clause “Material and Equipment”:

Enpoco
Jay R. Smith
Mifab
Zurn

2.6 **VALVES**

2.6.1 Use valves of same manufacturer except where approved otherwise by the Consultant.

2.6.2 Unless otherwise specified, use valves designed for minimum 1380 kPa (200 psig) CWP (Cold Working Pressure).

2.6.3 Use flanged, screwed or solder ends to suit pipe lines, and non-heating malleable iron handles. Use rising stems where space permits. Use valves with extended valve stems where piping is to be insulated.

2.6.4 Use only industrial class valves meeting ANSI, ASTM, ASME and applicable MSS standards.

2.6.5 All valves supplied for this project shall have a current and valid Canadian Registration Number (CRN) for the Province of Ontario. Upon request, suppliers shall provide a copy of statutory declaration for valves, stamped, signed and dated by TSSA as validation of the CRN registration.

2.6.6 All valves are to comply NSF/ANSI 372 with lead content below 0.25%.

2.6.7 For gear operated valves located within mechanical rooms or service spaces, where valves are installed more than 3 m (10 ft) above finished floor, or are difficult to access from a ladder, provide chain drives in lieu of handwheels.

2.6.8 **Domestic Water Systems up to 1380 kPa (200 psi)**

2.6.8.1 **Ball Valves 50 mm (2") and under:** 4140 kPa (600 WOG/psig) water oil or gas rating: Use Kitz model 868AMLL/869AMLL, lead free forged brass body, two piece full port, PTFE seats, double Viton “O” ring stem seals, Stainless Steel vented solid ball, blowout proof Stainless Steel stem, and Locking lever handle.

2.6.9 **Natural Gas Systems Isolation Valves**

2.6.9.1 For sizes 50 mm (2") and under, use Kitz Model 58, Class 150 ball valve with 4140 kPa (600 psig) water oil or gas pressure rating, cast brass body to ASTM C37700, full port, TFE seats, double “O” Ring or teflon packing, chrome plated brass ball, lever handle. Must be CGA approved to 860 kPa (125 psig).

2.6.9.2 For sizes 65 mm (2-1/2") to 200 mm (8") use Kitz 150SCTBZM, Class 150 flanged full port ball valve with cast steel body, stainless steel ball and stem, RPTFE packing and seats, locking lever handle. Must be CGA approved to 860 kPa (125 psig). Provide lever on sizes 100 mm (4") and 150 mm (6"). On valves 150 mm (6") and over, use manual gear operators. Gear operators to be permanently lubricated, self-locking, with large size position indicator. All operators to have lockout capability.

2.6.10 **Equivalent Manufacturers**

2.6.10.1 The following manufacturers of the above equipment will be considered equal, subject to requirements of Clause “Material and Equipment”:

Ball, Gate, and Check Valves

Apollo (Industrial Class)
Kitz (Industrial Class)
Mueller (Industrial Class)
Nibco (Industrial Class)
Toyo (Industrial Class)

2.7 **TRAP SEAL VALVES**

2.7.1 Use PPP, P Series trap primer valves. Provide chrome plated finish in exposed locations.

2.7.2 For floor drains 100 mm (4") and smaller, located outside of Mechanical Rooms, Kitchens, and Laboratories, provide only Proset trap guard drain inserts in lieu of priming through use of trap seal valves.

2.7.3 Electronic trap priming manifold systems will be acceptable in lieu of base specified valves. Arrange and pay for power connections to the system and included this cost in the Base Bid.

2.7.4 The following manufacturers of the above equipment will be considered equal, subject to requirements of Clause “Material and Equipment”:

Jay R. Smith
Zurn

2.8 ESCUTCHEON PLATES

2.8.1 Provide one piece brushed aluminum escutcheon plates at all points where pipes pass into finished areas through walls, floors, or ceilings.

3 Execution

3.1 SANITARY AND STORM PIPING

3.1.1 Where pipe sizes are not shown on the Drawings and are not specified, size in accordance with the requirements of the Ontario Building Code.

3.1.2 Install piping and connect to, or rough-in for, all fixtures as shown or as specified. Conceal piping in walls or ceilings in finished areas. Where sewers pass under footings, backfill with lean concrete.

3.1.3 Combustible pipe and fittings shall not be installed in vertical shafts (vertical service spaces). Piping and fittings with a Smoke Developed Classification of greater than 50 shall not be installed in return air plenums, or High Buildings, per OBC.

3.1.4 Use the following minimum slopes on horizontal drains:

Fixture waste or drains	2%
Drains up to and including 75 mm (3")	2%
Drains 100 mm (4") and up to 150 mm (6")	1%
Drains over 150 mm (6")	0.5%

3.2 WATER PIPING

3.2.1 Use only lead free solder and fluxes.

3.2.2 Connect required service to plumbing fixtures, hose bibbs, etc., as shown or as specified.

3.2.3 After installation, thoroughly flush complete system to remove all scale, sediment, etc.

3.2.4 Where press-connect fittings, joints and valves are specifically permitted in Part 2 Clause "Pipe and Fittings", all press-connect fittings and joints are to be installed and tested in

strict accordance with manufacturer's instructions, including two step process for pressure testing.

3.2.5 Piping below grade will only be accepted where shown below grade on the Drawings.

3.2.6 Arrange with local municipal service provided for supply and installation of domestic water meter. Provide all necessary valves and piping needed to comply with municipal service provider’s requirements.

3.3 **NATURAL GAS PIPING**

3.3.1 Install in accordance with the latest CAN/CSA-B149.1, Natural Gas and Propane Installation Code and subsequent supplements, and the latest Ministry of Energy & Resources Management Regulations.

3.3.2 Provide vents to atmosphere for all safety devices and regulators, as required by Code. All vent outlets to terminate with turned down elbows, unless noted otherwise on Drawings. Ensure all vent openings at grade or above roof terminate above the expected level of snow accumulation.

3.3.3 Generally, do not install piping concealed within walls. Where this is required, install all piping which is concealed in concrete or masonry walls, or piping which passes through walls or floors, in pipe sleeves so that pipe can be removed or tested in compliance with Code. For piping in other walls, ensure access doors are provided.

3.3.4 Provide manufactured gas pipe supports for all roof-mounted piping. Pipe supports shall be spaced in accordance with Code. Arrange piping to accommodate expansion and provide expansion loops as required to suit pipe runs. Refer to Section 15001 “Mechanical General Provisions”, Clause “Piping”.

3.3.5 Make a copy of all gas fitter tags for inclusion in the O+M manuals. Laminate all gas fitter tags before securing them to the system.

3.4 **ROUGHING-IN**

3.4.1 Where shown on Drawings, rough-in hot and cold water systems, drain and vent.

3.4.2 Cap off all piping and provide shutoff valves on hot and cold water piping.

3.4.3 Obtain roughing-in details for future equipment from Owner before starting work. Rough-in according to details received.

3.5 **VENTING**

3.5.1 Vent all fixtures in accordance with local and provincial regulations. Run vents as directly as possible and grade properly to drain back to the fixture connection. Connect the bottom of all vent stacks into soil or waste stacks for drainage. Conceal vents in walls and ceilings in finished areas. Carry vent stacks through roof where shown or where required and project at least 610 mm (24") above roof deck.

3.5.2 For Health Care Facilities, locate vents minimum distance away from air intakes and other building openings in accordance with CSA Z317.1.

3.6 **FLASHING**

3.6.1 Carry vent, waste, and soil stacks through roof where shown on Drawings or where required. Supply all flashing materials. Use materials as specified in Section 15001, “Mechanical General Provisions”.

3.7 **CLEANOUTS**

3.7.1 Install cleanouts behind walls so that the bolted cover on the cleanout will be within 25 mm (1") of the finished wall. Wall cleanout access doors to be installed minimum 200 mm (8") above finished floor.

3.7.2 Conceal cleanouts in finished walls with access doors. See Section 15001 “Mechanical General Provisions”.

3.7.3 Place cleanouts where shown, at end of all drainage lines, at all changes of direction greater than 45°, and at the base of all stacks.

3.7.4 Bring cleanouts up to floor level in all buried pipe and in all horizontal runs above grade where specifically shown. For all other cleanouts in horizontal runs above grade, leave with access from ceiling space. Bring cleanouts in concealed vertical pipes to a wall surface.

3.7.5 Locate floor cleanouts clear of fixed furniture and equipment. In corridors, locate cleanouts near walls but clear of base.

3.8 **FLOOR DRAINS**

3.8.1 Connect all floor drains, running traps, and open hubs to trap seal valves, or “dribbler” connection made from nearest flush valve, where required.

3.8.2 Connect all floor drains into sanitary drainage systems unless specifically shown otherwise.

3.8.3 Elevator pit drains are to be provided with backwater valves that are serviceable from outside of the pit, in accordance with the requirements of the Elevator Safety Code CSA B44.1. Use inline backwater valve with line sized cleanout at floor. Provide extension pipe so that backwater valve check assembly can easily be removed and serviced through the cleanout. Follow backwater valve manufacturer’s installation instructions. Provide primed running trap downstream of each backwater valve.

3.9 **UNIT DRAIN CONNECTIONS**

3.9.1 Connect up all drains, blowdowns, condensate drains from fan cabinets, pumps, coils, condensers, etc. Run drains to funnel floor drains or open hub drains without crossing or interfering with walkways.

3.10 **VALVES**

3.10.1 Install a valve at takeoff point in each main branch which takes off from main and in all locations shown.

3.10.2 Install drain valves with hose connections at all low points and at all branch valves for upfeed risers.

3.10.3 Use line sized valves unless noted otherwise. Use ball valves on sizes up to 65 mm (2-1/2") size and butterfly valves on larger size pipe. Use ball valves or gate valves either side of water meter.

3.10.4 Mount interior hose bibbs with centre at a point 760 mm (30") above finished floor unless noted otherwise.

3.10.5 Install check valves on pump discharge a minimum of 8 pipe diameters downstream of pump.

3.11 EXISTING SYSTEMS

3.11.1 Maintain systems in operation throughout construction, using temporary systems where shown. Disconnect existing systems only when temporary or permanent replacement systems are operational.

3.11.2 Construct the temporary systems to the same standards of material and installation as the permanent systems.

3.12 NEW EQUIPMENT

3.12.1 Kitchen Equipment:

3.12.1.1 Refer to the Kitchen Drawings and Specifications.

3.12.1.2 Make all necessary drain, vent, hot water, cold water, and gas connections to kitchen equipment in locations shown. Provide unions or flanges on all piping connections to equipment. Provide shutoff valves on all lines, except drains and vents, to each piece of equipment. Provide and install flexible connectors as required between the kitchen equipment and gas pipeline. Install pressure regulating valves supplied by Kitchen trade.

3.12.1.3 Run all indirect wastes from equipment including condensing units to open hub and combination drains.

3.12.2 **Other Equipment:** Make drain, vent, hot water, cold water, air, and distilled water connections to the other equipment which will be supplied by other Divisions. The required services to each piece of equipment are shown on the Drawings. Provide unions or flanges on all piping connections to equipment. Provide shutoff valves on all lines, except drains and vents, to each piece of equipment. Provide vacuum breaker and backflow preventer on both hot and cold water lines to each piece of equipment.

3.13 STERILIZATION OF POTABLE WATER SYSTEMS

3.13.1 All chlorination and sampling must be completed and tested by a person holding a Water Distribution Licence Class 1 thru 4 and sampling submitted to an accredited laboratory. Provide certified reports.

3.13.2 Thoroughly flush the domestic hot and cold water piping systems using clean potable water to remove dirt and other contaminants. Remove all faucet screens prior to flushing and reinstall after completion of flushing.

3.13.3 Disinfect domestic hot and cold water piping systems using a liquid chlorine solution. Introduce the liquid chlorine to ensure the chlorine is distributed throughout the sections being tested. Apply chlorine to a achieve a minimum chlorine concentration of 10 mg/L throughout the sections being tested. Leave the 10 mg/L chlorine solution in place for 24 hours.

3.13.4 Test the chlorine residual after 24 hours. If tests show a minimum chlorine residual of 5 mg/L, flush the disinfected sections and recharge with potable water. If the chlorine residual is found to be less than 5 mg/L, repeat the disinfecting procedure until satisfactory results are obtained.

3.13.5 After the systems have been flushed and recharged with potable water, arrange and pay for bacteriological tests to be conducted by an independent testing agency. Provide certified reports. If there is evidence of contamination, repeat the disinfecting procedure until satisfactory results are obtained. Obtain the Building Inspector’s permission before placing the systems in normal operation.

END OF SECTION

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 15001, “Mechanical General Provisions”.

1.2 **SHOP DRAWINGS**

1.2.1 Submit Shop Drawings in accordance with Section 15001, “Mechanical General Provisions” Clause “Shop Drawings”.

2 Products

2.1 **MATERIALS**

2.1.1 Use materials specified herein or approved equal as defined in Section 15001, “Mechanical General Provisions” Clause “Material and Equipment”.

2.2 **PLUMBING FIXTURES**

2.2.1 **General**

2.2.1.1 Provide white fixtures unless specified otherwise. Use only first quality fixtures. Warped or distorted fixtures will not be accepted. Use fixtures of a single manufacturer only, wherever possible. Likewise use a single manufacturer for faucets, supplies and drains.

2.2.1.2 All plumbing fixtures, faucets and supplies to meet NSF 372, with lead content below 0.25%.

2.2.1.3 Use only new plumbing fixtures certified by CAN/CSA-B45.0, and closet seats, fittings, and trim certified by CAN/CSA B125, free from cracks, scratches, wrench marks, or imperfections of any kind. Replace any permanently stained, chipped, or marred fixtures or connections.

2.2.1.4 Use factory chrome plated items for all visible parts of the fixture trim including faucets, escutcheons, waste, strainers, traps, supplies, stops, etc.

2.2.1.5 Unless specified otherwise, the following manufacturers of the above equipment will be considered equal, subject to requirements of Clause “Material and Equipment”:

- Plumbing Fixtures - American Standard, Eljer, Kohler, Mansfield
- Plumbing Brass - Chicago Faucets, Delta Commercial, T&S Brass
- Stainless Steel Sinks - Franke Kindred, Novanni,
- Interceptors - Jay R Smith, Watts, Zurn, Mifab

2.2.2 **Fixture Carriers**

2.2.2.1 **Lavatories:** Watts Series 400 heavy duty carriers to support all wall hung lavatories independent of the wall.

2.2.2.2 The following manufacturers of the above equipment will be considered equal, subject to the requirements of Clause “Material and Equipment”:

Jay R. Smith
Watts
Zurn

2.2.3 **Single Compartment Sink (Drawing Reference SS1) (Kitchen Handwash)**

2.2.3.1 **Sink:** Sink provided by kitchen supplier. Installed by mechanical.

2.2.3.2 **Faucet:** Chicago Faucets Ecast 895-317CP deck mounted faucet, chrome plated, 100 mm (4") centres, solid cast brass lead-free body, 1/4 turn ceramic disc valve cartridges, 100 mm (4") solid brass rigid gooseneck spout with 8 lpm (2.2 gpm) flow aerator outlet and 100 mm (4") blade handles.

2.2.3.3 **Waste:** Cast brass P trap, 40 mm (1-1/2"), with unions, cleanout, and escutcheon.

2.2.4 **Triple Compartment Sink (Drawing Reference SS2) (Kitchen Triple Sink)**

2.2.4.1 **Sink:** Sink provided by kitchen supplier. Installed by mechanical.

2.2.4.2 **Faucet (two faucets mounted side by side):**

2.2.4.2.1 **Faucet 1**: Encore model KL53-1000-BR, wall mounted, chrome plated brass, 8” (203mm) centres, pre-rinse assembly, no swing spout.

2.2.4.2.2 **Faucet 2**: Delta model 28C4243-AC, wall mounted, chrome plated brass, 8” (203mm) centres, 8” (203mm) tubular swing spout.

2.2.4.3 **Waste:** Cast brass P trap 40 mm (1-1/2") with unions, cleanout, and escutcheon.

2.2.5 **Dishwasher (Drawing Reference DW)**

2.2.5.1 **Drain:** Provided by owner, installed by mechanical.

2.2.6 **Grease Interceptor (Drawing Reference GI1) (Small Unit, Stainless Steel in Unfinished Area)**

2.2.6.1 Watts WD-CSA-135-SS-HDC recessed stainless steel grease interceptor with heavy duty (4500 kg [10,000 lb] load rating) gasketed stainless steel skid proof cover secured with stainless steel hardware. 130 lpm (35 gpm) flow rate, 32 kg (70 lb) grease capacity. Include internal flow control per OBC 7.4.4.3(8), removable baffle assembly, deep seal trap with cleanout. Include extension if required to suit inlet invert elevation. Include external cast iron flow control fitting for all installations with 1.5 m (5 ft) or greater head pressure.

3 Execution

3.1 **PLUMBING FIXTURES**

3.1.1 Provide shutoff ball valves at each fixture in addition to the faucets on each fixture.

3.1.2 Where fixture connections pass into walls, floors, or ceilings, provide proper escutcheons.

3.1.3 Where electronic faucets are provided, if the electronic solenoid valve is not integral to the faucet, locate solenoid enclosure in block wall behind surface mounted stainless steel access door.

3.1.4 When installing accessories, take great care to avoid marring chrome plating. Wrench or other tool marks on the plating will be sufficient cause for rejection.

3.1.5 Unless shown otherwise, use the following sizes of hot and cold water and waste connections to fixtures:

Fixture	**Hot Water**	**Cold Water**	**Waste**
mm (in)	**mm (in)**	**mm (in)**	**mm (in)**
Sink	15 (1/2)	15 (1/2)	40 (1-1/2)

3.1.6 Caulk all around bases of water closets, lavatories, wash fountains and other built-in equipment. Caulk all edges which abut walls and floors. For floor mounted water closets, leave 150mm gap at rear-centre.

3.1.7 Confirm all mounting heights with Architect prior to roughing in.

END OF SECTION

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 15001, “Mechanical General Provisions”.

1.2 **SHOP DRAWINGS**

1.2.1 Submit Shop Drawings in accordance with Section 15001, Clause “Shop Drawings” for all equipment and materials.

2 Products

2.1 **MATERIALS**

2.1.1 Use materials specified herein or approved equal as defined in Section 15001, “Mechanical General Provisions”, Clause “Material and Equipment”.

2.2 **DUCTWORK**

2.2.1 **Standards:** Construct all ductwork in accordance with the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) Manual “HVAC Duct Construction Standards - Metal and Flexible”.

2.2.2 **Materials:** Unless specified otherwise, fabricate all ductwork from galvanized steel. Use SMACNA recommended thicknesses except where specified otherwise.

2.2.3 **Rectangular - Low Pressure:** Use SMACNA 0.5 kPa (2" W.G.) pressure class. Use SMACNA recommended sheet metal thicknesses. For all round take-offs from rectangular ducts use bevelled rectangular to round take-offs, tapered in the direction of air flow. For rectangular take-offs serving only one terminal outlet use bevelled rectangular take-offs. For rectangular take-offs serving multiple terminal outlets use full radius wye fittings.

2.2.4 **Rectangular - Medium Pressure:** Fabricate according to current SMACNA standards for static pressures in duct up to 1.5 kPa (6" W.G.). For all rectangular branch connections use full radius wye fittings. For all round branch connections use tapered or conical takeoffs.

2.2.5 **Round and Flat Oval - Medium Pressure:** Fabricate according to current SMACNA standards for static pressures in duct up to 1.5 kPa (6" W.G.). Use Alpha, McGill, Plascad or Rozell spiral round or flat oval ducts. Use machine formed fittings. Use conical type takeoffs. Where round or flat oval ductwork is shown internally lined, use Alpha, McGill, Plascad or Rozell acoustic thermal duct consisting of free-flow spiral round or oval duct lined with 25 mm (1") fibreglass insulation and 28 gauge steel perforated interior liner.

2.2.5.1 For sizes up to and including 200 mm (8") diameter, use machine formed fittings. In larger sizes, use machine formed or shop fabricated fittings. For shop fabricated fittings, make sample fittings and get approval of the Consultant before proceeding with fabrication of job fittings. For all round branch connections use tapered or conical type takeoffs.

2.2.5.2 Where round or flat oval ductwork is exposed to view, a decorative grade installation with a satin coat finish, degreased and suitable for field painting, is required. Arrange for special handling and shipping to avoid dents and minimize scratches.

2.2.6 **Flexible Type Round Ducts**

2.2.6.1 Flexible ductwork will not be permitted where exposed to view.

2.2.6.2 In other areas, where not exposed to view, use Thermaflex Type M-KC insulated flexible duct with a woven fibreglass fabric core with a flame resistant coating permanently bonded to a coated wire helix. Minimum positive pressure rating of 4 kPa (16" W.G.) for sizes 100 mm to 250 mm (4" to 10") and 2.5 kPa (10" W.G.) for sizes 300 mm to 400 mm (12" to 16"). Insulate duct with minimum 40 mm (1-1/2") thickness of 12 kg/m³ (0.75 lb/ft³) density fibreglass and bidirectional reinforced metallized film outer vapour barrier.

2.2.6.3 Flexible duct must bear ULC approval labels and conform to flame spread and smoke developed ratings as required by the Ontario Building Code.

2.2.6.4 The following manufacturers will be considered equal, subject to the requirements of Clause “Material and Equipment”:

FlexMaster

2.2.7 **Kitchen Hood Exhaust Ducts:** Use minimum 18 gauge type 304 stainless steel. Continuously weld all joints and connections for fully watertight construction. Slope duct toward hood at minimum 1%. For all surfaces exposed to view, grind and polish welds and provide No.4 brushed finish. Comply with all requirements of NFPA 96-2014 paragraph 7.5.1.1.

2.3 **ROOFTOP DUCTWORK SUPPORTS**

2.3.1 See Section 15001 “Mechanical General Provisions” Clause “Rooftop Supports”.

2.4 **DUCT SEALER**

2.4.1 Use Duro Dyne DWN water based high pressure duct sealer.

2.4.2 The following manufacturers of the above material will be considered as equal, subject to requirements of Clause “Material and Equipment”:

Childers
Multi-Purpose
3M Canada Inc.
United McGill
Hardcast

2.5 **BIRDSCREENS**

2.5.1 Use 12 mm x 12 mm (1/2" x 1/2") galvanized steel wire mesh mounted in reinforced steel frame.

2.6 **TURNING VANES AND RAILS**

2.6.1 Use Duro Dyne turning vanes and rails in all square elbows. Use 26 gauge galvanized steel 50 mm (2") turning vanes and rails in standard ductwork. In stainless steel or aluminum ductwork, vane and rail material to match duct construction. Bolt or screw rail

to duct and seal. Vane and rail to be manufactured in accordance with latest version of SMACNA guidelines.

2.7 FLEXIBLE DUCT CONNECTORS

2.7.1 Use Duro Dyne “Durolon” pre-assembled flexible duct connectors with 150 mm (6") fabric width, Hypalon coating.

2.7.2 The following manufacturer of the above equipment will be considered as equal, subject to requirements of Clause “Material and Equipment”:

Carlisle
Thorburn
VentFabrics

2.8 DUCT ACCESS DOORS

2.8.1 Use Nailor Industries Inc. 0800 Series duct access doors. Minimum size for access to fire damper, smoke damper or combination smoke and fire damper is 300 mm x 300 mm (12" x 12"). For other locations, for duct dimension up to 300 mm (12") use 250 mm x 150 mm (10" x 6") door and for duct dimension up to 600 mm (24"), use 380 mm x 250 mm (15" x 10") door. For all larger ducts, use 660 mm x 510 mm (26" x 20") door. For round ducts, use Nailor 0895 access door.

2.8.2 For insulated ducts, use doors factory insulated with 25 mm (1") thick fibreglass insulation.

2.8.3 For grease ducts, use ULC listed Acudor model GDD bolted grease duct access doors with flange and gasket, or Ductmate equivalent. For insulated ducts, use 3M fire barrier grease duct access doors. Follow NFPA 96 requirements for access door sizes.

2.8.4 For access door with viewport, use Duro Dyne model DADVP hinged access door with frame and with plexiglass vision panel.

