REQUEST FOR TENDER:

St. Jacobs Public School:

A/C Upgrades & Window Replacements

Tender No. 7188-KP-21

Issue Date: April 26, 2021
Closing Date: May 17, 2021
Deadline: 2:00:00 p.m. Local Time
Black-out Period: Deadline for Questions to Bid Award

Waterloo Region
District School Board

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1.0 INVITATION TO PROPONENTS

1.1 INTRODUCTION

The Waterloo Region District School Board, herein after referred to as the "Board" would be pleased. to receive a bid for**: St. Jacobs Public School: A/C Upgrades Ph 1 & Window Replacements.**