2.8.5 The following manufacturer of the above equipment will be considered as equal, subject to requirements of Clause “Material and Equipment”:

Acudor
AMI
Ductmate
Nailor
Ruskin

2.9 BALANCING DAMPERS

2.9.1 For ducts 930 cm² (144 in²) and less in cross sectional area, use single blade dampers with locking quadrant and pin on far side. For larger ducts use, multi-blade, opposed blade dampers with external operator and locking quadrant. Provide spacers to maintain clearance between duct and damper blades.

2.10 BACKDRAFT DAMPERS

2.10.1 Use Ruskin Model CBD-6 heavy duty, extruded aluminum backdraft dampers with counter balance. Use 3.2 mm (1/8") aluminum frame, 1.8 mm (0.070") aluminum blades with vinyl edge seals and nylon bushings.

2.10.2 The following manufacturer of the above equipment will be considered as equal, subject to requirements of Clause “Material and Equipment”:

Alumavent
Arrow United Industries
EH Price
Greenheck
Nailor
National Controlled Air
Ruskin
United Enertech

2.11 INTERNAL DUCT LINING

2.11.1 Use Knauf Performance Plus formaldehyde free fibreglass duct liner with air stream surface protected with airstream surface mat facing treated with EPA registered anti-microbial agent so as not to support growth of fungus or bacteria as determined by ASTM G21 and G22. Flame spread rating less than 25 and Smoke Developed Classification less than 50 when tested in accordance with CAN/ULC S102. Use 24 kg/m3 (1.5 pcf) density insulation with a minimum Noise Reduction Coefficient of 0.70 and a maximum thermal conductivity of 1.42 W/m2 °C). Equivalent Manson formaldehyde free duct liner product will also be acceptable.

2.12 GRILLES, REGISTERS, AND DIFFUSERS

2.12.1 Use Price Limited grilles, registers, and diffusers where noted in schedule on drawings. Provide types, accessories and finishes as noted in the Equipment Schedules. See Drawings for sizes.

2.12.2 The following manufacturers of the above equipment will be considered as equal, subject to requirements of Clause “Material and Equipment”:

Kreuger
MetalAire
Nailor
Titus
Tuttle & Bailey

2.13 KITCHEN EXHAUST HOOD

2.13.1 Use exhaust only wall canopy hood with end skirts. The entire assembly must be ULC Listed. Exhaust hood must be in accordance with NFPA 96. Include 25 mm (1") insulated stainless steel backsplash from bottom of hood to top of counter along the full length of the hood. Backsplash to be of material and construction to match hood. Hood capacity and details as shown on the Schedule on the Drawings.

2.13.2 Construct units from 18 gauge, Type 304 stainless steel with No. 4 finish and continuously welded, liquid tight seams. Provide integral 75 mm (3") air space along back wall of hoods in order to meet NFPA 96 clearance requirements to limited combustibles. Provide high efficiency centrifugal type stainless steel filters, UL listed. Filter housing of same construction as canopy and shall terminate in pitched troughs the full length of hood with a removable grease container. Provide vapour proof LED lights to suit hood length, prewired to junction box on top of hood.

2.13.3 Utility cabinet housing fire suppression system to be integral to kitchen hood and of similar material construction to that of kitchen hood. Provide electric gas valve and strainer for gas fired equipment under hood.

2.13.4 Shop drawings for the suppression system to include an isometric layout showing the suppression head locations and the locations of the equipment below the hood. The drawing must be stamped by a P.Eng. registered in the Province of Ontario. Manufacturer is responsible for submitting the drawings and calculations to the City as required for approval.

2.13.5 Provide unit controls to control kitchen hood, as well as makeup air system without the use of a building automation system.

2.13.6 The following manufacturers of the above equipment will be considered equal, subject to requirements of Clause “Material and Equipment”:

Captiv-Aire
Garland
Gaylord
Greenheck
Halton
Spring Air

2.14 KITCHEN EXHAUST HOOD FIRE PROTECTION SYSTEM

2.14.1 Provide a complete Ansul R102 wet chemical fire extinguishing system for kitchen exhaust hood. System to include spray nozzles, pressure switches, hand valves, mechanical pull station and piping. Place nozzles as required above grease and heat generating appliances.

2.14.2 Provide one set of normally closed dry contacts for connection to fire alarm system.

2.14.3 The following manufacturers of the above equipment will be considered equal, subject to requirements of Clause “Material and Equipment”:

Kiddy-Fewal

2.15 KITCHEN MAKEUP AIR UNIT

2.15.1 Provide a natural gas fired makeup air unit, to be connected to the kitchen exhaust hood system. Unit to be factory assembled, single piece unit. Provide al factory wiring, piping, controls and special features required for startup.

2.15.2 Unit to be configured for vertical supply ductwork connection.

2.15.3 Unit to meet ASHRAE 90.1 minimum efficiency requirements. Unit to be Energy Star certified.

2.15.4 Unit to be designed and tested to ANSI Z21.47, AHRI standards 210/240 and 340/360, and UL standard 1995.

2.15.5 Unit to utilize microprocessor controls and have an operating range between 46°C (115°F) and -18°C (0°F).

2.15.6 **Unit Cabinet**

2.15.6.1 Constructed of galvanized steel, bonderized and coated with a pre-painted baked enamel finish on all externally exposed surfaces. All access doors to be hinged and capable of locking.

2.15.6.2 All airstream interior surfaces to be insulated with a minimum 15 mm (1/2") thick, 16kg/m^3 (1 lb) density foil-faced cleanable insulation. Insulation to be bonded with a thermosetting resin (8 to 12% by weight nominal, phenol formaldehyde typical), and coated with an acrylic or other material that meets the NFPA 90 flame retardance requirements and has an “R” Value of 3.70.

2.15.6.3 Cabinet panels to be hinged with stainless steel or rust resistant brass hinges. Hinged access panels for the filter, compressors, evaporator fan, control box and heat section areas. Each panel to use multiple quarter-turn latches and handles. Each major external hinged access panel to be double-wall construction and permanently attached to the rooftop unit. Panels to also include tiebacks.

2.15.6.4 Cabinet panels to be easily removable for servicing. Unit shall have one factory installed, tool-less, removable, filter access panel. Panels covering control box, indoor fan, indoor fan motor, gas components (where applicable), and compressors shall have a molded composite handles. Handles to be UV modified, composite. They to be permanently attached, and recessed into the panel. Screws on the vertical portion of all removable access panel shall engage into heat resistant, molded composite collars. Collars to be removable and easily replaceable using manufacturer recommended parts.

2.15.6.5 All access doors to be lockable.

2.15.6.6 Return air filters to be accessible through a hinged access panel and be on a slide-out track using standard size filters.

2.15.6.7 Provide holes in the base rails (minimum 16 gage) for rigging shackles and level travel and movement during overhead rigging operations.

2.15.6.8 **Condensate Pan and Connections**: Units to have a factory-installed internally sloped condensate drain pan, providing a minimum 20 mm (3/4") NPT connection to prevent standing water from accumulating. Pan to be fabricated of high impact polycarbonate material or stainless steel. All drain pans conform to ASHRAE 62 self-draining provisions. Units to have standard thru-the-bottom power and control wiring connection capability. Provide condensate trap piping with every unit.

2.15.6.9 **Gas Connections**: All gas piping connecting to unit gas valve shall enter the unit cabinet at a single location on side of unit (horizontal plane). Standard unit shall have a thru-the-base gas-line location using a raised, embossed portion of the unit basepan. Optional,

factory-approved, water-tight connection method must be used for thru-the-base gas connections. No base pan penetration, other than those authorized by the manufacturer, is permitted.

2.15.6.10 **Electrical Connections**: All unit power wiring shall enter unit cabinet at a single, factory-prepared, knockout location. Standard unit shall have a thru-the-base electrical location (s) using a raised, embossed portion of the unit basepan. Optional, factory-approved, water-tight connection method must be used for thru-the-base electrical connections. No base pan penetration, other than those authorized by the manufacturer, is permitted.

2.15.7 **Fans**

2.15.7.1 Induced-draft blower to be of the direct-driven, single inlet, forward-curved, centrifugal type. It shall be made from aluminized steel with a corrosion-resistant finish and shall be dynamically balanced.

2.15.7.2 Use motor with controller enabling field speed selection. Centrifugal supply air blower to have rubber-isolated, cartridge type ball bearings. Fan wheel to be made from steel with a corrosion resistant finish, dynamically balanced, double-inlet type with forward-curved blades. Evaporator-fan motors to be continuous operation, open drip-proof. Bearings to be sealed, permanently lubricated ball-bearing type for longer life and lower maintenance. Coordinate speed selection with Section 23 05 93 “Testing and Balancing”.

2.15.8 **Gas Heat**

2.15.8.1 Heat exchanger to be an induced draft design. Positive pressure heat exchanger designs shall not be allowed. Incorporate a direct-spark ignition system and redundant main gas valve. Gas supply pressure at the inlet to the rooftop unit gas valve must match that required by the manufacturer.

2.15.8.2 The heat exchanger to be controlled by an integrated gas controller (IGC) microprocessor. IGC board shall notify users of fault using an LED (light-emitting diode). The LED to be visible without removing the control box access panel. IGC board shall contain algorithms that modify evaporator-fan operation to prevent future cycling on high temperature limit switch. Unit to be equipped with anti-cycle protection with one short cycle on unit flame rollout switch or 4 continuous short cycles on the high temperature limit switch. Fault indication to be made using an LED.

2.15.8.3 Provide flue discharge deflector to direct discharge upwards.

2.15.9 **Stainless Steel Heat Exchanger**

2.15.9.1 Heat exchanger to be of the tubular-section type constructed of a minimum of 20-gauge type 409 stainless steel. Burners to be of the in-shot type constructed of aluminum-coated steel. Burners shall incorporate orifices for rated heat output up to 2000 ft (610m) elevation. Each heat exchanger tube shall contain multiple dimples for increased heating effectiveness.

2.15.9.2 Induced draft combustion motor and blower to be direct-drive, single inlet, forward-curved centrifugal type, made from steel with a corrosion-resistant finish. Use permanently lubricated sealed bearings, with inherent thermal overload protection, automatic reset feature.

2.15.10 **Roof Curbs**: Provide a vibration isolation insulated roof curb, minimum 360mm high, including spring isolation with a minimum of 50mm of static deflection.

2.15.11 **Filter Status**: The filter status switch shall be a pressure switch and will indicate a dirty filter. The switch to be factory-installed.

2.15.12 **Phase Loss Protection**: Provide unit shutdown when an electrical phase loss is detected.

2.15.13 **Filter Section**

2.15.13.1 Standard filter section shall consist of factory-installed 2-in. thick throwaway fibreglass filters and shall be on a dedicated slide out track to easily facilitate access and replacement.

2.15.13.2 Filter section to use standard size filters and be of common sizes within cabinet sizes.

2.15.13.3 Standard 2-in. filter rack to be field convertible to 4-in. by removing a spacer rack.

2.15.13.4 Use Camfil Farr 100 mm (4") pleated panel type filters MERV 13 efficiency. Provide one spare set of filters with each unit.

2.15.14 **Controls and Safeties:** Units to be completely factory wired with necessary controls and contactor pressure lugs or terminal block for power wiring. Provide integral controls to include the following points:

- supply fan start/stop
- low heat enable
- high heat enable
    - outside air damper position
- alarm status

2.15.15 The following manufacturers of the above equipment will be considered equal, subject to requirements of Clause “Material and Equipment”:

Captiv-Aire
Garland
Gaylord
Greenheck
Halton
Spring Air

2.16 **FANS**

2.16.1 **General**

2.16.1.1 See Equipment Schedules on Drawings for types, details, and capacities. Use arrangement and motor location to suit fan location. All motor mounting locations must maintain accessibility for maintenance staff. Fans to be listed in accordance with UL 705 and bear cUL label.

2.16.1.2 Use fan classification in accordance with A.M.C.A. Pressure Limitations. Use a minimum of Class I construction on all fans unless specified otherwise. Ensure all selections will accommodate at least 10% speed increase before class change is required. Upgrade to higher construction class if this condition is not met. Submit certified Fan Performance Curves and fan sound level ratings based on A.M.C.A. Standards to the Consultant with Shop Drawings.

2.16.1.3 Provide felt edged backdraft dampers on all systems which are not provided with automatic control dampers.

2.16.1.4 Size V-belt drives for 150% of motor nominal horsepower. Use fixed drive pulleys on fans greater than 0.75 kW (1 hp). Use adjustable drive pulleys on fans 0.75 kW (1 hp) or less.

2.16.1.5 Provide lifting lugs with all fans within service rooms.

2.16.1.6 All steel fan components to be coated with electrostatically applied, baked polyester powder coating. Each component to be coated with minimum 0.05 mm (2 mil) thick baked powder finish. Paint must exceed 1,000 hour salt spray under ASTM B117 test method.

2.16.1.7 Use bearings of ball bearing type, grease lubricated Use heavy duty ball bearings, grease lubricated, regreasable, designed specifically for HVAC applications. L10-200,000 hours minimum at maximum catalogued operating speed, unless specified otherwise. Provide extended grease fitting where required for easy access.

2.16.1.8 **Motors:** Motors must meet requirements of Section 15001, “Mechanical General Provisions”.

2.16.1.9 Where 2-speed or multi-speed motors are specified in the Equipment Schedule, provide motors which will be compatible with starters. Coordinate with Division 16 requirements.

2.16.2 **Kitchen Hood Roof-mounted Fans:** Use upblast centrifugal direct drive exhaust fan with spun aluminum housing. Mount motor and drive housing on vibration isolators and seal from exhaust air stream. Provide prefabricated roof curb. Height to suit site conditions. Fan outlet must be minimum of 1,000 mm (40") above roof. Provide vented curb extensions as required to meet height requirement. Provide safety disconnect switch, bird screen, drain troughs, grease trap and hinging kit. Fan must be in accordance with latest version of NFPA 96 and UL listed for grease removal. Use NEMA premium efficiency motors.

2.16.3 The following manufacturers of the above equipment will be considered as an equal, subject to requirements of Clause “Material and Equipment”:

Roof-mounted Fans:	Aerovent
	Carnes
	Cook
	Greenheck
	PennBarry
	Twin City
	Spring Air

3 Execution

3.1 **DUCTWORK**

3.1.1 **Indoor Air Quality Requirements**

3.1.1.1 Seal all openings in HVAC systems with plastic. While duct installation is proceeding, seal all openings that are not under immediate work.

3.1.2 **General**

3.1.2.1 Construct all ductwork located inside Mechanical Equipment Rooms and all supply air ducts on systems with variable air volume boxes between the fan outlets and the volume box inlets to Medium Pressure duct standards. Construct all ducts designated on Drawings as round or oval to Medium Pressure duct standards. Unless specified otherwise, construct all other ductwork to Low Pressure duct standards.

3.1.2.2 Fabricate and install ductwork in accordance with the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) Manual “HVAC Duct Construction Standards - Metal and Flexible”.

3.1.2.3 Pay particular attention to Section 15001 “Mechanical General Provisions”, Clause “Cutting and Patching”. This will be strictly enforced on this project. Coordinate work with trades responsible for floor and wall construction to reduce difficulty of making tight seals.

3.1.2.4 Fabricate all ductwork to the clear inside dimensions shown on the Drawings. Where internal lining is specified, dimensions shown are inside insulation.

3.1.2.5 Do not suspend ducts from metal roof deck.

3.1.2.6 Make duct connections to fans, air handling units and connections between air handling units and plenums and any other rotating piece of equipment, with flexible duct connectors.

3.1.2.7 Install access doors for easy access to each damper, thermostat, coil, valve, or other concealed device which requires servicing. Use at least 1 m (36") of removable duct on inlet and outlet of inline return air fans.

3.1.2.8 Provide backdraft dampers where shown or specified.

3.1.2.9 Install dampers, air flow measuring stations and duct sensors as supplied by Section 15900 “Controls”. Exact locations to be determined by Section 15900.

3.1.2.10 Where ductwork has to be altered from dimensions shown due to construction conditions, use the same effective cross sectional areas, without exceeding a 4 to 1 aspect ratio. Carry out such changes at no additional cost to the Owner.

3.1.2.11 Install ductwork to maximize clear floor to ceiling heights.

3.1.2.12 Transitions are described in the direction of air flow. For converging transitions, use a maximum slope of 1 in 4 and, for diverging transitions, use a maximum slope of 1 in 6.

3.1.2.13 Paint interior of ductwork for at least 610 mm (24") behind supply, return and exhaust grilles and registers with matte black paint so as to render ductwork invisible from occupied space. Do not paint ductwork which is internally lined.

3.1.2.14 Apply one coat zinc chromate primer over all welded surfaces.

3.1.2.15 If there is a conflict between the duct sizes shown on the floor plans and the duct sizes shown on sections, elevations or details, the floor plans will govern.

3.1.2.16 Seal all transverse joints, longitudinal seams, and duct wall penetrations to SMACNA Seal Class A standards.

3.1.3 **Low Pressure - Rectangular Ductwork**

3.1.3.1 Fabricate and install according to current SMACNA standards. Use 0.5 kPa (2" W.G.) pressure class. Use SMACNA recommended sheet metal thicknesses. Fabricate with all flat surfaces wider than 450 mm (18") either cross broken or transverse beaded, regardless of whether the duct is insulated, lined or bare.

3.1.3.2 Use elbows in the following order of preference:

3.1.3.2.1 Full radius elbows with inside radius equal to duct width.

3.1.3.2.2 Square elbows with turning vanes.

3.1.3.3 For duct takeoff to a single register, diffuser, grille, or branch, use balancing damper located at the branch takeoff. Do not use splitter dampers.

3.1.4 **Medium Pressure Ductwork**

3.1.4.1 Fabricate and install according to current SMACNA standards for 1.5 kPa (6" W.G.) pressure class.

3.1.4.2 Provide increasers on inlets to variable air volume boxes to match duct sizes shown.

3.1.4.3 **Round and Flat Oval Ductwork**

3.1.4.3.1 Provide a decorative grade installation where ductwork is exposed to view, outside of Mechanical Rooms. Use satin coat finish, degreased and suitable for field painting without etching duct surfaces.

3.1.4.3.2 Make all joints in ductwork exposed to view using “Spiralmate” round duct connector system or equivalent.

3.1.4.3.3 Rotate spiral seams on duct-to-duct joints so that the seam provides a continuous helical pattern across the joint.

3.1.4.3.4 Fasten diffuser collars to duct using pop rivets. Provide a finishing filet of elastomer seal at the collar-duct junction.

3.1.4.3.5 Space hangers at equal intervals. Fasten hangers to duct system using ring collars as shown on the Drawings.

3.1.5 **Kitchen Exhaust Ductwork**

3.1.5.1 Install in accordance with NFPA 96 requirements.

3.1.5.2 Use minimum 1.6 mm (1/16") thick carbon steel for duct supports.

3.1.5.3 Provide continuous external weld for all joints and seams to ensure watertight construction.

3.1.5.4 Install access doors on the side of the duct a minimum of 40 mm (1-1/2") up from the bottom edge. Do this at every change in duct direction and on 3.6 m (12') centres in straight duct runs.

3.1.5.5 Slope duct back towards hoods or, where it is not practical, provide accessible grease reservoirs and slope to these points.

3.2 **FLEXIBLE DUCTS**

3.2.1 In lieu of the solid duct connections shown, flexible ducts may be used to connect air terminal units to medium pressure duct system and to connect linear supply diffusers to supply duct plenums. Flexible ducts may also be used to connect diffusers to duct runouts.

3.2.2 Length of flexible duct must not exceed 600 mm (24") and only maximum 70° offsets (no elbows) will be permitted. Use hangers and supports to ensure this condition is maintained.

3.2.3 For diffuser runouts, the length of flexible duct must not exceed 1.8 m (6') and maximum one 90° elbow will be permitted. Use hangers and supports to ensure duct does not sag.

3.2.4 Make all duct connections using high pressure fibreglass tape, sheet metal screws, and high pressure duct sealer. Installation to be UL Listed treatment as published by the manufacturer.

3.3 **FLEXIBLE DUCT CONNECTORS**

3.3.1 Make all duct connections to fans, fan cabinets and heat pump units with preassembled duct connectors. On all return air fans, fabricate an acoustic seal over flexible connectors.

3.4 **INTERNAL DUCT LINING**

3.4.1 Install lining in accordance with liner manufacturer’s published recommendations and SMACNA “HVAC Duct Construction Standards - Metal and Flexible”. Use both adhesive and mechanical fasteners. Select pin lengths to limit insulation compression to 3 mm (1/8"). Butter butt joints with a fire-resistant coating and extend 50 mm (2") on either side of joint to stop air from lifting insulation. Repair liner surface penetrations with adhesive meeting ASTM C916. Pins must be welded to duct.

3.4.2 Internally line ducts where shown on Drawings. Use 25 mm (1") thickness, unless designated otherwise.

3.4.3 Where plenums are not specified, internally line outside air intake ducts with 40 mm (1-1/2") thickness. Finish with two 3 mm (1/8") thick coats of asphalt or vinyl mastic. Apply glass reinforcing fabric between coats. Lap joints by 100 mm (4").

3.5 GRILLES, REGISTERS AND DIFFUSERS

3.5.1 Cooperate on the job with other trades so that grilles, registers, and diffusers do not conflict with lights, etc. Bring any conflict between grilles, registers, and diffusers, and the work of other trades, to the attention of the Consultant before any ductwork is installed. See Architect's reflected ceiling plan for location of grilles, registers, and diffusers.

3.5.2 Install frame for each grille, register and diffuser to suit the type of building construction.

3.5.3 For high induction units, provide adequate chain hanger supports for all units installed in suspended ceilings

3.6 KITCHEN EXHAUST HOOD

3.6.1 Install hoods in accordance with manufacturer's instructions. Make all connections. Install hood fire suppression system, including cylinders, sprinkler heads and all piping and wiring. Comply with NFPA 96.

3.6.2 Install electric gas solenoid valve provided by hood manufacturer and wire to hood fire suppression system so that valve is shutoff on activation of fire suppression system.

3.7 ROOFTOP UNITS

3.7.1 Provide the services of the unit manufacturer's service representative to supervise startup. Manufacturer's representative to provide written report to the Consultant certifying that the unit assembly and installation is done in accordance with the manufacturer's recommendation. Provide 610 mm x 610 mm (24" x 24") patio stone at condensate drain discharge.

3.8 ROOF CURB INSULATION

3.8.1 Provide roof attenuation under roof-mounted air conditioning units as follows:

3.8.1.1 Mount all new rooftop units on prefabricated roof curbs.

3.8.1.2 Use two layers of 25 mm (1") thick, 96 kg/m³ (6 lb/ft³) density insulating board on roof deck. Stagger board joints. Board to be butted tightly to sides of ductwork and curb.

3.8.1.3 Seal all board joints and edges with acoustic sealant.

3.8.1.4 Advise Consultant when this work is complete, for his review. Seal joints to satisfaction of Consultant.

3.9 OTHER EQUIPMENT

3.9.1 Make duct connections to all hoods provided by Kitchen Equipment trade and other equipment where shown.

3.10 TESTING AND BALANCING

3.10.1 Cooperate with the Testing and Balancing trade. See Section 15200, "Testing and Balancing". Make any changes deemed necessary by the Testing and Balancing trade to permit proper testing and balancing of the systems.

3.10.2 Provide additional balancing dampers where required by the Testing and Balancing Company.

3.10.3 Be responsible for the initial alignment and tension of all fan pulleys and belts.

3.10.4 Provide any changes to fan drives, pulleys and belts as required to allow a proper air balance as recommended by the Testing and Balancing Company for equipment supplied under this Contract.

END OF SECTION

1 General

1.1 **GENERAL PROVISIONS**

1.1.1 This Section and Division 1 - General Requirements apply to and govern the work of all Sections of Division 16.

1.2 **VISITING SITE**

1.2.1 Visit the site and be familiar with working conditions and work involved before submitting Bids. **NO EXTRAS WILL BE GRANTED DUE TO LACK OF A THOROUGH PRELIMINARY INVESTIGATION.**

1.2.2 Remove and replace existing ceiling tiles to inspect ceiling for existing mechanical, electrical and structural obstructions. Include cost of all necessary changes in Bid Price. No extras will be granted due to lack of a thorough preliminary investigation of accessible ceiling spaces.

1.3 **CONTRACT DRAWINGS**

1.3.1 Electrical Drawings show Electrical work only and are not intended to show Structural details, Mechanical details or Architectural features. Take building dimensions and details from Architectural or Structural Drawings or from job measurements only.

1.3.2 Electrical Drawings indicate only the general locations of equipment and outlets. Wiring requirements are shown diagrammatically. Responsibility for the detailed layout of equipment, outlets, raceways and wiring is part of the work of this Division. Specific outlet locations are detailed on elevations.

1.3.3 If shown, only the general location and route of conduit, cable trays and communication hooks are shown. Install all services neatly to conserve headroom. All conduit, cable trays and communication hooks are to be accessible after work by other trades is complete. Install all services parallel to building lines unless shown otherwise.

1.3.4 The Consultant reserves the right to revise the locations of equipment and outlets within any given room without altering the Contract Price provided Notice of Change is given prior to roughing-in.

1.3.5 In case of conflict between work of other trades and work of this Division, clarify the location of these items with the Consultant before roughing-in.

1.3.6 In the event of any discrepancies or ambiguity of any symbol, note, abbreviation, etc., used in this Specification or on the Contract Drawings, obtain clarification, in writing, from the Consultant prior to submitting Bid. No allowance will be made for additional costs arising from failure to obtain proper clarification of conflicting information before Bid.

1.4 **SHOP DRAWINGS**

1.4.1 Submit Manufacturers' shop drawings, electrical wiring diagrams and control system drawings to the Consultant. Provide title sheet for shop drawing submitted. Include project name, shop drawing item (including Specification paragraph reference) and approval stamps. The Consultant reserves the right to have samples submitted of any specified products.

1.4.2 Before submitting shop drawings, provide a complete list of shop drawings to be submitted in Microsoft Excel format. List all shop drawings and approximate date of submission.

1.4.3 Submit all shop drawings electronically in PDF format. File attachments to an email must total no more than 5 MB and must be submitted unzipped. If multiple items are submitted in single PDF file, each individual piece of equipment must be “book marked” using equipment labels as per Design Drawings. All shop drawings submitted electronically must be checked and stamped by Contractor as specified below.

1.4.4 All shop drawings submitted electronically must be checked and stamped by Contractor as specified below.

1.4.5 Catalogues, manuals or price lists will not be accepted as shop drawings. Before submission, check shop drawings, make necessary corrections, apply stamp “Checked and Certified Correct”, sign and date.

1.4.6 Submit one reviewed set of shop drawings with each set of Maintenance and Operating Instructions.

1.4.7 The review of shop drawings by Chorley + Bisset Ltd. is for the sole purpose of ascertaining conformance with the general design concept. This review does not mean that Chorley + Bisset Ltd. approves the detail design inherent in the shop drawings, responsibility for which remains with the Contractor. Such review does not relieve the Contractor of their responsibility for errors or omissions in the shop drawings or of their responsibility for meeting all requirements of the Construction and Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation, and for coordination of the work of all subtrades.

1.4.8 The Contractor is to review each shop drawing and document the differences between the shop drawing submission and the description listed in the specification. If there are no differences listed, the Contractor implicitly declares the shop drawing meets all requirements of the Specification.

1.4.9 Ensure at least one copy of each reviewed shop drawing is kept on site at all times for reference.

1.4.10 Shop Drawings to include the following:

1.4.10.1 Indicate details of construction, dimensions, capacities, weight and electrical performance characteristics of equipment or material.

1.4.10.2 Where applicable, include wiring, single line and schematic diagram including interconnect with work of other sections.

1.4.10.3 Include manufacturer's special installation instructions where applicable.

1.5 **FIELD DRAWINGS**

1.5.1 Submit, to the General Contractor, Drawings accurately showing all openings for busducts, conduits, etc. Drawings must include the size of openings and their locations by dimensions, including the location of the structural members framing these openings. Each trade will be responsible for detail layout of their own work.

1.5.2 Assume full responsibility for the detailed coordination of all Electrical work. Prepare Field Drawings to determine the exact location of each service. On these drawings, include all mechanical and electrical services, architectural features, and structural details. If a conflict becomes apparent after the installation of services, pay all costs associated with removing and reinstalling these services.

1.5.3 If the General Contractor separates the Communication, Security or similar work from the other work of Division 16, the General Contractor assumes full responsibility for this coordination work including the preparation of the Field Drawings.

1.6 **AS-BUILT DRAWINGS**

1.6.1 The Contractor will be provided with Mechanical and Electrical Files used to produce the contract documents. The following digital formats were used and are to be maintained: AutoCAD and PDF. The Contractor is to print Drawings from the PDF files provided.

1.6.2 Revise and maintain the prints as work progresses. Show all revisions, relocations and changes, to scale. Use colour markings. At the end of the project, provide a complete PDF red mark-up set of as-built drawings to the Consultant for record purposes. Printed hard copies will not be accepted.

1.6.3 Contractor shall take as-built measurements, prior to backfill, of all buried duct bank(s) and conduits under floor slab. Show routing, depths and dimensions from fixed points on as-built drawings.

1.6.4 Transfer information from the marked prints to AutoCAD files on a monthly basis. Match the software version that the original files were created in. Have the marked prints and updated CAD prints on site for review by the Consultant at all times. Monthly draws will not be approved unless all changes have been shown.

1.6.5 Prior to testing, balancing and final commissioning, complete the transfer of marked prints to the AutoCAD files. Fill in the Owner's equipment numbering system in the Schedules on the Drawings and on the plans where blank placeholder tags have been shown.

1.6.5.1 AutoCAD format files are to match exactly the layering system and symbology of the Consultant. Bind all external references.

1.6.6 Mark Drawings "As-Built Drawings" and insert name and logo of Contractor. Submit one set of printed "As-Built Drawings" for review by the Consultant. Remove Engineers Stamp. Include Contractor’s name and logo.

1.6.7 Submit completed As-Built Drawings on disks in same digital data software program, and version as original contract documents. Also provide one set of printed Drawings with the Operating and Maintenance Manuals.

1.6.8 For the purposes of Contract payments, As-Built Drawings will be assumed to have a value of $2,500.00. This will not be released until the As-Built Drawings have been accepted as complete and acceptable by the Consultant. This amount is in addition to the normal 10% holdback required by the Construction Lien Act, 2018.

1.7 **SIMULTANEOUS PROJECTS**

1.7.1 Other projects may be under construction simultaneously on this site during the course of this construction project. The Owner will not be the "constructor" as defined by The Ontario Health & Safety Act & Regulations. This Contractor is to maintain a separation between this project and all other Contractors, by time or space, as defined by The Ontario Health & Safety Act & Regulations.

1.8 **CONFLICTS AND PRECEDENCE**

1.8.1 Immediately upon discovery of any conflict, ambiguity, error or omission in the Contract Documents, request clarification in writing from Consultant prior to starting the work in question.

1.8.2 Failure to give such written notice will constitute an irrevocable waiver and release of any claim for additional compensation or delays incurred.

1.8.3 Where work fails to conform to Contract Documents, as clarified by Consultant, promptly remove and replace such work as directed, without adjustment to Contract price.

1.9 **FIRESTOPPING**

1.9.1 Before starting any work on site, submit detailed shop drawings to the Consultant for review and comments. Include:

1.9.1.1 Manufacturer's technical product data and installation instructions for each specific type and location of penetration.

1.9.1.2 Certification that proposed firestopping materials and assemblies comply with the latest edition of CAN/ULC-S115 "Standard Method of Fire Test for Firestop Systems".

1.9.1.3 For each specific type and location of penetration, provide installation instructions from a recognized independent testing agency.

1.9.2 Mark penetration and system number types and locations on set of white prints and submit with shop drawings. At completion of project, transfer this information to As-Built Drawings.

1.9.3 Comply with all requirements of Ontario Building Code Clause 3.1.9, "Building Services in Fire Separations and Fire Rated Assemblies".

1.10 **MAINTENANCE AND OPERATING INSTRUCTIONS**

1.10.1 For the Electrical work only, assemble three sets of equipment literature (cuts), operating instructions, maintenance instructions, voltage test results, certificate, other pertinent data and Letter of Warranty. Place in three ring binders, complete with index pages, indexing tabs and cover identification at front and side. Submit to Consultant for approval.

1.10.2 Provide an electronic copy of the maintenance and operating manual in PDF format on a USB drive and submit with the final version of manuals. Electronic copy of manual to be provided as one file formatted with bookmarks in accordance with the sections of the hard copy manuals. Do not include separate files in subfolders. Divide the maintenance manuals into sections which correspond with Specification Sections.

1.10.3 Make changes or submit additional information as required to obtain approval. Final Certificate of Completion will not be issued until the Consultant possesses three approved sets. Include copies of reviewed shop drawings and name and address of spare parts' suppliers with manuals.

1.10.4 The following information is to be contained within the Sections:

1.10.4.1 **Section 1:** A list of names, addresses, and telephone numbers of the Consultants, General Contractor and Electrical Contractor. Written warranty of the Electrical systems.

1.10.4.2 **Section 2:** Electrical Safety Authority Inspection Permit, Fire Alarm Verification Report and Certificate, Emergency Lighting Verification Letter.

1.10.4.3 **Remaining Sections - By Specification Section**

1.10.4.3.1 A list of names, addresses, and telephone numbers of all suppliers. A copy of all reviewed shop drawings.

1.10.4.3.2 A complete and comprehensive maintenance and operating instructions details D (daily), W (weekly), M (monthly), SA (semi-annually), A (annually) for maintenance.

1.10.4.3.3 Copies of warranties.

1.10.4.3.4 Complete control diagrams, wiring diagrams and description of applicable control systems and the functioning of the system.

1.11 REGULATIONS AND PERMITS

1.11.1 Carry out the work in accordance with the latest editions of relevant codes, local bylaws, and requirements of local Authority Having Jurisdiction. Apply for and obtain permits and pay all fees. Consultant will submit Drawings to Electrical Safety Authority as required.

1.11.2 Enforce all prevailing Provincial and local safety regulations at all times. Abide by all Owner’s safety and security policies and procedures and conform to all regulations of the current Occupational Health & Safety Act.

1.11.3 After completion of the work, furnish to Consultant a Certificate of Unconditional Approval from Inspecting Authorities.

1.12 MATERIAL AND EQUIPMENT

1.12.1 Where an item of material or any equipment is specifically identified by a manufacturer's trade name and/or catalogue number, make no substitution except as provided for in paragraphs 3, 4 and 5 below.

1.12.2 In the case of some items of equipment, one or more additional names of acceptable equal manufacturers are listed in the Clause describing an item or a group of items. The design, layout, space allocation, connection details, etc., are based on the products named first in the description of each item. The products named first in the description of each item establish the quality of manufacture and design standards for all other manufacturers of that item. The general approval indicated by listing the names of other manufacturers is subject to final review of shop drawings, performance data, test reports, production samples (if required) by Consultant, and equipment shipped to site. Ensure

that the products used meet the requirements specified and as shown on the Contract Drawings.

1.12.3 Suppliers wishing to submit other items of equipment for approval as an equal to those specified must apply to the Consultant at least 8 working days before Bid closing date. Requests must be accompanied by complete description and technical data on the items proposed. Approval for substitution of equipment will only be given on the understanding that all details, accessories, features and performance meet the Specifications unless otherwise stated. Deviations from the Specifications must be stated in writing at time of application for approval.

1.12.4 Include in the Bid, the equipment named in the Specifications or approved as an equal as in paragraph 3 above. This will form the Base Bid. Any number of alternative bids, as defined below, may be included in addition to the Base Bid.

1.12.5 Items of equipment by Manufacturers not named in the Specifications may be offered as alternatives to the manufacturers named in the Specifications. The alternative proposals must be accompanied by full descriptive and technical data, together with the statement of amount of addition or deduction from the Base Bid, if the alternative is accepted. Prior approval by the Consultant is not required on items submitted as alternative bids.

1.12.6 After execution of the Contract, substitution of equipment will be considered only if equipment accepted cannot be delivered in time to complete the work in proper sequence, or if the manufacturer has stopped production of the accepted item. In such cases, requests for substitution must be accompanied by proof of equality and difference in price and delivery, in the form of Certified Quotations from Suppliers of both specified and proposed equipment. Credit any decrease in price involved in substitution to the Owner by reduction of the Contract Price. The Contractor will not be reimbursed for any such increase in price.

1.12.7 Where equipment other than the equipment used as a basis for design, layout and space allocation is used, produce and submit revised layouts of equipment, pipes, ducts, etc., in the areas affected. Submit these Drawings with the shop drawings. Failure to produce these Drawings is indication by the Contractor that they are not required and that the original space allocations are adequate for the substituted equipment.

1.12.8 Name the Subcontractors and Manufacturers in the Bid as indicated in Clause “List of Electrical Subcontractors and Manufacturers”.

1.13 INTERPRETATION OF CONTRACT DOCUMENTS

1.13.1 The decision as to which trade provides required labour or materials rests solely with the Contractor. Extra payments will not be considered based on a difference in interpretation of the Contract Documents as to which trade involved provides materials or labour for specific items of work. The Consultant will not enter into such discussions.

1.14 SITE VISITS

1.14.1 The Electrical Contractor shall have an office representative (not site personnel) at each site meeting and deficiency review. Attendance at these meetings is mandatory.

1.15 **PROGRESS DRAWS**

1.15.1 Electrical Contractor shall review all supplier and subcontractor draws submitted to their office to ensure they are fair and reasonable for the amount of work completed on site to date prior to submitting to the General Contractor. Electrical Contractor will be responsible for the validity of supplier and subcontractor draw claims.

1.16 **WARRANTY**

1.16.1 Warranty all workmanship, material and equipment supplied by Division 16 for one year after Ready for Takeover except where specifically specified otherwise. Make good damage caused due to defects and workmanship.

1.16.2 Where equipment specified in Sections of Division 16 to have an extended warranty period, e.g. five years, the first year of the warranty period will be governed by the terms and conditions of the warranty in the Contract Documents, and the remaining years of the warranty will be direct from the manufacturer and/or supplier to the Owner. Submit signed and dated copies of the extended warranties to the Consultant before applying for a Certificate of Substantial Performance of the Work.

1.17 **DIMENSIONS AND QUANTITIES**

1.17.1 If shown on Drawings, dimensions are approximate. Verify dimensions by reference to shop drawings and field measurement.

1.17.2 Verify equipment access and coordinate with equipment supplier to ensure equipment can be physically transported to installation location. Under no circumstances will any claim be allowed for extra cost to disassemble and/or assemble equipment at the final location which will be considered as part of equipment installation.

1.17.3 Quantities or lengths indicated in any of the Contract Documents are approximate only and will not be held to gauge or limit the work. No adjustment to the Contract Price will be allowed to complete the work.

1.17.4 Provide labour, products and services specified, but not shown on Drawings and vice versa, and all other labour, products and services necessary for completion of the work.

1.17.5 Make any necessary changes or additions to routing of conduit, cables, cable trays, and the like to accommodate structural, mechanical and architectural conditions, without adjustment to Contract price.

1.17.6 Provide work in accordance with the approved Schedule to meet completion date and specified interim Schedules.

1.18 **COOPERATION BETWEEN TRADES**

1.18.1 Cooperate and coordinate with other trades as required for satisfactory and expeditious completion of work. Take field dimensions relative to work. Fabricate and erect work to suit field dimensions and field conditions. Pay cost of extra work caused by and make up time lost as result of failure to provide necessary cooperation information or items to be fixed to or built-in, in adequate time.

1.19 **COOPERATE WITH OWNER'S STAFF**

1.19.1 Maintain close cooperation with Owner's staff. The Owner will determine the times during which work may be carried out in certain areas. If the work cannot be completed in the allowed time, the Contractor may be required to clean up the area and finish the work at some future time.

1.19.2 Shutdowns will be scheduled during unoccupied times. Include any overtime wages due to conditions stipulated above in the Bid Price.

1.19.3 Provide seven day's minimum notice, in writing, prior to any interruptions of service or restriction of use of any service.

1.19.4 Provide all phase testing, as required, prior to disconnecting existing and connecting new to avoid damage to equipment.

1.19.5 The Owner's operations must take precedence over Contractors' operations at all times. Interruptions due to noise, drilling, etc., will not be allowed without Owner's prior approval.

1.19.6 Include any overtime wages due to conditions stipulated above in the Bid Price.

1.20 **EXAMINATION OF DAMAGED DEVICES**

1.20.1 Report all damaged, defective and non-functioning devices and equipment shown for reinstallation or relocation to the Consultant prior to removal and storage. All devices and equipment will be assumed to be fully functional unless reported otherwise prior to removal.

1.20.2 Devices and equipment damaged during removal, storage or reinstallation will be replaced at no cost to the Owner.

2 Products

2.1 **MATERIALS**

2.1.1 Use materials specified herein or approved equal as defined in Clause “Material and Equipment”.

2.2 **SLEEVES**

2.2.1 In general, sleeves are not required through walls or floors except in service room floors and foundation walls.

2.2.2 Use Schedule 40 steel pipe sleeves through concrete structural members, walls and floor slabs. Extend sleeves minimum 25 mm (1”) past finished surface and seal pipe to sleeve.

2.2.3 For all conduits passing through foundation walls, use Link-Seal pre-engineered mechanical seals between sleeves and pipes.

2.2.4 For rated separation requiring a FT firestopping rating, use materials in conformance with manufacturer's recommendations.

2.3 **FIRESTOPPING**

2.3.1 Use only service penetration firestop components and assemblies tested in accordance with the latest edition of CAN/ULC-S115 “Standard Method of Fire Tests for Firestop Systems” and listed in most recent ULC “List of Equipment and Materials” or by another recognized independent testing and certification agency acceptable to the Consultant.

2.3.2 All pipe insulation passing through the fire separation to be approved with the listing of the firestop system.

2.3.3 Fire stopping installers must be trained by the fire stopping manufacturer and be able to provide proof of training by providing Fit Level 1 certificate when requested, while working on site.

2.3.4 Pipe sleeves through fire separations requiring a rating are to be installed as per firestopping manufacturer's recommendations, as some firestopping manufacturers do not allow pipe sleeves within their approved system. Confirm pipe sleeve compatibility prior to starting work on site.

2.3.5 The following manufacturers of the above equipment will be considered equal subject to requirements of Clause "Material and Equipment":

STI

2.4 **ACCESS DOORS**

2.4.1 Access doors to be flush to edge of frame, concealed continuous hinge with screwdriver operated cam latch. Non-fire-rated door construction to be minimum 14 gauge, with 16 gauge frame. Fire-rated door construction to be a minimum 20 gauge insulated door with 16 gauge frame. Insulation thickness to provide required rating.

2.4.2 Size doors to allow adequate operating/maintenance clearance for devices. Doors to be a minimum 600 mm x 600 mm (24” x 24”) for body entry, and 300 mm x 300 mm (12” x 12”) for hand entry, unless noted otherwise. Use the following access doors:

Masonry Walls	Acudor UF-5000
Drywall Walls	Acudor DW-5040
Drywall Ceilings	Acudor BP58, match ceiling thickness
Fire-Rated	Acudor FW-5050/FB-5060 to match fire separation
Wet Areas, Operating Rooms	Acudor UF-5000 (stainless)

2.4.3 The following manufacturers of the above equipment will be considered equal subject to requirements of Clause “Material and Equipment”:

Adam
Ancon LeHage
E. H. Price

2.5 **IDENTIFICATION NAME LABELS**

2.5.1 Provide black lamacoid identification labels with white uppercase lettering, minimum 14 pt Arial or Helvetica typeface, for identification of all MCCs, switchboards, distribution panels, panelboards, transformers and transfer switches.

2.5.2 Submit a complete list of nameplate wording for review by Consultant prior to installation.

2.5.3 Warning plates are to be red with white letters, minimum 14 pt Arial or Helvetica typeface, as indicated on drawings.

2.5.4 For all pieces of equipment served by multiple sources of power, provide a lamacoid warning label to read: “CAUTION – EQUIPMENT FED FROM MULTIPLE SOURCES. DISCONNECT ALL SOURCES OF POWER PRIOR TO SERVICING EQUIPMENT”. This label is to match the lamacoid warning plate specification noted above.

2.6 **FLASHING**

2.6.1 For locations with roof penetrations serving a piece of equipment, such as for roof mounted split system condensing units, receptacles, etc, use Portals Plus, Inc. Alumi-Flash system consisting of 330 mm (13”) high, one piece spun aluminium base with deck flange and EPDM rubber cap. Use caps suitable for required number and diameter of service penetrations. Flashing is for Divisions 15 and 16 use only. Coordinate with Division 15 to minimize the number of flashings required.

2.6.2 The following manufacturers of the above equipment will be considered equal subject to requirements of Clause “Material and Equipment”:

Portals Plus

3 Execution

3.1 **GENERAL**

3.1.1 Instruct and supervise other Sections doing related work.

3.1.2 Supply the measurements of equipment to other Sections to allow for necessary openings to be left in the work of other Sections.

3.1.3 Install conduit, which is to be concealed, neatly and close to building structure so that the necessary furring can be kept as small as possible.

3.1.4 Carry out all work in accordance with the latest regulations of the Ontario Electrical Safety Code and all applicable Municipal, Provincial and Federal Codes and Regulations. In no instance, however, is the standard established by the Drawings and Specifications, to be reduced by any of the Codes referred to above.

3.1.5 Install all ceiling components in direct accordance with reflected ceiling plans.

3.1.6 Electrical Drawings show approximate locations for wall-mounted devices. Clarify exact location and mounting height with Consultant prior to roughing-in.

3.1.7 All serviceable equipment installed on the roof (including receptacles) to be installed minimum 3 m (10') from roof edge unless otherwise noted on Drawings.

3.1.8 Pack all roof penetration flashings with mineral wool insulation after service installation is complete, to prevent condensation.

3.2 STORAGE OF MATERIALS

3.2.1 Provide proper weatherproof storage for the protection of materials and equipment on site. Blank off openings in all equipment until required for use. Consultant may require materials which are not properly stored to be discarded and removed from the site.

3.3 EXCAVATION AND BACKFILL

3.3.1 Be responsible for any excavation and backfill required for work of Division 16. Slope or shore all trenching in accordance with all current regulations and safety standards. Where any conduits pass under building footings, backfill under footings with lean concrete.

3.3.2 Use materials and standards of compaction for backfill in accordance with Division 2 unless specified otherwise.

3.3.3 If changes are required in locations, depth of excavating or related data, advise the Consultant in reasonable time to avoid disruption of work sequence.

3.4 CONCRETE WORK

3.4.1 Arrange for the supply and pouring of all concrete required for the Electrical work. Include the cost of this in the Lump Sum Contract Price for the Electrical work of this project.

3.4.2 Carry out all concrete work in accordance with requirements of Division 3. Provide wire mesh, rebar and all necessary reinforcing.

3.5 SUPPORTS AND BASES

3.5.1 Provide structural work required for installation of equipment provided under this Division.

3.5.2 Set all floor-mounted equipment on concrete bases at least 100 mm (4”) high. Size concrete equipment bases to suit the equipment actually supplied and in accordance with the shop drawings of such equipment. Do not start concrete work until anchor bolts and other embedded parts required for the complete installation, as well as shop drawings, are available at the site.

3.5.3 Extend existing concrete bases as required for replacement or new equipment. Match existing height.

3.5.4 For new concrete bases or pads on existing floors, first scrape and remove existing floor finish. Scarify existing floor so that new concrete adheres to it. Dowel new pads to new and existing floors.

3.5.5 Provide all brackets and supports required in steel stud walls. All conduits and equipment must be supported on brackets or supports attached to steel studs. Do not support materials or equipment from wall sheathing.

3.5.6 Provide independent support; brackets and unistrut structures where required to install electrical equipment; disconnect switches, splitters, panels, etc:

- in areas where the equipment is located on walls/columns that are not suitable for direct installation;
- when installation away from structural building elements is called for; or
- when it is necessary to elevate the electrical equipment to ensure code compliance or ergonomical operator access.

3.5.7 For all supports of suspended or wall hung electrical equipment, provide structural drawings stamped and signed by a structural engineer holding a P.Eng. designation and registered in the Province of Ontario. This engineer is to submit proof of professional liability insurance. These drawings are to be provided complete with all engineering calculations, including but not limited to sizes of members and lateral bracing, connections to building structure, and sizes of all bolts and welds etc. For existing structures, structural engineer is to provide a statement on the drawings that the existing structure has been reviewed and was found to be satisfactory to support the new equipment load when using present day floor and/or roof loads from current OBC or provide drawings showing required reinforcement for the existing structure to support the new equipment. Equipment to be supported from the bottom.

3.5.8 Do not mount starters, VFD's, etc. on building equipment.

3.5.9 Do not suspend luminaires greater than 11.3 kg (25 lb), cable tray, conduit racks, etc from metal roof deck. Provide supports as required to suspend from roof joists.

3.5.10 Provide lintels for double-width and adjacent tubs and multiple conduits running in parallel, where located in block and poured walls.

3.6 CONCRETE INSERTS

3.6.1 General

3.6.1.1 Anchors for the support of conduits and equipment from the underside of suspended structural concrete systems may be by cast-in-place inserts placed prior to the pouring of concrete or by the use of inserts placed in holes drilled after the forms are stripped.

3.6.1.2 The safe load capacity of concrete anchors is affected by a number of variables such as specific anchor type, embedment, spacing between individual anchors, edge distances, direction of loading, concrete strength and "prying action". Refer to the manufacturer's recommendations for each specific insert proposed, including any dynamic or vibratory loads.

3.6.1.3 Be responsible for the proper selection and installation of inserts, including number, type, spacing and accurate placement to provide the necessary safe load capacity and satisfactory long term performance.

3.6.2 Installation of Inserts in Hardened Concrete

3.6.2.1 Use inserts placed in pre-drilled holes. Do not use powder driven inserts or self-drilling inserts. Before drilling holes, accurately locate all reinforcing bars in the affected areas using an electro-magnetic locator.

3.6.2.2 Do not drill through or otherwise damage reinforcing bars. If reinforcing is encountered, the inserts must be relocated. Ensure that hole diameter, depth of penetration, spacing, etc., are in strict accordance with the insert manufacturer's recommendations for the specific insert type and load condition.

3.6.2.3 Due to the relatively close spacing of reinforcing bars in the bottom of many of the beams and girders, the preferred location of drilled-in-place anchors in beams and girders is into the sides of these members, rather than upwards into the bottom.

3.6.2.4 Inserts to be zinc plated female concrete anchors. Nylon or plastic anchors are not acceptable.

3.6.3 Concrete screws without anchors are not acceptable.

3.7 **SLEEVES**

3.7.1 **Sleeves Embedded in Concrete**: Except as approved otherwise by the Consultant, install sleeves embedded in concrete in accordance with the following general guidelines:

3.7.1.1 Centre to centre spacing to be not less than 3 diameters of the maximum size adjacent sleeve.

3.7.1.2 Provide additional reinforcing at points of congestion as directed by the Consultant.

3.7.1.3 Sleeves through beams will be permitted only as directed by the Consultant.

3.7.1.4 The reinforcing in beams, slabs and columns must not be displaced from its intended position under any circumstances unless prior written approval is obtained from the Consultant.

3.7.2 Provide sleeves for all conduits which pass through service room floors and foundation walls. Sleeves to extend minimum 25 mm (1") past finished surface.

3.8 **FIRESTOPPING**

3.8.1 Provide a listed firestop system in accordance with the Ontario Building Code to seal around all piping, tubing, ducts, conduits, electrical wires and cables, and other similar mechanical services which penetrate part of a building assembly required to have a fire resistance rating or a fire separation. Refer to Architectural Drawings and Specifications Section "Firestopping and Smoke Seals" for building assembly and fire separation types and locations.

3.8.2 For all penetrations through fire separations required to have a fire resistance rating, use firestop systems with an F rating not less than the fire resistance rating for the fire separation. This includes the sealing of any sleeves provided for future uses. Provide an FT rating where required by the Ontario Building Code. For all penetrations through a service room floor, provide a minimum W rating - Class 1 in addition to the fire resistance rating.

3.8.3 At each fire stopping penetrating location, provide a fire stopping identification label indicating the system number installed, products used, date installed and installer’s name. Locate label on penetrating service at the penetration location.

3.8.4 All firestopping must be reviewed by the Consultant on site before any firestopping is concealed. Complete 3 destructive tests to confirm compliance with ULC listing, minimum one floor test and one wall test, third test to be Contractor's choice. Contractor to replace fire stopping system after destructive test has been completed. Submit a copy of the report to the Consultant. Report to include as a minimum, confirmation fire stopping shop drawings were used during review, locations where destructive testing was completed, confirmation all fire stopping locations were reviewed and installed systems meet the manufacturer requirements.

3.9 **CUTTING AND PATCHING**

3.9.1 Flash holes through walls and roof to make weatherproof.

3.9.2 Do not cut or drill holes through floors, roof or structural members without obtaining permission from the Consultant. Accurately locate and note sizes for each required hole prior to cutting or drilling.

3.9.3 For penetrations through walls not required to have a fire rating, seal all spaces between pipe or pipe and surrounding wall construction with a fire-rated foam sealant. Use 3M Fire Barrier, Metacaulk, or Dow Fire Stop UL Classified fire rated foam sealants. Do this as the work progresses to avoid leaving inaccessible holes at completion of the job. For penetrations through parts of the building assembly required to have a fire resistance rating or acting as a fire separation, see Clause “Firestopping” in this Section.

3.9.4 Where conduits are required to pass through existing walls, floors, and roof, cut and patch the necessary openings.

3.9.5 Where recessed electrical equipment is removed or replaced with equipment of a smaller size, patch openings to match existing wall material.

3.9.6 Where wiring devices (switches, receptacles, etc) are removed from drywall walls, remove device box and patch opening to match existing wall.

3.9.7 Where wiring devices (switches, receptacles, etc) are removed from poured concrete or block walls, remove device and provide blank coverplate.

3.9.8 Include the cost of all cutting and patching in the Lump Sum Contract Price for the work of Division 16.

3.9.9 Remove and replace ceiling where necessary to complete the work of this Division unless this work is specifically included in another Division.

3.9.10 All cutting and patching to be done by the trade specializing in the materials to be cut.

3.10 **PAINTING**

3.10.1 Touch up minor damage to finish on equipment supplied with factory applied baked enamel finish. Completely refinish items suffering damage which, in the opinion of the Consultant, is too extensive to be remedied by touch-up.

3.10.2 Paint both sides and edges of plywood backboards for electrical and communications equipment before installing equipment. Use one coat fire retardant primer and two coats fire retardant paint.

3.10.3 Paint disconnect switch or breaker for fire alarm and exit light systems in red enamel. Use one coat of primer and one finish coat.

3.10.4 Where walls and/or ceilings are cut and patched for electrical work including the removal of existing devices, paint walls and ceilings to match existing. For walls and ceilings less than 9.3 m^2 (100 ft^2), paint entire wall. For walls and ceilings larger than 9.3 m^2 (100 ft^2), paint area of patch. Painting to be completed by painting contractor.

3.10.5 Include the cost of all painting in the Lump Sum Contract Price for the work of Division 16.

3.11 ACCESS DOORS

3.11.1 Supply access doors wherever equipment, junction boxes, life safety devices, etc., are concealed behind walls or inaccessible ceilings. All devices installed requiring periodic maintenance to be made accessible. Doors will be installed by the trade specializing in the materials receiving access doors.

3.12 IDENTIFICATION

3.12.1 Colour code control wiring consistently throughout the installation and generally match colour coding of internal wiring of pre-wired components. Match existing colour coding in use on site. Verify with Owner prior to installation.

3.12.2 All branch circuits shall be:

Phase A red
Phase B black
Phase C blue

3.12.3 Identify all disconnects, starters, and other control equipment with lamacoid nameplates indicating the equipment controlled and all panels, transformers, etc identifying equipment name.

3.12.4 Lamacoid labels to be mechanically attached with self-tapping screws or rivets. Lamacoid labels attached using adhesive methods are not acceptable.

3.12.5 Identify the panel and circuit number for each wiring device with self-adhesive label on the coverplate. Use clear tape with black 14 pt Arial or Helvetica typeface. Locate labels for receptacles on front of coverplate and labels for switches on rear of coverplate.

3.12.6 Identify the panel and circuit number for each wiring device with self-adhesive label on the coverplate. Use clear tape with black 14 pt Arial or Helvetica typeface. Locate labels on front of coverplate.

3.12.7 Identify the panel and circuit number for each device with lettering marking on the rear of each coverplate. Use clear tape with black 14 pt Arial or Helvetica typeface.

3.12.8 Identify all pull boxes, junction boxes or octagon boxes located in the ceiling cavity with the exact use of the box, including circuits contained within. Felt pen is acceptable.

3.12.9 Where equipment is concealed above accessible ceilings, indicate location using coloured-coded marking devices, approved by Consultant, fastened to the ceiling components.

3.13 **LOCKS AND KEYS**

3.13.1 Where locked panelboards, control panels, terminal cabinets, etc., are specified, use a separate key pattern for each system with all locks in each system common to one key. Provide seven keys of each pattern to the Owner on a 25 mm (1”) key ring. Submit one set of keys with manuals.

3.14 **TESTING**

3.14.1 All systems must be thoroughly tested before arrangements are made for the final demonstration in the presence of the Owner's staff. Systems to be tested are:

1. Emergency Lighting
2. Lighting Control Systems

3.14.2 For the following systems, the manufacturer's Testing Representative must be present for the test period and submit a Certificate of Operation to the Consultant:

1. Fire Alarm

3.14.3 At the completion of the work, demonstrate operation of all systems to the Owner's representative and the Consultant. Promptly rectify any malfunction found.

3.15 **TEMPORARY ELECTRICAL FACILITIES FOR CONSTRUCTION**

3.15.1 Temporary electrical power is available at the site. Cooperate with owner for use of this power.

3.15.2 Tie in at one location only, as directed. Distribute temporary power from this location.

3.15.3 Arrange and pay for the cost of inspection of the temporary service.

3.15.4 Notify the monitoring company and Owner each and every time a part of the fire alarm system is shut down and reactivated.

3.15.5 Completely remove all temporary facilities when they are no longer required.

3.15.6 Provide fixed temporary lighting for open areas, stairwells and each enclosed room. In open areas and enclosed rooms use 150W A21 lamps, or equivalent, at spacings not exceeding 7.5 m (25’). In stairwells, use one 100W A21 lamp, or equivalent, at each landing. Lighting to be on dedicated circuits.

3.15.7 Temporary lighting stipulated in this Section, do not include provisions for higher intensity lighting required for a specific operation (concrete finishing, plastering, etc.). This will be the responsibility of the specific trade requiring the higher intensity.

3.15.8 Provide minimum two 120V 20A GFCI receptacles, on dedicated circuits, per 150 m² (1600 ft^2) construction area.

3.15.9 Temporary power requirements stipulated in this Section, do not include provisions for electric space heating, electric welders, or any other item of equipment which requires

either a 3 phase supply or connection to a single phase circuit rated in excess of 20A. Any trade using equipment which falls into above categories is to be responsible for providing additional facilities required for such equipment, including any increased sizing. This Division is responsible to see the connection to the temporary system is safe.

3.15.10 Use non-metallic sheathed cable, Type NMW-10, #12 AWG, manufactured in accordance with CSA C22.2 No. 38 ”Thermoset-insulated wires and cables” for all temporary lighting branch circuit wiring.

3.15.11 Temporary Fire Alarm Devices

3.15.11.1 Notify the local Fire Department and Owner each and every time a part of the fire alarm system is shut down and reactivated.

3.15.11.2 Provide new temporary hard wired fire alarm detectors, pull stations and notification appliances within the construction area.

3.15.11.2.1 Provide one 135°F rate-of-rise heat detector for every 465 m² (5000 ft²) of floor area.

3.15.11.2.2 Provide smoke detectors in all temporary corridors spaced maximum 10 m (30’).

3.15.11.2.3 Provide a manual pull station at every exit/entrance to the construction area.

3.15.11.2.4 Provide one surface mounted bell for every 560 m² (6000 ft²) of floor area.

3.15.11.3 Use #14 AWG, AC-90 cable for temporary wiring to devices.

3.15.11.4 Connect devices to dedicated fire alarm zones, grouped on a floor-by-floor basis. Provide zone cards as required to suit existing fire alarm panel.

3.15.11.5 Completely verify temporary fire alarm devices any time temporary devices are added, removed or relocated.

3.15.11.6 Once the permanent fire alarm system is operational completely remove all temporary devices and wiring. Turn devices over to the Owner.

3.16 EQUIPMENT SCHEDULE

3.16.1 Equipment Schedules are as shown on Drawings.

3.16.2 In general, the motor or item numbers shown in the Equipment Schedules coincide with those numbers shown for Mechanical Trades.

3.17 GROUNDING

3.17.1 Ground all components of the Electrical system in accordance with the requirements of Section 10 of the Ontario Electrical Safety Code latest edition and the Inspection Authority.

3.17.2 Provide a separate green ground conductor in all raceways.

3.17.3 Ground secondary neutrals of transformers to building ground conductor.

3.17.4 Where attached to equipment, conduits, cabinets, etc., use suitable approved solderless lugs, compression connectors. No soldered or split bolt type connections are to be used on grounding circuits at any point.

3.17.5 All compression connectors, lugs, etc., used in grounding circuits in any location are to have bolts, nuts, etc., of silicone bronze alloy equal to “Everdur” metal.

3.17.6 Clean all surfaces to which bus or cable are to be bolted, of all paint, rust, etc., and work to a bright, flat surface.

3.17.7 Conduit expansion joints and telescoping sections or metal raceways not thoroughly bonded otherwise, are to be provided with approved bonding jumpers or not less than #8 AWG stranded bare copper.

3.17.8 Provide a separate #14 green ground wire for all isolated ground receptacles.

3.18 START-UP SERVICES

3.18.1 Provide the services of a qualified person to be on call and available to the site within one hour for 2 weeks after the Work of this Contract is taken over by the Owner. Assist Owner's staff to become familiar with the system operation.

3.19 MAINTENANCE OF EXISTING SERVICES

3.19.1 Take every precaution to locate and protect existing services so that no interruption occurs. If any existing service is damaged due to the work of this Division, arrange and pay for repair. Bear any costs due to interruption of existing services.

3.19.2 Be responsible for maintaining continuity of existing services, and for programming work so that the Owners can carry out their normal business uninterrupted, with the exception of scheduled shutdowns for connection to or rerouting of existing services, at a time agreed to by the Owners, on weekdays, over weekends or after normal working hours.

3.19.3 Permission from the Owner is required before making any connections to or rerouting of existing services. Give seven days prior notice to the Consultant and Owner.

3.20 PROTECTING AND MAKING GOOD

3.20.1 Be responsible for protection of Owner's property, as well as finished and unfinished work, from damage due to execution of work under this Contract. Repair damage resulting from failure to provide such protection to the satisfaction of the Consultant, at no expense to the Owner.

3.20.2 Attach and fasten fixture and fittings in place in safe, sturdy, secure manner so that they cannot work loose or fall or shift out of position during occupancy of building, as the result of vibrating or other causes in normal use of building.

3.20.3 Coordinate and cooperate with other trades, taking into account existing installations, to assure best arrangement of equipment in available space. For critical locations, prepare interference and installation drawing showing work of various sections as well as existing installations, for approval before commencing work.

3.20.4 All new equipment shall be delivered to site wrapped in plastic and removed only after room is thoroughly cleaned and painted, if applicable. Where existing or new equipment must be operational throughout construction in adjacent spaces, ensure door sweeps are installed and mechanical ventilation systems are fully operational. Provide filters with minimum filtration rate of 10 micron (MERV 5) on all make-up air and supply ducts. Ensure filters are regularly changed to maintain adequate airflow.

3.21 REMOVAL OF EXISTING MATERIAL AND EQUIPMENT

3.21.1 Remove existing material and equipment where shown or specified. Equipment such as Fire Alarm devices, and any other special devices are to be turned over to the Owner. Relocate these items to a designated storage site as directed by Owner. Other material and equipment which is removed becomes the property of the Contractor and must be immediately removed from the site.

3.22 LOAD BALANCE

3.22.1 Measure phase current to distribution panels and MCCs with typical building loads operating at time of acceptance.

3.22.2 Submit, at completion of work, a report listing phase and neutral currents on panelboards, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

3.23 REBATES AND INCENTIVES

3.23.1 Provide all invoices and proof of purchase documentation to Owner as requested for application by Owner for rebates and incentives. All incentives will be paid to the Owner.

3.24 PHASING

3.24.1 The work on this project is to be phased to enable continuous operation of the Owners facilities. See the Architectural Drawings and Specifications regarding the proposed phasing of the work. Provide for temporary services, connections, bypasses, etc. to enable the phasing as described. Carry all associated costs in the Bid.

3.25 DEFICIENCY REVIEW

3.25.1 The Electrical Contractor shall confirm in writing that the work is complete and ready for inspection. The Consultant will schedule a site visit to review the work and provide a written deficiency list. Once deficiencies have been corrected, the Electrical Contractor shall confirm in writing to the Consultant that all deficiencies have been corrected. The Consultant will schedule a second site visit to review the correction of noted deficiencies. Should any noted deficiencies be found to be still outstanding, the Electrical Contractor shall correct them and again notify the Consultant in writing. Charges to the Electrical Contractor may result from repeat visits after the second visit.

3.25.2 The Electrical Contractor is required to complete all work above ceilings and allow time for deficiency reviews and correction of noted deficiencies in a timely manner in order to accommodate the current Construction Schedule. This includes time for reinspection as required prior to concealing (drywall enclosures, drywall ceilings and acoustic tile ceilings) of any service. The Electrical Contractor will be responsible for uncovering any concealed services for inspection.

3.26 HOURLY LABOUR RATE

3.26.1 Hourly labour rate shall be the actual rate paid to the worker as posted by the local Union Agreement plus a burden mark-up of 100% to compensate for contributions, assessments, employment insurance, health insurance, pension plans, WSIB, taxes, vacation pay, travel, parking, welfare, union package and membership dues, supervision, material handling, training, rest periods, down time, breaks, personal hygiene, small tools, clean up time, profit, other benefits paid to the worker and all other costs incurred by the Company including meetings, office time. Travel time to and from the site shall be at no charge to the Owner. For the purpose of electrical work, the journeyman electrician union rate will be used for all trades completing any electrical work.

3.27 LIST OF ELECTRICAL SUBCONTRACTORS AND MANUFACTURERS

3.27.1 In the Bid documents, name the Subcontractors and Manufacturers for the items listed below. Use only one name for each item. See Clause “Material and Equipment”. Where the name of a manufacturer is not entered on the Bid Form, the Contractor will be required to use the base specified manufacturer.

3.27.2 **Subcontractors**

Fire Alarm System

3.27.3 **Manufacturers**

Disconnect Switches
Emergency Lighting / Exit Signs
Fire Alarm Devices
Lighting Control System
Luminaires (by Type)
Motor Control Equipment
Panelboards
Wiring Devices

END OF SECTION

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 16001, “Electrical General Provisions”.

1.2 **DESCRIPTION OF SYSTEM**

1.2.1 Provide all new wiring and raceways. Where possible, conceal all wiring and raceways above ceilings, in walls and partitions. See Section 16001, “Electrical General Provisions”.

2 Products

2.1 **MATERIALS**

2.1.1 Use materials specified herein or approved equal as defined in Clause “Material and Equipment”.

2.1.2 All outlet boxes, wiring devices, equipment and accessories must be C.S.A. approved and be designed for the application intended.

2.2 **RACEWAYS**

2.2.1 Use E.M.T. in concealed locations in concrete block walls, drywall partitions and for main and branch circuit wiring above ceiling spaces.

2.2.2 Use minimum 1/2" (16 mm) conduit for power wiring and 3/4" (21 mm) conduit for motor circuits.

2.2.3 Raceways for motors and equipment are to be dedicated home runs back to source and shall not be grouped with adjacent motors and equipment.

2.2.4 Refer to Section 16700 for communication raceways.

2.2.5 Use set screw steel couplings and connectors. Use raintight steel couplings and connectors complete with "O" rings, in sprinklered buildings.

2.2.6 Use red conduit for Fire Alarm wiring concealed above ceilings, in concrete walls and in mechanical and electrical rooms.

2.2.7 For new devices on existing block or poured concrete walls exposed in finished areas, provide metallic single compartment raceway and appropriate bases.

2.2.8 Use conduit expansion coupling for expansion joint crossing.

2.2.9 Use flexible metal conduit for all final connections to motors and other equipment subject to vibration or which has adjustable mountings. Minimum size 1/2" (16 mm).

2.2.10 Use rigid PVC underground and in concrete floors, unless otherwise noted. Provide marking tape for underground installations in accordance with Ontario Electrical Safety Code.

2.2.11 For exterior above grade installations, use rigid aluminum conduits and fittings. All boxes and conduit bodies shall be die-cast, copper-free aluminum with aluminum covers and neoprene gaskets.

2.2.12 Fasten all raceways with approved supports. Use clamps and all mounting hardware of the same material as the conduit or compatible material to prevent galvanic corrosion.

2.3 CONDUCTORS

2.3.1 Aluminum conductors are NOT permitted on this project.

2.3.2 Use minimum copper #12 AWG RW-90XLPE **stranded** for branch circuiting and receptacle wiring.

2.3.3 Use RWU-90XLPE wire in all below grade locations.

2.3.4 Use minimum size of #14 AWG RW-90XLPE for control wiring.

2.3.5 Type AC-90 cable may be used for final drops (maximum 2 m [6.5']) to lighting fixtures and devices in accessible ceiling spaces. **DO NOT USE AS MAIN BRANCH WIRING FROM PANELBOARDS OR FOR BRANCH CIRCUIT WIRING (i.e. RECEPTACLES, ETC.).**

2.3.6 For wiring to heating equipment, recessed lighting fixtures or where body of fluorescent fixture is used as raceway, use conductors with high temperature insulation of type approved by Electrical Safety Authority.

2.3.7 Use all wire and cable insulation rated 600 volts minimum unless specified otherwise.

2.4 OUTLET BOXES

2.4.1 Use only masonry approved boxes in concrete and masonry construction.

2.4.2 Use 100 mm (4") square or utility type boxes for surface-mounted boxes and 100 mm (4") octagonal boxes for ceiling outlet boxes. Use multi-gang boxes for grouped devices. Use wrap-around covers for utility boxes. Use cast aluminium FS type boxes where surface mounted in finished areas.

2.4.3 Use flush-mounted boxes complete with adjustable ears, extension rings and plate rings as required. Do not use shallow or narrow boxes.

2.4.4 Provide FS type boxes c/w rain tight fittings where surface mounted in service rooms or for any surface boxes in sprinklered buildings not located above ceilings.

2.5 WIRING DEVICES

2.5.1 Use specification grade wiring devices, types and ratings shown on the Drawings.

2.5.2 Switched receptacles to be black.

2.5.3 Use red devices for receptacles/switches fed from emergency circuits.

2.5.4 Confirm colour of wiring devices and plates with Consultant prior to ordering.

2.5.5 **Receptacles**

2.5.5.1 125 volt 15 amp white U-ground Tamper Resistant Duplex Receptacle (CSA 5-15R)
Pass &Seymour Catalogue No. TR62W, or equivalent.
Alternative manufacturers to provide equivalent grade or better.

2.5.5.2 125 volt 20 amp white self-testing Tamper Resistant GFCI Duplex Receptacle (CSA 5-20R)
Hubbell Catalogue No. GFTRST20W

2.5.5.3 125 volt 20 amp white U-ground Tamper Resistant Duplex Receptacle (CSA 5-20R)
Pass &Seymour Catalogue No. TR63W, or equivalent.
Alternative manufacturers to provide equivalent grade or better.

2.5.6 **Cover Plates**

2.5.6.1 In general, use 302 stainless steel face plates for all flush-mounted devices and die-cast face plates for all surface-mounted devices.

2.5.6.2 All receptacles exposed to weather to have die-cast aluminum duplex gasketted spring door in-use covers.

2.5.7 The following manufacturers of the above equipment will be considered as equal subject to requirements of Clause “Material and Equipment”:

Arrow Hart
Hubbell
Leviton
Pass & Seymour

2.6 **DISCONNECT SWITCHES**

2.6.1 Unless specified otherwise, fused or unfused disconnect switches to be conditionally hp rated, heavy duty type with visible break industrial safety switches in general purpose or weatherproof enclosures as required. NEMA 3R enclosures with large exposed factory mounting holes must be plugged with stainless steel washer, nut, bolt and plug.

2.6.2 For 120V mechanical equipment, provide Hubbell Cat. #HBL1372D disconnect switch with aluminum housing and lockable switch.

2.6.3 For equipment above ceilings such as fans and heat pumps single phase and three phase 30A and below: Hubbell Cat # HBL1379D disconnect switch with aluminum housing or equivalent to be approved by Consultant.

2.6.4 For exterior roof mounted equipment single phase and three phase 30A and below: Hubbell Cat # HBL13R series NEMA 3R disconnect switch with aluminum housing. Or equivalent to be approved by Consultant.

2.6.5 The door to be mechanically interlocked with the operating handle to prevent it from being opened when the switch is in the “ON” position. The handle is to be capable of being padlocked in the “OFF” or “ON” position.

2.6.6 The following manufacturers of the above equipment will be considered as equal subject to requirements of Clause “Material and Equipment”:

Eaton
Schneider
Siemens

2.7 **OVERCURRENT PROTECTIVE DEVICES - FUSES**

2.7.1 Provide fuses for all fusible equipment in this Contract.

2.7.2 Fuse interrupting rating is to be 200,000 amps RMS symmetrical unless otherwise noted.

2.7.3 Rated as noted on the Drawings, 600 volts AC, fuses will be CSA certified HRCI J/Class J Time Delay with dimensions and current limiting performance in accordance with CSA Specification C22.2 No. 106-05 or UL Standard 198C for Class J fuses. HRCI/JY fuses are not acceptable.

2.7.4 The following manufacturers of the above equipment will be considered as equal subject to requirements of Clause “Materials and Equipment”:

Cooper Bussmann
General Electric Power Controls
Littlefuse
Mersen

2.8 **SURFACE RACEWAYS**

2.8.1 **Surface Metal Raceways**

2.8.1.1 Provide surface metal raceways to supply power and/or low potential services as shown on the building plans.

2.8.1.2 Provide and install all surface metal raceways and appropriate fittings to provide a safe and complete installation.

2.8.1.3 Raceway and fittings are to be the 4000 Series as manufactured by Wiremold Company. **ALTERNATIVE MANUFACTURERS MUST PROVIDE SAMPLE FOR APPROVAL.**

2.8.1.4 The two piece surface metal raceway is to consist of a base section having a nominal material thickness of .129 mm (0.50”) and have trade size knockouts, 32 mm (1-1/4”) from each end and one centre of approximately 450 mm (17-3/4”) throughout to facilitate mounting.

2.8.1.5 The cover sections will have a nominal material thickness of .1016 mm (.040”) and be furnished in 1500 mm (60”) lengths.

2.8.1.6 The base and cover sections are to be painted with colour selected by Consultant. The dimensions of the two compartment raceway when assembled will be a minimum of 120 mm x 44 mm (4-3/4” x 1-3/4”) deep.

2.8.1.7 All raceway shown is to be divided into two equal but separate wiring compartments to facilitate installation of power and voice/data cabling.

2.8.1.8 Provide all necessary couplings, elbows, wire clips and end fittings. In addition, provide all device brackets to install the duplex receptacle horizontally within the raceway for both power and communication devices. Provide blank duplex coverplates on all communication devices shown on floor plan. For all communication devices on raceway, provide 32 mm x 75 mm (1-1/4" x 3") punch plate opening. Confirm communication device plate requirements with Owner prior to ordering.

2.8.1.9 The following manufacturer of the above equipment will be considered as equal subject to requirements of Clause "Material and Equipment":

Hubbell
Wiremold

2.9 **ROOF CONDUIT SUPPORT**

2.9.1 **General**: Provide conduit support system specifically designed for installation without the need for roof penetrations or flashings, and without causing damage to the roofing membrane.

2.9.1.1 For Electrical conduits 2-1/2" (64 mm) in diameter or less, up to 10" (254 mm) above roof: Portable Pipe Hanger Model No.: SS8

2.9.1.2 For Electrical conduits 3-1/2" (89 mm) in diameter or less, up to 16" (406 mm) above roof: Portable Pipe Hanger Model No. PP10.

2.9.1.3 For single Electrical 3 – 5" (78 -120 mm) in diameter: Portable Pipe Hanger Model No. PS 1-2.

2.9.2 **Acceptable Manufacturer:** Portable Pipe Hangers; 5534 Harvey Wilson Drive, Houston, Texas 77020. ASD. Tel: (713) 672-5088. Fax: (713) 672-1170. www.portablepipehangers.com. Email:info@portablepipehangers.com or approved equal.

3 Execution

3.1 **GENERAL**

3.1.1 Unless shown otherwise, the minimum size of all raceways and conductors to be in accordance with the Ontario Electrical Safety Code.

3.2 **CONDUIT INSTALLATION**

3.2.1 Conceal all conduits except in equipment rooms, unfinished area, and where specifically noted. Flush mount all devices, starters, etc., in finished areas. Install all exposed conduits parallel to building walls and partitions.

3.2.2 All conduit supports and fastening accessories installed outside are to be stainless steel or aluminum. Galvanized will not be accepted.

3.2.3 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

3.2.4 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

3.2.5 Run parallel or perpendicular to building lines.

3.2.6 Run conduits in flanged portion of structural steel. Do not pass conduits through structural members except as indicated.

3.2.7 Group conduits wherever possible on suspended surface channels.

3.2.8 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers. Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

3.2.9 Do not run conduit through unconditioned (heated or cooled) spaces without approval from the consultant.

3.2.10 Horizontal runs of conduit will not be permitted in walls unless noted otherwise.

3.2.11 In any case, horizontal runs must be located above level of door or transom frames in area.

3.2.12 Vertical conduits must be supported at each floor slab and at the top and bottom of each riser.

3.2.13 Conduits must be supported from building structure. Provide independent unistrut under obstructions such as ductwork for support as required. Support unistrut from structural members. Do not secure to underside of metal pan roof deck.

3.2.14 Conduit placement should follow the following priority:

- Below grade
- In walls or partitions
- In ceiling cavity
- Exposed

3.2.15 Maintain continuity of ground through all connection points. Use sealer lubricant on all threaded connections embedded in concrete, buried in ground or exposed outdoors.

3.2.16 Leave all conduit systems finished complete with outlet boxes, coverplates, bushings, caps, nylon fish wire, etc. Provide bushings for all sleeves.

3.2.17 PVC is only permitted underground and under floor slabs. Transition from PVC to EMT within 6" of finished floor.

3.2.18 For conduit installed on roof provide support system designed for installation without roof penetrations, flashings, or damage to the roofing material.

3.2.18.1 Before beginning installation, conduct a meeting at the project site attended by Owner, Contractor, installers of roofing and mechanical and electrical piping, to coordinate layout of support systems according to the OESC requirements and in coordination with other trades. Route conduit as required to eliminate or reduce trip hazard. Space support every

5" (1500 mm) MAXIMUM unless greater spacing is allowed by OESC for particular conduit size.

3.2.18.2 Consult manufacturer of existing or new roofing system as to type of walk pads required for their roofing system and install pads. Scrape off loose gravel, if gravel already exists.

3.2.18.3 After pads are installed, place support bases on pads. With all pipe supports in place, start at the beginning of the system and adjust each strut to achieve a balanced system.

3.2.18.4 Clamp down with channel clamp.

3.2.18.5 Adjust channel until height and weight of system is evenly distributed.

3.3 CONDUCTORS

3.3.1 Join #8 AWG and larger conductors with compression connectors properly sized. On #10 AWG and smaller, relaxed wing-nut type connectors may be used. Ideal Industries 451, 452 or 453.

3.3.2 Size conductors for a maximum of 2% voltage drop from the supplying panel to the furthest outlet in the circuit. In calculating voltage drop, use 80% of overcurrent rating or design load where known, whichever is less.

3.3.3 For all equipment feeders (panels, transformers, and directly connected electrical loads) over 50m of total installed length, provide voltage drop calculations to consultant for review. Submit calculations prior to installation of any cabling, conduit, and raceways.

3.3.4 Draw wiring into raceways only after all other work that may cause injury to the wire is completed. Use only wiring lubricants that do not shorten insulation life. Use continuous lengths for feeders to panels and large equipment. Do not splice without permission from Consultant.

3.4 GROUNDING

3.4.1 Ground all components of the Electrical system in accordance with the requirements of Section 10 of the Electrical Safety Code latest edition and the Inspection Authority.

3.4.2 Provide a separate ground conductor in all raceways.

3.4.3 Ground secondary neutrals of transformers to building ground conductor.

3.4.4 Where attached to equipment, conduits, cabinets, etc., use suitable approved solderless lugs, compression connectors. No soldered or split bolt type connections are to be used on grounding circuits at any point.

3.4.5 All compression connectors, lugs, etc., used in grounding circuits in any location are to have bolts, nuts, etc., of silicone bronze alloy equal to "Everdur" metal.

3.4.6 Clean all surfaces to which bus or cable are to be bolted, of all paint, rust, etc., and work to a bright, flat surface.

3.4.7 Conduit expansion joints and telescoping sections or metal raceways not thoroughly bonded otherwise, are to be provided with approved bonding jumpers or not less than #8 AWG stranded bare copper.

3.4.8 Provide a separate #14 green ground wire for all outlets connected to a GFCI circuit breaker.

3.5 **OUTLET BOXES**

3.5.1 Support all boxes independently of the conduits running to them. Use flush boxes in areas where concealed conduit is used.

3.5.2 Check the Drawings to ensure that no outlets are roughed-in at inaccessible locations, where built-in furniture, counters, etc., are to be installed. In such locations, install the outlets above and clear of the trim by approximately 100 mm (4") unless shown otherwise on the Drawings.

3.5.3 **DO NOT INSTALL OUTLET BOXES OF ANY SYSTEM BACK TO BACK**. Offset as necessary to prevent sound transmission between areas.

3.6 **WIRING DEVICES**

3.6.1 Install light switches on lock jamb side of the door as finally hung. Check door swing before roughing-in. Install switches with the "ON" position up. Locate switch as close as practical to door jamb but not closer than 1". Coordinate location with built-in and Owner supplied equipment and furnishings.

3.6.2 When two or more devices are grouped together, mount under a common coverplate unless shown otherwise.

3.6.3 Mount light switches at height as indicated on Drawings.

3.6.4 Mount duplex receptacles 25 mm (1") above a countertop backsplash to bottom of device coverplate.

END OF SECTION

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 16001 “Electrical General Provisions”.

1.2 **RELATED WORK**

1.2.1 **Power supply wiring and raceways for motors of mechanically driven equipment:** Supply and installation of wiring and disconnect at motor by Division 16, unless otherwise noted on Drawings.

1.2.1.1 Wiring and raceways for control devices and instruments, such as automatic temperature and pressure control systems, electrical interlocks between starters, field devices and control panels, heat sensors, water temperature controls, thermostatic controls, ON/OFF multi-speed controller for cabinet unit heaters: Supply and installation by Division 15.

1.2.1.2 Control wiring and conduit for unit heaters and forced flow units for their associated thermostats and control by Division 15.

1.3 **REFERENCES**

CSA C22.2 No. 14-18	Industrial control equipment
CSA C22.2 No. 100-14	Motors and generators
CSA C390-10	Test method, marking requirements, and energy efficiency levels for three-phase induction motors

1.4 **SYSTEM DESCRIPTION**

1.4.1 **Design Requirements**

1.4.1.1 Divisions supplying motor-driven equipment are to supply and install factory-wired package assembly, field instruments and control devices, including relevant raceway and wiring forming an integral part of automated control system of equipment.

1.4.1.2 Division 16 is to supply and install “power train” such as power supply equipment (switchgears, distribution boards, distribution panels, and panelboards), disconnect switches, circuit breakers and splitter boxes, complete with wiring and raceways to termination point at motor or designated power terminals of assembled equipment (packaged unit).

1.4.1.3 Division 16 is to install separately mounted starters and other specified motor control devices handed over by other Division, necessary to complete “power train”.

1.4.1.4 Division 16 is to incorporate into motor control centre all starters, controls, terminals, equipment and wiring as specified herein and/or as indicated on Drawings.

1.5 **SUBMITTALS**

1.5.1 Submit Shop Drawings as defined in General Conditions of the Contract, to include but not limited to following:

1.5.1.1 **Starters and Controllers**: Mounting method and dimensions, starter size and type, layout of identified internal and front panel components, enclosure types, wiring diagram for each type of starter and interconnection diagrams.

2 Products

2.1 **FULL VOLTAGE MOTOR STARTERS**

2.1.1 **Common Requirements**

2.1.1.1 Provide starters as specified in Equipment Schedules and as shown on the Drawings.

2.1.1.2 Starters to be complete with enclosures suitable for the area in which they are installed and capable of being padlocked in the OFF position.

2.1.1.3 Single phase and three phase magnetic starters shall not be smaller than NEMA size 0 and NEMA size 1 respectively.

2.1.1.4 Provide 1 normally open and 1 normally closed auxiliary contact in all starters.

2.1.1.5 All starters to be NEMA rated. IEC rated starters are not acceptable.

2.1.2 **Manual Starters**

2.1.2.1 Manual single-phase starters to have a double-break silver alloy contact mechanism and pilot light. The overload shall have a field adjustment allowing up to +/- 24% variance in ratings of the nominal heater value.

2.1.2.2 Manual three-phase starters to have a double-break silver alloy contact mechanism and pilot light. The overload shall be ambient compensated bimetallic-type with interchangeable heaters and automatic reset.

2.1.2.3 In service spaces, starters are to be enclosed in a general purpose NEMA 1 enclosure. In finished areas, starters are to be flush-mounted with a stainless steel faceplate.

2.1.2.4 The operating toggle or button shall clearly indicate whether the unit is ON, OFF or TRIPPED.

2.1.3 **Magnetic Starters**

2.1.3.1 Unless noted otherwise, magnetic starters to be full-voltage non-reversing type complete with HAND-OFF-AUTO selector switch and, red “motor running” pilot light.

2.1.3.2 Provide one set of contacts for remote automatic start.

2.1.3.3 Provide one set of contacts for Fire Alarm shutdown, as noted on Mechanical Equipment Schedule. Fire Alarm shutdown operation to override HAND-OFF-AUTO selector switch.

2.1.3.4 Magnetic starters to be complete with individual control transformer protected by control fuses. Control voltage 120V, 60Hz unless otherwise noted or required by Controls Contractor. Coordinate with Controls Contractor.

2.1.3.5 Where shown as combination magnetic starters, provide disconnect switch and breaker overcurrent protection integral to enclosure.

2.1.3.6 The following manufacturers of the above equipment will be considered as equal, subject to the requirements of Clause “Materials and Equipment”:

Allen-Bradley
Eaton
Siemens
Square D

3 Execution

3.1 **INSTALLATION**

3.1.1 **Starters**

3.1.1.1 Install starters and connect wiring as indicated on Drawings, in accordance with Code requirements, and in accordance with approved wiring diagrams and manufacturer's Drawings.

3.1.1.2 Where multiple devices are located in close proximity, provide 19 mm (3/4”) thick plywood panel sized to accommodate group-mounted disconnect switches, starters, splitter box and other required control devices.

3.1.1.3 Provide raceways, boxes, cables and wirings from panelboards or switchgear through splitters, starters and field disconnect switches to complete power supply required for motors.

3.1.1.4 Provide raceways and wirings for control devices and instruments for installation by Division 16 when specified herein. Other control wiring and conduits for field instruments and devices forming part of automated control system for equipment are to be supplied and installed by Divisions installing such system and equipment.

3.1.1.5 Provide raceways and wiring and terminate in designated power supply connection points of pre-wired equipment or package unit supplied by other Divisions. All other outgoing control wiring and conduits are to be installed by Divisions supplying and installing pre-wired equipment or package unit.

3.1.2 Check in field and coordinate motor nameplate full load amperes and service factor to ensure correct fuses and overload relay heater elements are installed. Set adjustable relays.

3.1.3 Provide lamacoid nameplates on front cover of starters, separately mounted control stations, and field-mounted disconnect switches, indicating function or equipment service identification as indicated on Drawings.

3.2 **TESTS AND INSPECTION**

3.2.1 Operate switches and contactors to verify correct functioning.

3.2.2 Operate selector switch or pushbuttons for performance of starting and stopping sequences of contactors and relays. Confirm delays and Fire Alarm override function as specified.

3.2.3 Inspect and test starter operation as per starter manufacturer's instructions.

3.2.4 Full responsibility for proper performance of motors is to be assumed by Division installing such motors.

END OF SECTION

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 16001, “Electrical General Provisions” and Section 16100, “Basic Materials and Methods”.

1.2 **DESCRIPTION OF WORK**

1.2.1 Provide panelboards as shown on the Drawings.

1.3 **SPRINKLER SHIELDS**

1.3.1 This building will be fully sprinklered. All surface mounted panels and enclosures will include sprinkler shields. Ensure all conduit and fittings in sprinklered areas meet the requirements outlined in 16001 clause "Sprinkler Proof Equipment".

2 Products

2.1 **MATERIALS**

2.1.1 Use materials specified herein or approved equal.

2.1.2 This building will be fully sprinklered. Use sprinkler proof electrical equipment to prevent the sprinkler system water from entering electrical equipment for all surface mounted equipment.

2.1.3 Unless noted otherwise on the Drawings or in Specifications, user operated devices, display and controls shall be located between 125mm (5") and 1830mm (72") from bottom of floor mounted equipment.

2.2 **DISTRIBUTION EQUIPMENT**

2.2.1 **Panelboards**

2.2.1.1 Use panelboards of the circuit breaker type, complying with the requirements contained in the Panel Schedules.

2.2.1.2 Panelboards are to have formed galvanized steel tubs and shop finished enamelled covers.

2.2.1.3 All panelboards to have hinged doors with chrome plated locks and catches. Flush-mounted panelboards to have concealed hinges and trim fasteners, flushlock and large rigid covers. All parts of the panel are to be of welded construction.

2.2.1.4 Provide gutter space and barriers in panelboard where required by Inspection Authorities.

2.2.1.5 Each breaker or switch to be clearly identified with a factory stamped circuit number on silkscreened metal tape or lamacoid. Double section panels must have circuit numbers factory installed, indicating from 1 - 84. Circuit numbers are to be mechanically fastened to panelboard. Two sided tape on accessories will not be accepted.

2.2.1.6 Use panelboards of type noted on the Panel Schedules. Bus to be copper and rated to withstand interrupting capacity of circuit breakers contained within.

2.2.1.7 Where panelboards are indicated with main contactors, contactors shall be enclosed within the same tub as the panelboard and with same interrupting rating as breakers.

2.2.1.8 Where space is indicated, bus the space for future breakers. Provide panel fronts with removable fillers in spaces.

2.2.1.9 Where equipped with main breakers mounted vertically, down position should open breaker.

2.2.2 **Distribution and Panelboard Circuit Breakers**

2.2.2.1 Unless noted otherwise on Drawings or panel schedules, circuit breakers are to be moulded case as rated below. Series rated breakers are not acceptable unless stated otherwise on the Drawings (ground fault breakers excluded).

2.2.2.2 Breakers are to be suitable for the panelboards provided. All breakers are to be bolted in place. Plug-in only type are not acceptable.

2.2.2.3 For 250V panelboards, main and branch breakers to be rated minimum 22,000 amperes RMS symmetrical at 208 or 240 volt.

2.2.2.4 All circuit breakers smaller than 400A to be moulded case thermal-magnetic type providing inverse time-current tripping curves. Multi-pole breakers to have common-trip device with single handle.

2.2.2.5 Shunt trip breakers to be 120V AC solenoid type. Electrically held shunt trip breakers are not acceptable.

2.2.2.6 Provide ground fault circuit interrupters breakers as indicated on Panel Schedules. Provide separate neutral conductors for each circuit. Unless noted otherwise, ground fault circuit interrupter breakers are Class A, Group 5mA.

2.2.2.7 Provide positive locking devices on the handles of breakers serving loads below. Trip units to remain free to function while locked in the ON position.

- exit signs
- emergency lighting and night light circuits
- fire alarm equipment
- door hardware

2.2.2.8 Provide quantity of spare breakers as called for on the Panel Schedules or Drawings

2.2.3 The following manufacturers of the above equipment will be considered as equal subject to requirements of Clause “Material and Equipment”:

Eaton
Schneider
Siemens

3 Execution

3.1 DISTRIBUTION SWITCHBOARD AND DISTRIBUTION PANELS

3.1.1 Install switchboards in electrical rooms. Arrange for all necessary lifting and moving equipment. Coordinate with all trades to provide openings or space to install and assemble switchboards in rooms in compliance with building schedule.

3.1.2 Clearly determine access to spaces within existing building. Assemble equipment in location on site if required.

3.1.3 Arrange for 100 mm (4”) high concrete pad to extend 50 mm (2”) on all sides of switchboard.

3.1.4 Assemble complete board in accordance with manufacturer's directions.

3.1.5 Provide lamacoid labels mechanically fastened to switchboards indicating connected load. Include room number and description of load for each breaker.

3.2 PANELBOARDS

3.2.1 Locate panelboards as indicated on the drawings. Confirm with Consultant prior to rough-in if panels cannot be installed in locations shown.

3.2.2 Install panelboards level and upright. Remove shipping supports only after securing.

3.2.3 Unless otherwise shown on the Drawings, mount panelboards 1830mm (72") above finished floor to top of panel and minimum 125mm (5") above finished floor.

3.2.4 Provide two empty 25 mm (1”) conduit stubs into the ceiling cavity from all flush-mounted panelboards.

3.2.5 Provide a typewritten directory mounted under transparent cover identifying each breaker on the back of each panel door.

3.2.6 Provide new typewritten directories for all existing panelboards affected by work.

3.2.7 Contractor to provide updated schedules complete with room numbers. Trace out existing circuits as required.

3.2.8 Include room number and description of load for each breaker. For circuits serving mechanical equipment, indicate room number mechanical equipment serves. Coordinate on site with Division 15.

3.3 ARC FLASH HAZARD WARNING LABELS

3.3.1 Provide generic shock and arc flash warning labels on all new panelboards, MCC’s and disconnect switches and splitters in accordance with Ontario Electrical Safety Code 2-306.

3.3.2 Label shall be located so that it is clearly visible to persons before examination, adjustment, servicing, or maintenance of equipment. Locate label on the inside door of panelboards.

END OF SECTION

SECTION 16400

A P P E N D I X

Panel Schedules

250 City Centre Ave, Suite 403
Ottawa ON K1R 6K7
P: 613-241-0030

Chorley+Bisset
CONSULTING ENGINEERS

201 Queens Ave, Suite 800
London ON N6A 1J1
P: 519-679-8660

PROJ. NAME: Goderich Municipal Childcare Centre Kitchen Renovation
PROJ. NO : 10693

PANEL ID: B
MAINS: 225A
VOLTAGE: 208/120V, 3Ø, 4W
MOUNTING: FLUSH
NO OF CKT: 72

LOCATION: Kitchen
FED FROM: Main Splitter
COMMENTS:
Shaded breakers are existing loads. Confirm load and update schedule as required.

CKT	BRKR	DESCRIPTION	WATTS	CKT	BRKR	DESCRIPTION	WATTS
1	15	LIGHTING		2	15	EXISTING LOAD	
3	15	LIGHTING		4	15	EXISTING LOAD	
5	15	LIGHTING		6	15	REC	
7	15	LIGHTING		8	15	REC	
9	15	LIGHTING		10	15	SPLIT REC	
11	15	LIGHTING		12	2P		
13	15	LIGHTING		14	15	SPLIT REC	
15	15	LIGHTING		16	2P		
17	15	REC		18	15	EXISTING LOAD	
19	15	EXISTING LOAD		20	2P		
21	40			22	15	EXISTING LOAD	
23		HVAC #1		24	15	REC	
25	3P			26	15	FRIDGE REC	
27	15	GARBURATOR		28	15	UPRIGHT FREEZER REC	
29	15	EXISTING LOAD		30	125	RANGE	
31	2P			32			
33	40			34	3P		
35		ROOTOP ACC #1		36	15	EXISTING LOAD	
37	3P			38	50	DISHWASHER	
39	30	KITCHEN AC MITS.		40	2P		
41	2P			42	15	EXISTING LOAD	
43	15	RANGE FIRE SUPPRESSION		44	15	FREEZER REC	
45	20 GFCI	KITCHEN GFCI REC		46	20	KITCHEN COUNTER REC	
47	20	KITCHEN COUNTER REC		48	20	KITCHEN COUNTER REC	
49	20	KITCHEN WORK TABLE REC		50	20	KITCHEN WORK TABLE REC	
51	15	KITCHEN EXHAUST FAN EF-1		52	15	KITCHEN MAU-101	
53				54			
55	3P			56	3P		
57	20 GFCI	ROOFTOP GFCI REC		58			
59				60			
61				62			
63				64			
65				66			
67	15	SPARE		68	15	SPARE	
69	15	SPARE		70	15	SPARE	
71	20	SPARE		72	20	SPARE	

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 16001, “Electrical General Provisions” and Section 16100, “Basic Materials and Methods”.

1.2 **DESCRIPTION OF SYSTEMS**

1.2.1 Lighting Systems

1.2.1.1 Nominal 120 volt A.C.

1.2.1.2 Branch circuit wiring from 120/208 volt, 3 phase, 4 wire panelboards.

2 Products

2.1 **GENERAL**

2.1.1 Use materials specified herein or approved equal.

2.1.2 Use the product of only one manufacturer for each type of luminaire.

2.1.3 Refer to Luminaire Schedule on Drawings.

2.2 **LED LUMINAIRES**

2.2.1 All LED luminaires must bear an approved certification mark as per Ontario Electrical Safety Code Bulletin 2-7-29. A UL certification mark without the ‘c' is not an approved certification mark.

2.2.2 **Luminaires designed for LED lamps with integral driver** as specified below shall adhere to LED lamp manufacturer guidelines, certification programs, and test procedures for thermal management to guarantee the minimum lamp life and lumen maintenance as specified below.

2.2.3 **Luminaires designed with integrated custom LEDs.** shall be as specified on drawings or approved equal meeting the following requirements:

2.2.3.1 Only products from manufacturers that have been in the lighting manufacturing business for minimum of 10 years will be considered.

2.2.3.2 Modularity, shall be designed to allow for replacement of; driver, LEDs, without specialised tools and without removing luminaire from the ceiling.

2.2.3.3 Performance - LED luminaire with custom lamps must exceed LED lamp parameters specified below for efficacy and lumen maintenance by minimum 15%.

2.2.3.4 Lumen Maintenance - at least 70% of initial lumens for at least 60,000 hours.

2.2.3.5 Minimum luminous efficacy 50 lumens per watt (lm/W)

2.2.3.6 0-10V dimming standard to 10% unless noted otherwise in luminaire schedule.

2.2.3.7 Warranty - Written warranty covering repair or replacement for a minimum of five (5) years from the date of purchase. Warranty must be included with maintenance manuals and have a toll-free (e.g., "800") number, or mailing address, or web site address for consumer complaint resolution and future LED replacement upgrade.

2.3 EMERGENCY LIGHTING

2.3.1 Emergency lighting units are to be Lumacell RG12S-36-LD7 with or without two unit mounted floodlights and remote heads as shown on plans. Remote heads to be die-cast with white powder coat finish. All floodlights to be 4 watt LED MR16 type. Units to be 12 volt with an 8 year minimum battery life expectancy, capable of producing 36 watts for 1/2 hour at 12 volt, rated in accordance with CSA Standard C22-2-141.

2.3.2 The following manufacturers will be considered equal subject to requirements of Clause "Material and Equipment":

AimLite
BeLuce
Emergi-lite
Hubbell
Lithonia
Lumacell
Stanpro

2.4 LUMINAIRE NOISE

2.4.1 All ballasted luminaires are to be manufactured to reduce noise below room ambient noise level.

2.4.2 Any luminaire or group of luminaires which can be heard above ambient noise are to be quietened or replaced at no additional cost to the Contract.

3 Execution

3.1 INDOOR LIGHTING

3.1.1 Install luminaires complete with the necessary accessories, conduit supports, ball aligners, hangers, mounting yokes, etc.

3.1.2 Check the type of ceilings before placing an order for luminaires.

3.1.3 Provide independent supports from slabs or steel above hung ceilings. Luminaires are not to be supported solely by the hung ceiling. Nylon inserts are not an approved fastening method for poured concrete. Do not secure to underside of metal pan roof deck.

3.1.4 Obtain revised locations from the Consultant when pipes or ductwork interfere with the proper mounting location of recessed luminaires before roughing-in conduit.

3.1.5 Take all necessary precautions to ensure that all luminaires, diffusers and lamps are left clean at the completion of the job.

3.1.6 Ensure that all luminaires including ballasts and lamps are in good working order at the completion of the job. Replace at no extra cost any defective or burned-out lamps.

3.2 **LUMINAIRES IN SUSPENDED CEILINGS**

3.2.1 Provide adequate additional chain hanger supports for all luminaires in suspended ceiling systems to approval of the Consultant, and in accordance with Ontario Electrical Safety Code Bulletin No. 30-4-12.2016.

3.2.2 All existing luminaires to be removed and reinstalled are to have new chain hangers provided.

3.2.3 Coordinate with the Architect and Ceiling Contractor to determine which ceilings have been designed and constructed to carry the weight of the luminaires, so the support chains can be eliminated.

3.2.4 Ensure all luminaires are mechanically secured to the ceiling system with manufacturer approved clips.

3.3 **LUMINAIRE SCHEDULE**

3.3.1 Refer to Drawings for luminaire type and description.

3.4 **EMERGENCY LIGHTING**

3.4.1 Test emergency for 1/2 hour and verify that the entire system is working properly. Contractor is to complete the Emergency Lighting Test Form and providing a line item for each and every device. A sample copy of the form is attached in the Appendix. Submit a letter and the completed form indicating each device has been tested, prior to occupancy. Letter to state the following: "The emergency lighting system has been tested for 1/2 hour and is working in accordance with the Drawings and Specifications".

3.5 **REPLACEMENT LUMINAIRES**

3.5.1 Prior to ordering new luminaires to replace existing, Contractor to verify voltage of existing luminaires.

END OF SECTION

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 16001, “General Electrical Provisions” and Section 16100, “Basic Materials and Methods”.

1.2 **DESCRIPTION OF SYSTEMS**

1.2.1 **Digital Lighting Controls**

1.2.1.1 Provide Digital Lighting Control devices as shown on plans and specified herein.

1.3 **SUBMITTALS**

1.3.1 Submit a lighting control sequence of operation schedule with shop drawings outlining control sequence for each type of room. Group rooms with identical sequence of operation and indicate room numbers.

1.3.2 Schedule to identify number of lighting zones, zone type (switching or dimming), auto-on operation (to preset lighting level if applicable), auto-off operation, daylight harvesting, work plane height and illumination as specified herein.

2 Products

2.1 **GENERAL**

2.1.1 Use materials specified herein or approved equal.

2.1.2 In general, switches and automatic wall switches to match wiring device colour. Faceplates for low-voltage switches to match wiring device faceplates. Refer to Section 16100.

2.2 **DIGITAL LIGHTING CONTROLS**

2.2.1.1 Provide a 100% digital lighting control system as shown on the drawings to meet space control requirements of AHSRAE/IESNA 90.1-2013. Provide occupancy/vacancy modes of operation. In general, provide two control circuits per lighting zone with one circuit configured in occupancy mode and other in vacancy mode.

2.2.1.2 Provide automatic shut-off of receptacles as shown on the drawings. Receptacles to be powered whenever spaces are occupied, regardless of overhead lighting.

2.2.1.3 System to be capable of adjustment, including programming and photosensors and occupancy sensor parameters, using software residing on a PC. Room controllers to operate independent of programming PC.

2.2.1.4 All components to be self-configuring, digitally addressable, capable of ladderless configuration and will not have dip switches or potentiometers.

2.2.1.5 Provide contact closure to BAS for occupancy status. To be Acuity Brands nLight nAR40.

2.2.2 **Digital Room Controllers**

2.2.2.1 Provide digitally addressable relay controllers. Controllers to be self-configuring, automatically binding the room loads to the connected control devices without commissioning or the use of any tools.

2.2.2.2 Housing to be plenum rated and complete with nipple to mount to standard junction box.

2.2.2.3 Room controllers to have integral on/off zero-crossing relays rated for 16A at 120V and three connections for digital lighting network connection.

2.2.2.4 Each room controller to have 0-10V dimming output.

Acuity Brands, nLight nPP16 EFP.

2.2.2.5 Provide receptacle controllers for circuits as shown on the drawings.

Acuity Brands, nLight nPP20 PL.

2.2.3 **Digital Switches**

2.2.3.1 Low voltage momentary pushbutton switches to be thee button configuration, white and compatible with standard decorator wall plates. Buttons to be field replaceable without removing switch from wall. Acuity Brands nLight nPODMA-DX-WH. Provide nPODMA-WH for non-dimming loads.

2.2.3.2 Buttons to be field replaceable without removing switch from wall.

2.2.3.3 Switches to have two connection ports for digital network through-wiring.

2.2.4 **Digital Occupancy Sensors**

2.2.4.1 Digital occupancy sensors to provide automatic switching for specified load connected to a room controller. Sensors shall be interchangeable without the need for rewiring.

2.2.4.2 Sensors to have two connection ports for digital lighting network.

2.2.4.3 Sensors to use dual technology (passive infrared and ultrasonic or microphonic) for occupancy detection. Sensors must be initially trigged by both detection technologies.

2.2.4.4 Digital occupancy sensors shall provide digital calibration for sensitivity (0-100%), time delay (1-30 minutes) and test mode.

2.2.4.5 Multiple occupancy sensors shall be able to be added to the digital lighting network without additional configuration.

2.2.4.6 Unless otherwise indicated, provide the following models according to the symbol type:

Type	Symbol	nLight Cat. No.	Mounting
1		nCM PDT-10-RJB	ceiling

2.2.5 **Isolated Relay Interface**

2.2.5.1 Provide Acuity Brands nLight nIO-1S, isolated relay interface to provide contact closure.

2.2.6 The following manufacturers will be considered as equal, subject to the requirements of Clause “Material and Equipment”:

Acuity nLight Series
Wattstopper DLM Series
Current NX Series

3 Execution

3.1 **DIGITAL LIGHTING CONTROLS**

3.1.1 Provide CMP rated Category 5e with RJ-45 connectors for all control wiring. Wiring in accessible ceiling space may be free run, supported by conduit for other systems. Do not attach cable to ceiling grid supports. In inaccessible ceilings and all walls, provide conduit and back boxes.

3.1.2 Digital lighting network cabling to be green throughout building. Contractor to ensure cabling colour is unique from other low voltage cabling (data, voice, BAS controls, etc).

3.1.3 Program all rooms for 50% automatic ON operation and 100% automatic OFF operation of all circuits. Programming to be in accordance with ASHRAE 90.1.

3.1.4 Adjust time delay so that controlled area remains lit for 5 minutes after occupant leaves area.

3.1.5 Provide assistance to BAS contractor as required to integrate, at minimum, occupancy status with BAS.

3.1.6 Upon completion of the installation, the system shall be commissioned by the manufacturer's factory authorized representative who will verify a fully functioning system. Provide Consultant and Owner ten working days written notice of system startup and adjustment date.

3.1.7 Provide room-by-room documentation on the commissioning of the system including sensor parameters, time delays, sensitivities, daylighting setpoints, sequence of operation, (e.g. manual ON, Auto OFF. etc.) and load parameters (e.g. blink warning, etc.).

3.1.8 Resubmit updated sequence of operation schedule to include high trim setting for each lighting zone and measured illumination at work plane.

3.1.9 Upon completion of commissioning, the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.

3.1.10 Thirty days from occupancy re-calibrate all sensor time delays and sensitivities to meet the Owner's specific requirements. Provide a detailed report to the Consultant of re-commissioning activity.

3.1.11 Turn handheld configuration tools over to Owner's representative at end of construction. Provide signed letter from Owner confirming receipt, and include in electrical manuals.

END OF SECTION

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 16001, “Electrical General Provisions”.

1.2 **DESCRIPTION OF SYSTEMS**

1.2.1 **Fire Alarm System**

1.2.1.1 Supply and install all equipment and accessories to extend the existing electrically supervised, coded, zoned fire alarm system by Mircom as described herein and as shown on plans. Fire alarm devices are to be in accordance with the Ontario Building Code and associated standards.

2 Products

2.1 **FIRE ALARM CONTROL PANEL**

2.1.1 Existing Fire Alarm Control Panel is Mircom FX-2000.

2.1.2 Consult with fire alarm manufacturer to determine accessories and wiring diagrams required to extend the existing fire alarm system. Extras will not be granted for failure to consult with fire alarm manufacturer.

2.2 **WIRING**

2.2.1 Provide new wiring to conform with requirements of Ontario Electrical Safety Code Section 32, and applicable Codes and Standards. Size wiring in accordance with Class 2 requirements, but protected from mechanical injury or other injurious conditions such as moisture, excessive heat or corrosive action in accordance with Class 1 requirements.

2.2.2 General wiring with a floor area, conductors to be solid copper Securix II, Type 105°C PVC, 300 volt. Minimum size of any conductor: for alarm receiving circuits and remote annunciators, #16 AWG solid. Wire resistance in these circuits not to exceed 50 ohms. For audible signal circuits minimum #16 AWG solid. Voltage drop to any signal not to exceed 10%.

2.2.3 Conductors in multi-conductor cables to have allowable temperature rating of at least 105°C (200°F).

2.2.4 All conductors to be as per Ontario Electrical Safety Code and installed in metallic raceway.

2.2.5 Install conductors entirely independent of all other wiring and do not enter fixture, raceway, box or enclosure occupied by other wiring.

2.2.6 Splices will not be permitted unless otherwise indicated on the Drawings or specified. Where splices are necessary and approved by the Consultant, use approval metal contact electrical crimp type connectors.

2.2.7 All wiring must be clear of shorts, open and grounds on completion of work.

2.3 **MANUFACTURER**

2.3.1 The following manufacturers of the above equipment will be considered as equal subject to requirements of Clause “Materials and Equipment”:

Mircom

3 Execution

3.1 **FIRE ALARM SYSTEM INSTALLATION**

3.1.1 Fire alarm system installation to be in accordance with the latest edition of CAN/ULC S-524 “Standard for the Installation of Fire Alarm Systems”.

3.1.2 **Wiring**

3.1.2.1 Riser diagrams on drawings show general design intent. Obtain complete wiring diagrams from Fire Alarm manufacturer prior to rough-in.

3.1.2.2 Provide all wiring in conduit and in accordance with Fire Alarm equipment manufacturer's requirements.

3.1.2.3 Identify signal circuit, initiating circuit, auxiliary circuit and all other wiring at Fire Alarm control panel, annunciator, terminal boxes or elsewhere on completion of work with appropriate marking labels.

3.1.2.4 All conventional initiating wiring to be Class B.

3.1.2.5 All initiating and D.C. signal circuits extending from the fire alarm control to be current limited and protected, in accordance with Ontario Electrical Safety Code requirements.

3.1.2.6 The extended circuit wiring to each alarm receiving circuit or signal circuit is to be individually supervised with no common wiring.

3.1.2.7 Install all wiring in EMT metal conduit above ceilings, and surface in mechanical spaces, and in maintenance/storage spaces with exposed ceilings.

3.1.3 **Devices**

3.1.3.1 Install detectors in accordance with CAN/ULC Standard CAN/ULC-S524:2019 latest edition “Installation of Fire Alarm Systems”.

3.1.3.2 Location of devices shown on Drawings are approximate and must be adjusted to site conditions. If location of existing device to be replaced is not properly centred in individual rooms, adjust to suit.

3.1.4 Mount detectors on ceiling as per CAN/ULC Standard CAN/ULC-S524:2019 standard unless otherwise specified herein, with the minimum and maximum distances as required for the respective type of detector, at the highest point where variations in ceiling height exist. Do not mount detectors on sides, on undersides, or less than 600 mm (20”) from walls, beams, joints, ducts, open web steel joists, bulkheads or any structure projecting below actual ceiling height and less than 450 mm (18”) from air handling or heating outlets.

3.1.5 Should interference from obstruction, lamp positions, air outlet or heat radiating surfaces be encountered in locating any detector where shown, locate the detector as near as possible to the indicated position, clear of obstacles, to the satisfaction of the Consultant, but maintain a clear space of 600 mm (24”) on the ceiling, below and around.

3.1.5.1 Duct detectors to be mounted in supply air ducts unless otherwise indicated on the Drawings.

3.1.5.2 Mount end of line resistors beside last device. Document location of end of line resistors and place inside fire alarm control panel and in maintenance manuals. Provide PTouch labels on end of line faceplates indicating circuits contained within.

3.1.6 Locate all addressable monitor modules adjacent to equipment being monitored.

3.1.7 Locate all addressable control modules for motors adjacent to starters/motor control centres or building automation control panels as site directed.

3.1.8 Locate all addressable control modules not controlling motors within 3' of device being controlled, where practicable.

3.1.9 **Ancillary Devices**

3.1.9.1 Shutdown of fans to occur at starter separate from building automation controls. Where single point connections are provided to mechanical equipment, connect to fire alarm shutdown contact on mechanical equipment control panel.

3.2 VERIFICATION AND CERTIFICATION OF FIRE ALARM EQUIPMENT

3.2.1 The Contractor is to provide a full set of Electrical Drawings and Specifications to the fire alarm system representative prior to starting the verification of the fire alarm system. Failure to do so may require the entire fire alarm system to be reverified. Fire alarm system representative to review drawings and provide comments to Consultant prior to commencing verification.

3.2.2 All construction work must be complete before verification of fire alarm system is started. Any modifications to the fire alarm installation after the verification has been commenced will require the entire system to be reverified. Where partial occupancies occur, the fire alarm system for the area to be occupied (including control units) shall meet the requirements of this Standard. Upon system completion, those parts of the fire alarm system tested to this Standard shall be retested in accordance with the requirements of CAN/ULC-S536, Standard for the Inspection and Testing of Fire Alarm Systems, prior to the release of the Verification Report.

3.2.3 Fire alarm technician to review existing building prior to date of verification and review any existing conditions requiring repair. Submit report minimum one week before commencing verification. Consultant will review and issue appropriate instruction.

3.2.4 Where a field device is replaced, the device shall be verified in accordance with CAN/ULC-S537:2019.

3.2.5 The Contractor is to engage the services of the Fire Alarm manufacturer's representative to verify the fire alarm system in accordance with CAN/ULC-S537:2019.

3.2.6 During the period of inspection by the manufacturer's representative, make available to the manufacturer's representative as many electricians as designated by the manufacturer's representative to complete the verification within the specified time frame.

3.2.7 Contractor is to supply Consultant with a list of deficiencies indicating areas where installation deviates from ULC Standards or Ontario Building Code. This list will be reviewed and authorized or rejected by Consultant prior to acceptance of certificate.

3.2.8 **Inspection Certification:** On completion of the inspection and when all the above conditions have been complied with, the Contractor is to provide to the Consultant:

3.2.8.1 A verification report identical to Appendix C of CAN/ULC-S537:2019 completed by the fire alarm manufacturer's technician. Document C1 from CAN/ULC-S537:2019 must be signed and dated by the technician upon completion of the verification.

3.2.8.2 A certificate of verification confirming that the inspection has been completed showing the conditions upon which such inspection and certification have been rendered. Certificate must be free of conditions noted. No additional exceptions or conditions are acceptable.

3.2.8.3 Proof of liability insurance for the inspection.

3.2.8.4 A letter separate from the Verification Report stating “All door hold open devices, including latch retraction/release have been tested by the fire alarm verifier and are installed and working, in accordance with Ontario Building Code 3.1.8.12".

3.2.8.5 Provide ESA Inspection Certificate.

3.2.9 **Description of Fire Alarm System**

3.2.9.1 Upon completion of the project, provide to the Owner a copy of CAN/ULC-S536-13 Appendix E "Description of Fire Alarm System for Inspection and Test Procedures". Provide type written copy of this form and provide soft copy with maintenance manuals.

3.3 **FIRE WATCH - ALTERNATIVE MEASURES FOR OCCUPANT FIRE SAFETY**

3.3.1 In the event of any shutdown of fire protection equipment or part thereof, the Fire Department and building occupants/owner should be notified. Instructions should be posted as to alternate provisions or actions to be taken in case of an emergency. These provisions and actions should be acceptable to the Chief Fire Official and be in accordance with the accepted Fire Safety Plan.

3.3.2 An attempt to minimize the impact of inoperative equipment should be made (i.e. where portions of a sprinkler, fire alarm system and standpipe system are taken out of service, the remaining portions will be maintained). Assistance and direction for specific situations should be sought from the Fire Department and be in accordance with the accepted Fire Safety Plan.

3.3.3 Procedures to be followed in the event of shutdown of any part of a fire protection system are as follows:

3.3.3.1 Notify the Fire Department and the monitoring station. Give your name, address and a description of the work and when you expect it to be corrected. The Fire Department should be notified in writing of shutdowns longer than 24 h;

3.3.3.2 Post notices on all floors by elevators and at entrances, stating the work and when it is expected to be completed;

3.3.3.3 Unless noted otherwise in the Fire Safety Plan, have staff or other reliable person(s) patrol the affected area(s) at least once every hour; and

3.3.3.4 Notify the Fire Department, the fire signal receiving centre, and building occupants/owner when work has been completed and systems are operational.

3.4 **INSPECTION COSTS**

3.4.1 Include all costs involved with this inspection in the total Bid Price.

3.5 **TESTING**

3.5.1 Tests of the complete system in the presence of the Owner and the Consultant are to include:

3.5.1.1 Spot check of devices to ensure proper connections and supervision.

3.5.1.2 Operation of an alarm initiating device on each detection circuit is to verify the required operation of alarm devices, annunciators, etc.

3.5.1.3 Operation of all other alarm initiating devices in a convenient, silent method (buzzer, light, meter, etc.) are to ensure connection to the proper circuit and function of the device.

3.5.1.4 Live smoke or open flame are not to be used for testing.

3.5.1.5 Test each area in stages to match the Work Schedule.

3.5.1.6 Demonstrate to Consultant and Owner the operation of ancillary functions (ie maglock and door hardware release, elevator recall, etc).

3.5.2 Provide assistance to the Fire Inspection Department for testing a minimum of 25% of the installed field devices and up to 100% of sprinkler/ standpipe devices (supervised valves, flow switches, etc). Correct deficiencies and retest any devices or zones operating incorrectly as directed by the Fire Inspection Department.

3.5.3 This building requires integrated systems testing. Provide fire alarm technician and electrician for duration of integrated systems testing.

3.6 **TRAINING**

3.6.1 The Contractor shall provide 2 hours training for the complete operation of fire alarm system.

END OF SECTION

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 26 05 00, “Common Work Results for Electrical”.

1.2 **INTEGRATED SYSTEMS TESTING**

1.2.1 Integrated Systems Testing (IST) is a systematic verification process that confirms the correct operation and interaction of fire protection and life safety systems. Unlike individual system commissioning, IST focuses on validating the entire sequence of operations among multiple systems integrated with the fire alarm under simulated emergency conditions. IST extends beyond fire alarm verification per CAN/ULC-537, Verification of Fire Alarm Systems, which only tests fire alarm components without verifying correct or actual operation of ancillary equipment. For example, doors in fire separations must release, close and latch upon a fire condition. This requires correct operation of the fire alarm, door hold-open devices, door closers, and door latching hardware. Where fire alarm verification only tests the smoke detector and fire alarm release, IST testing ensures that all components are present and functioning to meet the intended operation of the complete system.

1.2.2 This building requires integrated systems testing as required by the Ontario Building Code. Refer to requirements outlined in this specification. This work needs to be coordinated, scheduled and reports provided to the Consulting team well in advance of the required occupancy date. Schedule this testing accordingly in consultation with the general contractor and IST Coordinator.

1.2.3 Contractor to engage with a 3rd party commissioning type contractor to act as the Integrated Testing Coordinator (ITC) to arrange for this work.

2 Products

2.1 **INTEGRATED SYSTEMS TESTING**

2.1.1 Provide Integrated Systems Testing Plan (ITP) detailing system interfaces, control sequences and test scenarios as indicated in CAN/ULC-S1001-11 "Integrated Systems Testing of Fire Protection and Life Safety Systems”.

2.1.2 Provide Architectural, Mechanical and Electrical Drawings and Specifications to ITC upon construction start, along with all Supplemental Instructions and Change Orders issued throughout construction. ITC is responsible to review the documents to determine the scope of the IST and develop a project specific ITP.

2.1.3 Systems to be tested for proper integration with the fire alarm system are noted in CAN/ULC-S1001-11 and include but are not limited to elevators, cooking equipment fire suppression systems, hold-open devices, electromagnetic locks, smoke control systems, emergency generators, audio/visual and/or lighting controls, notification systems, sprinkler systems, standpipe systems, fire pumps, water supplies, water supply control valves, freeze protection systems, fixed fire suppression systems.

3 Execution

3.1 **INTEGRATED SYSTEMS TESTING**

3.1.1 Submit the test plan and proposed reports to the Consultant for approval prior to scheduling the IST.

3.1.1.1 ITC to provide all equipment required for testing, including but not limited to signage, canned “testing smoke” and communications radios.

3.1.1.2 ITC to communicate with participants ahead of scheduled testing date to indicate participant expectations and responsibilities, including bringing required and/or recommended PPE, such as hearing protection.

3.1.1.3 Integrated Systems Testing shall require individual functional testing of each installed instance of a system integration element. A system integration element means each discrete physical interface, control, releasing, or monitored element that forms part of an integration between the fire alarm system and other building systems, including door hardware and door control systems. Testing shall verify both the transmission of the command or signal and the actual physical response of the interfaced system, hardware, or device confirming that the intended function occurs. Verification of operation shall include confirmation that the commanded condition results in the intended final state of the interfaced system.

3.1.1.4 Sampling or representative testing of system integration elements, including identical elements such as door hold-open devices and related door hardware, shall not satisfy this requirement.

3.1.1.5 ITC to provide to the General Contractor a tentative schedule with estimated time required for each system. General Contractor will arrange and schedule trades, modifying order of testing as required to suit all participants’ schedules. Trades will not be expected to attend testing of systems unrelated to their scope of work.

3.1.1.6 Provide completed IST reports upon completion of fire alarm verification and submission of verification reports and certificate. The completed IST reports shall each be sealed by a licensed Engineer with Professional Engineers Ontario who qualified to provide this Engineering service and insured in accordance with the requirements of Division C of the 2012 OBC. That individual will be designated herein as the Integrated Systems Testing Coordinator for the project. Submit their proof of Engineers liability insurance with the final report.

3.1.2 The following are acceptable Integrated Systems Testing Coordinators:

Great Lakes Fire Consulting & Engineering
Guardian Fire Consulting Group
Lonergan Engineering
WSP

END OF SECTION

REPORT

2025 Asbestos Reassessment Survey Report

Goderich Municipal Childcare Centre
376 Cambridge Street, Goderich, Ontario

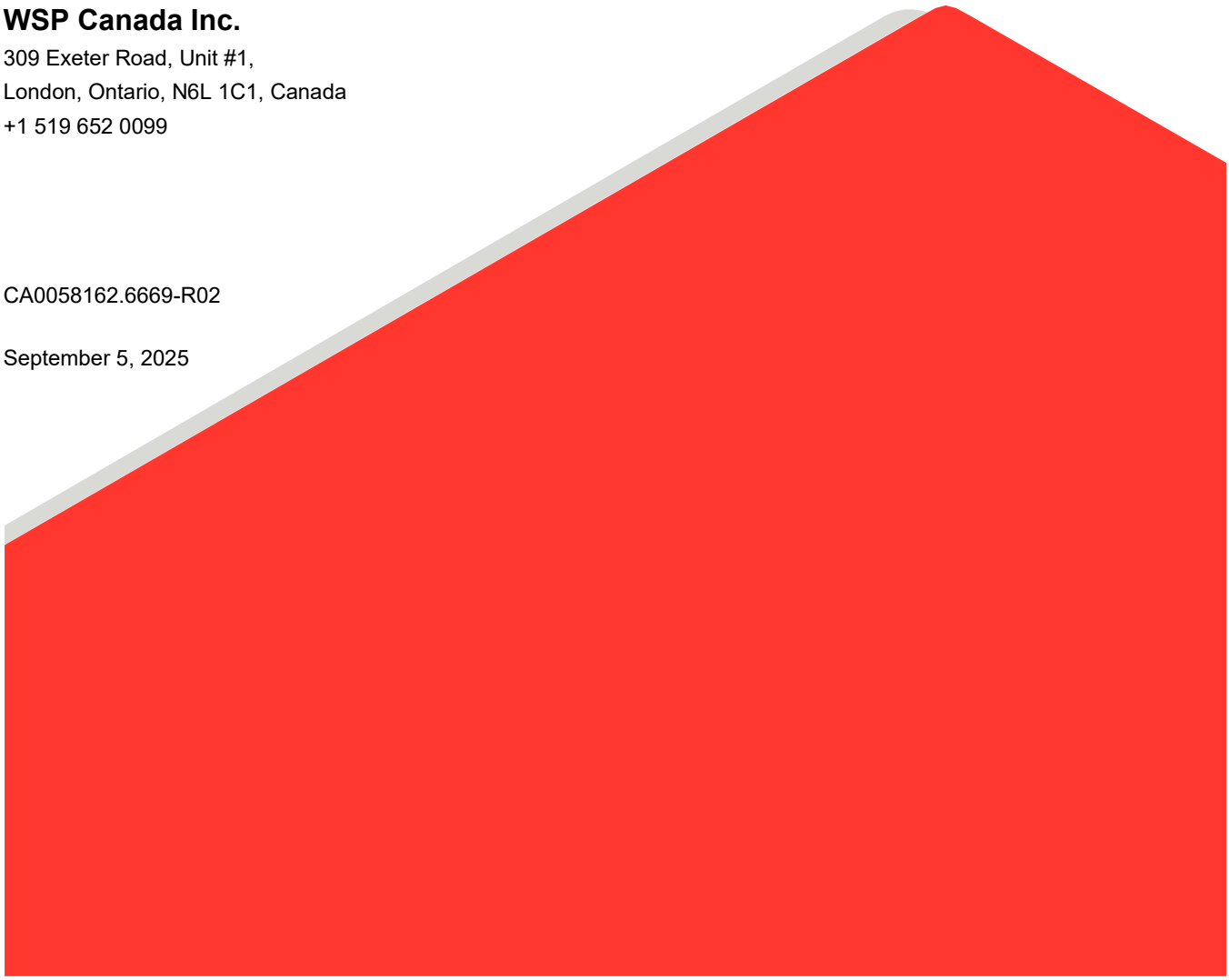
Submitted to:

John Dobie, Facilities Maintenance Manager

Town of Goderich
57 West Street
Goderich, Ontario
N7A 2K5

Submitted by:

WSP Canada Inc.
309 Exeter Road, Unit #1,
London, Ontario, N6L 1C1, Canada
+1 519 652 0099



CA0058162.6669-R02

September 5, 2025

Distribution List

1 Electronic Copy: Town of Goderich

1 Electronic Copy: WSP Canada Inc.

Executive Summary

At the request of the Town of Goderich (Town), WSP Canada Inc. (WSP), conducted a visual asbestos reassessment of the Goderich Municipal Childcare Centre (Site) to identify the current condition of building materials and architectural finishes that have been determined to contain, or are presumed to contain, asbestos. The survey was performed with the objective of updating an inventory of previously identified asbestos-containing materials (ACMs) and presumed asbestos-containing materials (PACMs) and to provide recommendations to manage these materials in accordance with Ontario Regulation 278/05 *Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations*, as amended (O. Reg. 278/05). The field work component of this reassessment was completed August 5, 6 and 8, 2025, by K. Huffman of WSP.

The following is a summary of ACMs and PACMs identified. Roofing materials (including shingles, mastics, membranes, etc.) have not been sampled and, therefore, all roofing materials not noted in the sample summary are presumed to contain asbestos until sampling and analysis prove otherwise.

Material Description	Asbestos Content	Location(s)	Friable	Priority
12”x12” cream with grey streaks vinyl floor tiles	0.5% Chrysotile	8, 9, 9A, 9B, 11, 15, 16, 21, 26, 28A	No	3
Duct flex connectors	Presumed	14	No	3
Fire doors	Presumed	Throughout the Site	No	3
Off-white vinyl floor tiles under carpet	1% Chrysotile	12	No	3
Door caulking	Presumed	1A	No	3
Roofing materials	Presumed	Exterior	No	3

Based on the findings of this assessment, priorities have been assigned for each ACM or PACM identified. Materials identified as Priority 3 materials, can remain in place with the implementation of a routine inspection program to monitor their condition.

No Priority 1 or Priority 2 materials were identified at the time of the assessment.

All ACMs and PACMs identified require routine inspection as indicated in O. Reg. 278/05. Based on the requirements of O. Reg. 278/05, WSP recommends the following:

- Inaccessible locations should be considered to contain asbestos until they can be accessed and properly assessed. Inaccessible areas, such as wall cavities or above inaccessible ceilings, may contain undiscovered ACMs. If encountered during future renovations or demolition, suspect materials should be treated as asbestos containing until proven otherwise;
- If tunnels or crawlspaces are present, they should be considered to contain asbestos until they can be accessed and properly assessed;

- Should planned renovations involve the removal of the materials identified as asbestos containing, ensure that all appropriate precautions (as detailed in O. Reg. 278/05) are followed; and
- Materials listed in this report as presumed ACMs should either be sampled prior to disturbance, such as building maintenance activities, renovation, or demolition, or treated as ACMs and handled in accordance with the requirements of O. Reg. 278/05.

Table of Contents

1.0 INTRODUCTION 6

1.1 Scope of Work 6

2.0 METHODOLOGY 6

2.1 Building Systems Assessed 6

2.1.1 Mechanical Systems 7

2.1.2 Structural Components 7

2.1.3 Architectural Finishes 7

2.1.4 Miscellaneous 7

2.2 Material Sampling and Analysis 7

2.3 Presumed ACMs (PACMs) 8

2.4 Response Action Priorities 9

2.5 Limitations of Survey 9

3.0 FINDINGS 10

3.1 Building Information 10

3.2 Site Specific ACM Information 10

3.2.1 Mechanical 12

3.2.2 Structural 12

3.2.3 Architectural 12

3.2.4 Other 13

3.3 Summary of ACM Locations 13

4.0 RECOMMENDATIONS 13

4.1 General Recommendations 13

4.2 Site Specific Recommendations 13

5.0 LIMITATIONS AND USE OF REPORT 14

6.0 CLOSURE 15

TABLES

Table 1: Bulk Material Sampling Requirements 7
Table 2: Examples of ACMs and PACMs Included in this Assessment 8
Table 3: Summary of Building Information 10
Table 4: Summary of Asbestos Bulk Sample Results 11
Table 5: Summary of ACMs and PACMs at the Site 13

APPENDICES

APPENDIX A
Figures

APPENDIX B
ACM Photograph Log

APPENDIX C
Laboratory Certificates of Analysis

1.0 INTRODUCTION

At the request of the Town of Goderich (Town), WSP Canada Inc. (WSP), conducted a visual asbestos reassessment of the Goderich Municipal Childcare Centre (Site) to identify the current condition of building materials and architectural finishes that have been determined to contain, or are presumed to contain, asbestos. The survey was performed with the objective of updating an inventory of previously identified asbestos-containing materials (ACMs) and presumed asbestos-containing materials (PACMs) and to provide recommendations to manage these materials in accordance with Ontario Regulation 278/05 *Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations*, as amended (O. Reg. 278/05). The field work component of this reassessment was completed August 5, 6 and 8, 2025, by K. Huffman of WSP.

1.1 Scope of Work

The scope of the work included a visual reassessment of non-friable ACMs previously identified by AMEC (now WSP) in an asbestos survey report for the above-noted building (2013 Report) and supplemented by previous annual visual asbestos reassessments at the Site completed by WSP since 2013 (the Previous Reassessment Reports). The work described herein included the following items:

- Visual assessment of accessible locations of each previously identified ACM or PACM;
- Visual assessment of accessible locations previously identified as not containing any known or suspected ACMs for confirmatory purposes;
- Provision of representative photographs of each ACM and PACM to assist in future on-site identification of these materials;
- Assignment and provision of recommended response action priorities for each accessible ACM or PACM at the Site to meet Building Owner requirements under Section 8 of O. Reg. 278/05;
- A description of the location and nature of any ACM or PACM observed in a condition other than ‘good’ requiring a Building Owner response other than routine inspection; and
- Provision of colour drawings outlining approximate locations of accessible ACMs or PACMs at the Site; and

2.0 METHODOLOGY

The reassessment included a visual assessment of accessible areas to confirm quantities and determine the current condition and extent of ACMs and PACMs within the Site. The reassessment was carried out on a room-by-room basis with WSP relying on the findings of the Previous Reassessment Reports to determine materials identified as ACMs or PACMs. Each location at the Site was assigned a location reference number that was used to create a uniform way to relate information between the report and its associated figures.

Materials were assessed based on the type of asbestos, as determined by laboratory analysis, condition and accessibility. Response action priorities were assigned to all materials determined to contain asbestos or presumed to contain asbestos.

2.1 Building Systems Assessed

The survey involved a visual assessment of the Site and accessible building systems. Building systems typically included are described in the following subsections.

2.1.1 Mechanical Systems

Building mechanical systems such as heating, ventilation, and air conditioning (HVAC) systems were inspected for the presence of ACMs on accessible components. The survey included visual inspection of accessible insulation on pipe runs, pipe fittings, ducts, etc., including parging cement which may be present over other insulating materials or directly on mechanical systems.

The assessment did not include partial or full dismantling of equipment, such as boilers, flanges, etc., to determine whether suspect materials were present.

2.1.2 Structural Components

Accessible and/or observable structural components at the Site were visually assessed to assist in identifying suspect ACMs and to delineate, where possible, areas of homogeneous construction. Structural components typically observed include accessible foundation walls, roofing supports and/or decks, fire-stopping and fireproofing materials, floor slabs, asbestos cement panels, etc.

2.1.3 Architectural Finishes

Architectural finishing materials, such as vinyl floor tiles and sheet flooring, mastic, ceiling tiles, troweled or spray-applied texture coats and finishes, asbestos sheet materials, joint compound, and caulking materials, were visually assessed where accessible to assist in identifying suspect ACMs.

2.1.4 Miscellaneous

In addition to structural, mechanical, or architectural components at the Site, miscellaneous materials, considered suspect for the presence of asbestos were also visually assessed and noted, when observed, during the reassessment. Typical materials noted, when present, include incandescent heat shields and fire doors.

2.2 Material Sampling and Analysis

Homogeneous materials are defined by O. Reg. 278/05 as materials that are uniform in colour and texture, even if their occurrence is not contiguous or physically connected. Bulk samples of each homogeneous material suspected to contain asbestos were collected and submitted for laboratory analysis under chain-of-custody procedures, as reported in the 2013 Report, except where otherwise noted. Sample analysis of each homogeneous material was stopped at the first positive result in accordance with O. Reg. 278/05. Some samples were noted to have been identified by the laboratory to contain multiple phases, requiring separation and individual analysis of each phase.

As reported in the 2013 Report, all sampling was performed in accordance with the Table 1 *Bulk Material Samples* requirements of O. Reg. 278/05, as follows:

Table 1: Bulk Material Sampling Requirements

Type of Material	Size of Area of Homogeneous Material	Minimum # of Samples
Surfacing material, including without limitation material that is applied to surfaces by spraying, by troweling or otherwise. Examples include acoustical plaster and fireproofing materials.	Less than 90 square metres (m^2)	3
	90 m^2 or more, but less than 450 m^2	5
	450 m^2 or more	7

Type of Material	Size of Area of Homogeneous Material	Minimum # of Samples
Thermal insulation, except patches	Any size	3
Thermal insulation patch	Less than 2 linear metres or 0.5 m^2	1
Other material	Any size	3

All samples were submitted to independent laboratories, International Asbestos Testing Laboratories (IATL) or EMC Scientific (EMC) for asbestos content analysis. Both laboratories are accredited under the National Voluntary Laboratory Accreditation Program (NVLAP) for asbestos bulk sample analysis. Samples were analyzed by IATL and EMC for asbestos type and percentage content using polarized light microscopy (PLM) in accordance with United States Environmental Protection Agency (USEPA) methodology and dispersion staining techniques EPA 600/R-93/116. Samples were analyzed to a minimum detection limit of 0.5% to meet the requirements of O. Reg. 278/05. Materials reported to contain less than 0.5% asbestos, including those referred to as less than the limit of detection (<LOD), are not considered to be asbestos containing under current regulations in Ontario.

In situations where WSP was required to collect additional samples of materials, the samples were also submitted to an independently accredited laboratory for bulk asbestos analysis.

Copies of all available laboratory certificates are provided in Appendix C.

2.3 Presumed ACMs (PACMs)

For the purpose of this reassessment, certain material types were designated as PACMs and not sampled. PACMs may also be referred to as “assumed” or “suspect” materials. As required by O. Reg. 278/05, all PACMs are to be treated as ACMs until appropriate sampling and analysis proves otherwise. Materials generally designated as PACMs are presented in Table 2, below.

Table 2: Examples of ACMs and PACMs Included in this Assessment

Materials Sampled and Analysed for Asbestos Content	Materials Presumed to Contain Asbestos Until Proven Otherwise (PACMs)
Drywall joint compound	Fire doors
Vinyl floor tiles	Cast iron bell and spigot joint packing material
Texture coat	Roofing materials (including membranes, shingles, felts, sealers, etc.)
Window, door and expansion joint caulking	Gaskets and packing materials
White putty	Electrical wiring wrap
Lay-in ceiling tiles	Flexible duct connectors
Mastics	
Concrete block mortar	

2.4 Response Action Priorities

For each ACM or PACM identified, a specific response action priority has been assigned. The assigned priority is based on consideration of the type of asbestos present, the observed condition, and the accessibility of the material. These priorities are based on the likely risk posed by the material, with damaged materials that are easily accessible posing the greatest risk and materials in good condition in inaccessible areas posing the least risk. Response action priorities range from immediate clean-up of debris to on-going routine inspections of materials identified in good condition.

The following is a summary of the response action priorities assigned as a part of this reassessment:

- **Priority 1** – ACM was observed to be in poor condition and requires immediate removal, repair and/or encapsulation of the material and/or resulting debris. This action should be completed as soon as possible.
- **Priority 2** – ACM that requires minor work which, due to the nature and/or accessibility of the material, can be scheduled for completion over periods when staff are not present, provided that the work is completed within a reasonable time frame. Appropriate measures should be taken to ensure that the material is not further disturbed prior to the work commencing. Continue with routine inspection of the ACM to monitor the condition.
- **Priority 3** – ACM was observed to be in good condition and no work is currently required. Continue with routine inspection of the ACM to monitor the condition. In the event of a building alteration which could impact the material, it will be necessary to remove the ACM, regardless of condition, that is likely to be disturbed by renovation, demolition, or maintenance work.

2.5 Limitations of Survey

Only accessible areas were examined during our visual reassessment. An accessible area is defined to include areas above a suspended ceiling tile, within a manufactured access hatch or behind a closed door, not impeded by any structure, article or item. An enclosed area that requires demolition to gain entry or a temporary access hatch that is not readily opened is considered inaccessible. Ceiling spaces (between suspended ceiling and structural deck) and wall cavities that were not accessible at the time of this assessment should be considered to contain asbestos until proven otherwise. If these spaces are to be accessed for any reason, such as a roof leak, etc., an inspection should be conducted by a competent person and any suspect ACM should be sampled or presumed to contain asbestos. This report reflects the observations of accessed areas and analytical results of materials sampled during the survey.

Please note that the roof was not accessible during the 2025 reassessment. Additionally, some locations with drywall ceilings had no access to the ceiling space.

Carpets were lifted where possible to determine the material below. However, depending on the method of securing the carpet to the flooring substrate, it may not have been possible to remove the carpet without causing damage to determine the materials below; nor, where it was possible to lift corners of the carpet, was the entire surface area under the carpet surveyed. Therefore, when indicated, it is possible that asbestos materials may be present under a portion of the carpeted area. Asbestos-containing flooring material should be suspected below all carpets until proven otherwise. Similarly, in areas identified as having floor finishes, multiple layers of flooring materials, such as vinyl sheet flooring and vinyl floor tiles, may be present.

Equipment such as exhaust stacks and metal-clad breaching, boilers, kilns, electrical components and mechanical piping and ducting, were not disassembled for assessment. Subsequently, materials such as refractory, gaskets and other internal components should be considered suspect ACM until sampled and proven otherwise. Roofing components and building envelope materials such as window caulking or glazing that were not sampled due to concerns about damage to the building envelope should be presumed asbestos containing until proven otherwise.

The analytical results reflect the sampled materials at the specific sample locations. Visually similar materials (colour and texture) were referenced to specific analysed samples and considered to be 'homogeneous' (of like composition) in nature, as is stipulated in O. Reg. 278/05.

Crawlspaces and tunnels, which may be present at the Site, were not assessed and are not included within this report. Should any crawlspace or tunnel be present, it should be assumed to contain suspect ACMs until proven otherwise.

3.0 FINDINGS

The findings of this assessment have been summarized in tabular form and are supported by additional information presented in the appendices as follows:

- Appendix A: Figures;
- Appendix B: ACM Photograph Log; and
- Appendix C: Laboratory Certificates of Analysis.

Floor plans mapping selected ACMs and PACMs are presented as figures in Appendix A. Please note that all materials may not be mapped on the figures. Locations (rooms or areas) which could not be accessed at the time of WSP's site visit are also indicated on the provided figures.

3.1 Building Information

The following table is a summary of site-specific building information that was provided by the Town.

Table 3: Summary of Building Information

Year of Construction/Addition	Approximate Size (sq. m.)	Number of Floors
1981	465	1

3.2 Site Specific ACM Information

The following table is a summary of all known historical asbestos laboratory results available for the Site.

Table 4: Summary of Asbestos Bulk Sample Results

Material Sampled	Sample ID	Sample Date (dd/mm/yy)	Sample Location	Asbestos Content
12”x12” pink with white vinyl floor tile	1A-G	22/10/2013	1A	None detected
Yellow/black mastic				
12”x12” grey with white streaks vinyl floor tile	2A-C	22/10/2013	1A	None detected
Black mastic				
Drywall joint compound (Exterior Walls)	3A-C	22/10/2013	2	None detected
12”x12” cream with grey streaks vinyl floor tiles	**4A-C**	**22/10/2013**	**1**	**0.5% Chrysotile**
Black mastic				None detected
Texture coat	5A-G	22/10/2013	17	None detected
2’x4’ fat fissure in 4’ ceiling tile	6A-C	22/10/2013	2	None detected
Drywall joint compound (interior walls)	7A-C	22/10/2013	2	None detected
Brown debris material	8A-C	22/10/2013	2	None detected
Black mastic	9A-C	22/10/2013	2	None detected
12”x12” tan streaked vinyl floor tile	10A-C	22/10/2013	3	None detected
2’x4’ fissure in 2’ ceiling tile	11A-C	22/10/2013	3	None detected
Drywall joint compound (ceiling)	12A-C	22/10/2013	8	None detected
Red firestop	13A-C	22/10/2013	9B	None detected
2’x4’ fat fissure in 2’ ceiling tile	14A-C	22/10/2013	11	None detected
Grey window caulking	**15A-C**	**22/10/2013**	**13**	**1.1% Chrysotile**
12”x12” grey with dark grey vinyl floor tiles	16A-C	22/10/2013	16	None detected
Black mastic				
Yellow mastic	17A-C	22/10/2013	20	None detected
12”x12” light grey with grey vinyl floor tiles	18A-C	22/10/2013	27	None detected
Black mastic				

Material Sampled	Sample ID	Sample Date (dd/mm/yy)	Sample Location	Asbestos Content
12”x12” grey with light grey streaks vinyl floor tiles	19A-C	22/10/2013	27	None detected
Black mastic				
12”x12” green with white streaks vinyl floor tiles	20A-C	22/10/2013	25	None detected
Black, yellow, tan mastic/leveling compound				
Grey and green window caulking	21A-C	22/10/2013	Exterior	None detected
Grey expansion joint caulking	22A-C	22/10/2013	Exterior	None detected
Baseboard mastic	*1A-C	08/08/2018	4	None detected
12”x12” off-white vinyl floor tiles under carpet	***2A-C**	**08/08/2018**	**12**	**1% Chrysotile**
Carpet mastic	*3A-C	08/08/2018	12	None detected
Concrete block mortar	*4A-C	08/08/2018	3	None detected

The location, quantity and extent of ACMs have been identified throughout the Site based on the findings during WSP’s current reassessment and both the 2013 Report and the Previous Reassessment Reports. Photographs of ACMs and PACMs identified during WSP’s reassessment can be found in Appendix B.

3.2.1 Mechanical

Duct flex connectors are present at the Site but haven’t been sampled and are presumed to be asbestos containing due to the destructive nature of sampling. Duct flex connectors are considered to be non-friable and were observed to be in good condition at the time of the reassessment

3.2.2 Structural

Roofing materials were previously identified at the Site but haven’t been sampled and are presumed to be asbestos containing due to the destructive nature of the sampling. Roofing materials are considered to be non-friable and were presumed to be in good condition, as the roof was inaccessible during the 2025 reassessment.

3.2.3 Architectural

Asbestos-containing vinyl floor tiles were noted in various locations throughout the Site. Vinyl floor tiles are considered non-friable and were observed to be in good condition at the time of the reassessment.

Mastic underneath asbestos-containing vinyl floor tiles was presumed to be asbestos containing. Mastic is considered non-friable and was presumed to be in good condition based on the condition of the vinyl floor tiles.

Fire doors are presumed asbestos containing. Fire doors are considered non-friable and presumed to be in good condition based on the condition of the outer cover of the door.

3.2.4 Other

Grey window caulking found in Location 13 was identified as asbestos containing but was noted to have been removed at some point before the time of the 2025 reassessment.

No other ACMs or PACMs were noted at the Site at the time of the reassessment.

3.3 Summary of ACM Locations

The following table outlines the locations of each ACM and PACM observed at the Site during the reassessment.

Table 5: Summary of ACMs and PACMs at the Site

Material Description	Asbestos Content	Location(s)	Friable	Priority
12”x12” cream with grey streaks vinyl floor tiles	0.5% Chrysotile	8, 9, 9A, 9B, 11, 15, 16, 21, 26, 28A	No	3
Duct flex connectors	Presumed	14	No	3
Fire doors	Presumed	Throughout the Site	No	3
Off-white vinyl floor tiles under carpet	1% Chrysotile	12	No	3
Roofing materials	Presumed	Exterior	No	3

4.0 RECOMMENDATIONS

4.1 General Recommendations

Should planned renovations involve the removal of the materials identified as asbestos containing, all appropriate precautions, as detailed in O. Reg. 278/05, must be followed. Due to the presence of ACMs or PACMs at the Site, the implemented asbestos reassessment inspection program must be maintained at the Site as per the requirements of O. Reg. 278/05.

This survey was conducted to determine the condition of previously identified ACMs and PACMs in accessible areas that require monitoring. It is possible that undiscovered ACMs may be present within inaccessible locations such as wall cavities or above inaccessible ceilings. It is recommended that a more comprehensive and intrusive survey be conducted prior to any planned demolition or renovations that involve entering previously inaccessible areas. If encountered during future renovations or demolition, suspect materials should be treated as asbestos containing until proven otherwise.

4.2 Site Specific Recommendations

Based on the findings of this assessment, priorities have been assigned for each ACM or PACM identified. Materials identified as Priority 3 materials can remain in place with the implementation of a routine inspection program to monitor their condition.

No Priority 1 or Priority 2 materials were identified at the time of the assessment.

All ACMs and PACMs identified require routine inspection as indicated in O. Reg. 278/05. Based on the requirements of O. Reg. 278/05, WSP recommends the following:

- Inaccessible locations should be considered to contain asbestos until they can be accessed and properly assessed. Inaccessible areas, such as wall cavities or above inaccessible ceilings, may contain undiscovered ACMs. If encountered during future renovations or demolition, suspect materials should be treated as asbestos containing until proven otherwise;
- If tunnels or crawlspaces are present, they should be considered to contain asbestos until they can be accessed and properly assessed;
- Should planned renovations involve the removal of the materials identified as asbestos containing, ensure that all appropriate precautions (as detailed in O. Reg. 278/05) are followed; and
- Materials listed in this report as presumed ACMs should either be sampled prior to disturbance, such as building maintenance activities, renovation, or demolition, or treated as ACMs and handled in accordance with the requirements of O. Reg. 278/05.

5.0 LIMITATIONS AND USE OF REPORT

This report is prepared for the sole use of the Town of Goderich. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third party. The conclusions and recommendations contained in this assessment report are based upon professional opinions with regard to the subject matter. These opinions are in accordance with currently accepted industry practices for asbestos surveys and regulatory requirements for sampling and identifying materials and are subject to the following inherent limitations:

1) The data and findings presented in this report are valid as of the date(s) of the investigation only. The passage of time, manifestation of latent conditions or occurrence of future events may warrant further exploration of the Site, analysis of the data, and re-evaluation of the findings, observations and conclusions expressed in this report.

2) The data reported and the findings, observations, conclusions, and recommendations expressed in this report are limited by the scope of work. The scope of work was defined by the request of the client, the time and budgetary constraints imposed by the client, and availability of access to the Site.

3) Due to the limitations stated above, the findings, observations, conclusions, and recommendations expressed by WSP Canada Inc. in this report are not, and should not be, considered an opinion concerning compliance of any past or present owner or operator of the Site with any federal, provincial, or local laws or regulations.

4) No warranty or guarantee, whether expressed or implied, is made with respect to the data or the reported findings, observations, and conclusions, which are based solely upon site conditions in existence at the time of investigation.

5) WSP Canada Inc. will not be responsible for any real or perceived decrease in the property value, its saleability or ability to gain financing through the reporting of information in this report.

6) WSP Canada Inc.’s assessment reports present professional opinions and findings of a scientific and technical nature. While attempts were made to relate the data and findings to applicable environmental and occupational health and safety laws and regulations, the report shall not be construed to offer legal opinion

or representations as to the requirements of, nor compliance with, environmental and occupational health and safety laws, rules, regulations, or policies of federal, provincial, or local governmental agencies. Any use of the assessment report constitutes acceptance of the limits of WSP Canada Inc.'s liability. WSP Canada Inc.'s liability extends only to its client and not to other parties who may obtain this assessment report. Issues raised by the report should be reviewed by appropriate legal counsel.

7) In completing our scope of work, WSP Canada Inc. has relied on information provided by other individuals or companies as noted in the report. WSP Canada Inc. has assumed that the information provided is factual and accurate and WSP Canada Inc. has not independently verified the accuracy or completeness of such information, except as noted in the report.

6.0 CLOSURE

We trust that this report meets your requirements. If you have any questions regarding the content of this report, please do not hesitate to contact the undersigned.

Signature Page

WSP Canada Inc.

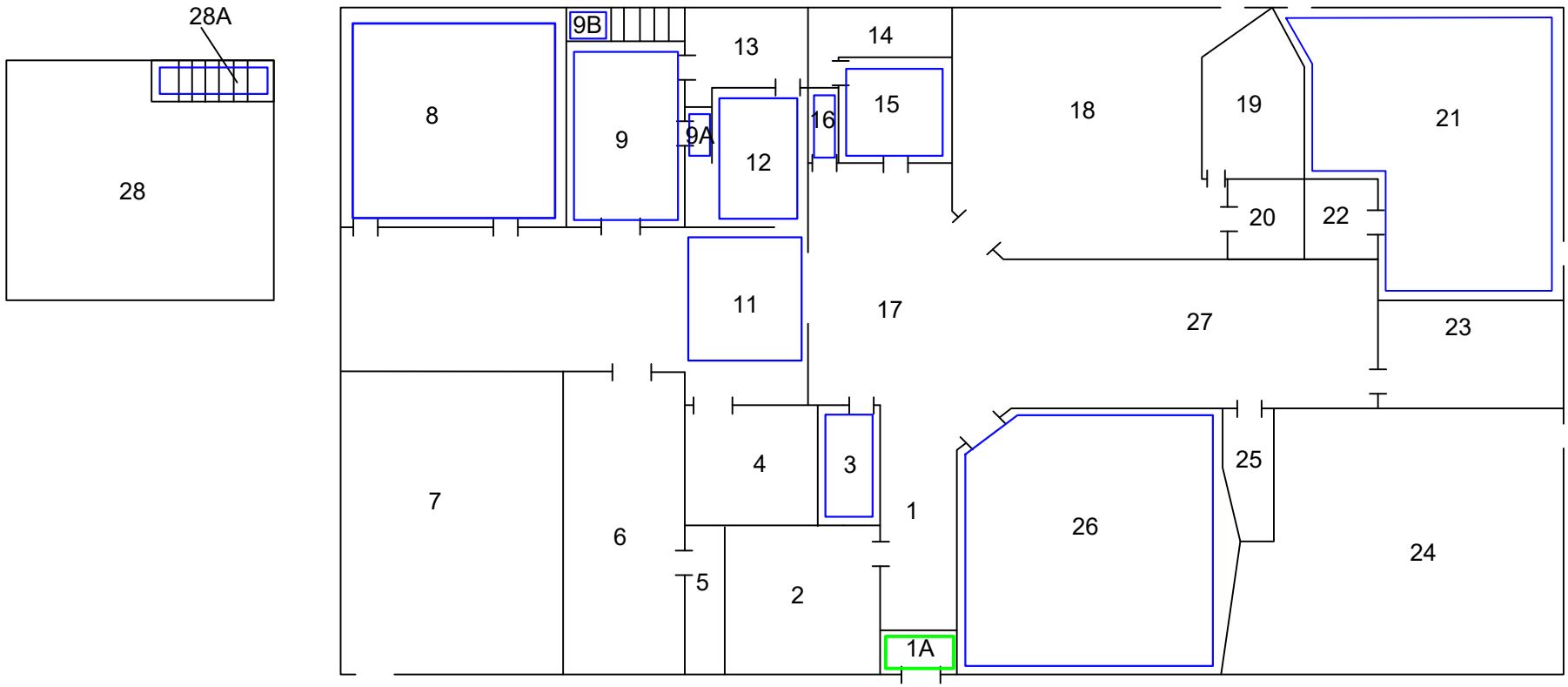
Kyle Huffman
Senior EHS Consultant

Jesse Clay
Senior EHS Consultant

KH/JBC/

APPENDIX A

Figures



LEGEND:

- ACM FLOORING
- ACM WALLS
- ACM CEILING
- ACM MECHANICAL

NOTES:
THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE WSP CANADA INC. REPORT No. CA0058162.6669.

ALL LOCATIONS ARE APPROXIMATE.

CLIENT:
TOWN OF GODERICH
57 WEST STREET
GODERICH, ONTARIO, N7A 2K5

WSP CANADA INC.
309 EXETER ROAD, UNIT 1
LONDON, ONTARIO
N6L 1C1
519-652-0099

DWN BY: KH
CHK'D BY: JC
DATUM: NAD83
PROJECTION: UTM Zone 17
SCALE: N.T.S.

PROJECT:
ASBESTOS-CONTAINING BUILDING MATERIALS
REASSESSMENT SURVEY
GODERICH MUNICIPAL CHILDCARE CENTRE
376 CAMBRIDGE STREET
GODERICH, ONTARIO

TITLE:
ACM LOCATION PLAN-MAIN FLOOR

DATE: SEPTEMBER 2025
PROJECT No: CA0058162.6669
REV. No: 0
FIGURE No: 1

DATE PLOTTED: 6/5/2023 1:44:15 PM
FILE LOCATION: P:\2023\Projects\06_Hygiene_Master\OES\#2312 — Town of Goderich — 2023 ACM Reassessment\2023 Reports\Childcare Centre\OES#2312-DAYCARE.dwg

APPENDIX B

ACM Photograph Log

Photo 1: 12”x12” cream with grey streaks vinyl floor tile (sample 4C) sampled from the Staff Washroom (Location 16) was found to contain 0.5% chrysotile asbestos.

APPENDIX C

Laboratory Certificates of Analysis

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147320 **Description / Location:** Pink/Tan Floor Tile; 12x12
Client No.: 1A Loc 1A

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147320 **Description / Location:** Yellow/Black Mastic **Layer No.:** 2
Client No.: 1A Loc 1A

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147321 **Description / Location:** Pink/Tan Floor Tile; 12x12
Client No.: 1B Loc 1A

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147321 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 1B Loc 1A

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Approved By: Frank E. Ehrenfeld, III
Laboratory Director

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147322 **Description / Location:** Tan Floor Tile; 12x12
Client No.: 1C Loc 1A

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147322 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 1C Loc 1A

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147323 **Description / Location:** Grey Floor Tile; 12x12
Client No.: 2A Loc 1A

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147323 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 2A Loc 1A

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147324 **Description / Location:** Grey Floor Tile; 12x12
Client No.: 2B Loc 1A

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147324 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 2B Loc 1A

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147325 **Description / Location:** Grey Floor Tile; 12x12
Client No.: 2C Loc 1A

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147325 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 2C Loc 1A

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147326 **Description / Location:** Off-White Joint Compound
Client No.: 3A Loc 2 Ext.

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147327 **Description / Location:** Off-White Joint Compound
Client No.: 3B Loc 2 Ext.

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147328 **Description / Location:** Off-White Joint Compound
Client No.: 3C Loc 2 Ext.

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147328 **Description / Location:** White Joint Compound **Layer No.:** 2
Client No.: 3C Loc 2 Ext.

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147329 **Description / Location:** Lt.Tan Floor Tile; 12x12
Client No.: 4A Loc 1

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 0.5	Chrysotile	None Detected	None Detected	PC 99.5

Lab No.: 5147329 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 4A Loc 1

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147330 **Description / Location:** Black Mastic; A/W 12x12 Floor Tile
Client No.: 4B Loc 1

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147331 **Description / Location:** Black Mastic; A/W 12x12 Floor Tile
Client No.: 4C Loc 16

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147332 **Description / Location:** White Texture
Client No.: 5A Loc 1

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147333 **Description / Location:** White Texture
Client No.: 5B Loc 1

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147334 **Description / Location:** White Texture
Client No.: 5C Loc 1

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147335 **Description / Location:** White Texture
Client No.: 5D Loc 17

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147336 **Description / Location:** White Texture
Client No.: 5E Loc 17

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147337 **Description / Location:** White Texture
Client No.: 5F Loc 17

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147338 **Description / Location:** White Texture
Client No.: 5G Loc 17

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147339 **Description / Location:** White/Tan Ceiling Tile; 2x4
Client No.: 6A Loc 2

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	30	Cellulose	30
		35	Fibrous Glass	
		5	Wollastonite	

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147340 **Description / Location:** White/Tan Ceiling Tile; 2x4
Client No.: 6B Loc 2

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	30	Cellulose	30
		35	Fibrous Glass	
		5	Wollastonite	

Lab No.: 5147341 **Description / Location:** White/Tan Ceiling Tile; 2x4
Client No.: 6C Loc 2

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	30	Cellulose	30
		35	Fibrous Glass	
		5	Wollastonite	

Lab No.: 5147342 **Description / Location:** Off-White Joint Compound
Client No.: 7A Loc 2 Int

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147343 **Description / Location:** Off-White Joint Compound
Client No.: 7B Loc 2 Int

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147344 **Description / Location:** Off-White Joint Compound
Client No.: 7C Loc 2 Int

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147345 **Description / Location:** Off-White Joint Compound
Client No.: 7D Loc 2 Int

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147346 **Description / Location:** Brown Cementitious
Client No.: 8A Loc 2 Debris

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147347 **Description / Location:** Brown/Black Cementitious/Tar
Client No.: 8B Loc 2 Debris

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147348 **Description / Location:** Brown Cementitious
Client No.: 8C Loc 2 Debris

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147349 **Description / Location:** Black Mastic
Client No.: 9A Loc 2

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147350 **Description / Location:** Black Mastic
Client No.: 9B Loc 2

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147351 **Description / Location:** Black Mastic
Client No.: 9C Loc 2

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147352 **Description / Location:** Lt.Tan Floor Tile; 12x12
Client No.: 10A Loc 3

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147353 **Description / Location:** Lt.Tan Floor Tile; 12x12
Client No.: 10B Loc 3

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147354 **Description / Location:** Lt.Tan Floor Tile; 12x12
Client No.: 10C Loc 3

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147355 **Description / Location:** White/Tan Ceiling Tile; 2x4
Client No.: 11A Loc 3

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	35	Cellulose	30
		35	Fibrous Glass	

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147356 **Description / Location:** White/Tan Ceiling Tile; 2x4
Client No.: 11B Loc 3

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	35	Cellulose	30
		35	Fibrous Glass	

Lab No.: 5147357 **Description / Location:** White/Tan Ceiling Tile; 2x4
Client No.: 11C Loc 3

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	35	Cellulose	30
		35	Fibrous Glass	

Lab No.: 5147358 **Description / Location:** White Joint Compound
Client No.: 12A Loc 8 Ceiling

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147359 **Description / Location:** White Joint Compound
Client No.: 12B Loc 8 Ceiling

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147360 **Description / Location:** White Joint Compound
Client No.: 12C Loc 8 Ceiling

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147361 **Description / Location:** Red Caulk
Client No.: 13A Loc 9B Firestop

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	3	Fibrous Glass	97

Lab No.: 5147362 **Description / Location:** Red Caulk
Client No.: 13B Loc 9B Firestop

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	3	Fibrous Glass	97

Lab No.: 5147363 **Description / Location:** Red Caulk
Client No.: 13C Loc 9B Firestop

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	3	Fibrous Glass	97

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147364 **Description / Location:** White/Tan Ceiling Tile; 2x4
Client No.: 14A Loc 10

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	35	Cellulose	30
		35	Fibrous Glass	

Lab No.: 5147365 **Description / Location:** White/Tan Ceiling Tile; 2x4
Client No.: 14B Loc 10

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	35	Cellulose	30
		35	Fibrous Glass	

Lab No.: 5147366 **Description / Location:** White/Tan Ceiling Tile; 2x4
Client No.: 14C Loc 10

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	35	Cellulose	30
		35	Fibrous Glass	

Lab No.: 5147367 **Description / Location:** Grey Caulk
Client No.: 15A Loc 13 Window

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 1.1	Chrysotile	None Detected	None Detected	PC 98.9

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147368 **Description / Location:** Sample Not Analyzed
Client No.: 15B

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
	Sample Not Analyzed		Sample Not Analyzed	

Lab No.: 5147369 **Description / Location:** Sample Not Analyzed
Client No.: 15C

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
	Sample Not Analyzed		Sample Not Analyzed	

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147370 **Description / Location:** Grey Floor Tile; 12x12
Client No.: 16A Loc 16

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147370 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 16A Loc 16

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147370 **Description / Location:** Clear Mastic **Layer No.:** 3
Client No.: 16A Loc 16

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147371 **Description / Location:** Grey Floor Tile; 12x12
Client No.: 16B Loc 16

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147371 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 16B Loc 16

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147372 **Description / Location:** Grey Floor Tile; 12x12
Client No.: 16C Loc 16

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147372 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 16C Loc 16

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147372 **Description / Location:** Grey Leveling Compound **Layer No.:** 3
Client No.: 16C Loc 16

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147373 **Description / Location:** Yellow/Tan Mastic
Client No.: 17A Loc 20

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147374 **Description / Location:** Yellow/Tan Mastic
Client No.: 17B Loc 20

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147375 **Description / Location:** Yellow/Tan Mastic
Client No.: 17C Loc 20

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147376 **Description / Location:** Grey Floor Tile; 12x12
Client No.: 18A Loc 27

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147376 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 18A Loc 27

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147377 **Description / Location:** Grey Floor Tile; 12x12
Client No.: 18B Loc 27

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147377 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 18B Loc 27

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147378 **Description / Location:** Grey Floor Tile; 12x12
Client No.: 18C Loc 27

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147378 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 18C Loc 27

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147379 **Description / Location:** Grey Floor Tile; 12x12
Client No.: 19A Loc 27

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147379 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 19A Loc 27

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147380 **Description / Location:** Grey Floor Tile; 12x12
Client No.: 19B Loc 27

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147380 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 19B Loc 27

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147381 **Description / Location:** Grey Floor Tile; 12x12
Client No.: 19C Loc 27

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147381 **Description / Location:** Black Mastic **Layer No.:** 2
Client No.: 19C Loc 27

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147382 **Description / Location:** Lt.Green Floor Tile; 12x12
Client No.: 20A Loc 25

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147382 **Description / Location:** Black/Yellow/Tan Mastic/LevelingCompoun **Layer No.:** 2
Client No.: 20A Loc 25

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147383 **Description / Location:** Lt.Green Floor Tile; 12x12
Client No.: 20B Loc 25

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147383 **Description / Location:** Black/Yellow/Tan Mastic/LevelingCompoun **Layer No.:** 2
Client No.: 20B Loc 25

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147384 **Description / Location:** Lt.Green Floor Tile; 12x12
Client No.: 20C Loc 25

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147384 **Description / Location:** Yellow/Black/GreyMastic/LevelingCompoun **Layer No.:** 2
Client No.: 20C Loc 25

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147385 **Description / Location:** Grey Window Caulk
Client No.: 21A Loc Ext

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147385 **Description / Location:** Green Window Caulk **Layer No.:** 2
Client No.: 21A Loc Ext

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147386 **Description / Location:** Grey Window Caulk
Client No.: 21B Loc Ext

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147386 **Description / Location:** Green Window Caulk **Layer No.:** 2
Client No.: 21B Loc Ext

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147387 **Description / Location:** Grey Window Caulk
Client No.: 21C Loc Ext

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147387 **Description / Location:** Green Window Caulk **Layer No.:** 2
Client No.: 21C Loc Ext

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147388 **Description / Location:** Grey Expansion Joint Caulk
Client No.: 22A Loc Ext

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 5147389 **Description / Location:** Grey Expansion Joint Caulk
Client No.: 22B Loc Ext

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

IATL **International Asbestos Testing Laboratories**

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructu
1940 Oxford St. E.; Unit 7
London ON N5V 4L8

Report Date: 10/22/2013
Report No.: 316979
Project: Goderich Daycare
Project No.: SW0113080

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5147390
Client No.: 22C

Description / Location: Grey Expansion Joint Caulk
Loc Ext

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA or any agency of the U.S. government
This report shall not be reproduced except in full, without written approval of the laboratory.

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: L. Solebello

Date: 10/22/2013

emcscientific
INCORPORATED

Laboratory Analysis Report

To:

Kyle Huffman
Wood E&IS
201 King Street
London, Ontario
N6A 1C9

EMC LAB REPORT NUMBER: A42016
Job/Project Name: Goderich Daycare DSS
Analysis Method: Polarized Light Microscopy – EPA 600
Date Received: Aug 9/18 **Date Analyzed:** Aug 16/18
Analyst: Chengming Li, *Analyst*
Reviewed By: Jon Delos Santos, *Laboratory Supervisor*

Job No: SWL189315
Number of Samples: 12
Date Reported: Aug 16/18

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
1A	A42016-1	Baseboard mastic / loc 4	Brown and yellow, mastic	**ND**			100
1B	A42016-2	Baseboard mastic / loc 4	Brown and yellow, mastic	**ND**			100
1C	A42016-3	Baseboard mastic / loc 4	Brown and yellow, mastic	**ND**			100
2A	A42016-4	VFT under carpet / loc 12	Off white, vinyl floor tile	**Chrysotile**	**1**		99
2B	A42016-5	VFT under carpet / loc 12	NA	**NA**			
2C	A42016-6	VFT under carpet / loc 12	NA	**NA**			
3A	A42016-7	Carpet mastic / loc 12	Yellow, mastic	**ND**			100
3B	A42016-8	Carpet mastic / loc 12	Yellow, mastic	**ND**			100
3C	A42016-9	Carpet mastic / loc 12	Yellow, mastic	**ND**			100
4A	A42016-10	Conc. Block mortar / loc 3	Grey, cementitious material	**ND**			100
4B	A42016-11	Conc. Block mortar / loc 3	Grey, cementitious material	**ND**			100
4C	A42016-12	Conc. Block mortar / loc 3	Grey, cementitious material	**ND**			100

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

EMC LAB REPORT NUMBER: A42016
Client's Job/Project Name/No.: SWL189315
Analyst: Chengming Li, *Analyst*

of the U.S. Government.
4. .The Ontario Regulatory Threshold for asbestos is 0.5%. The limit of quantification (LOQ) is 0.5%.

wsp.com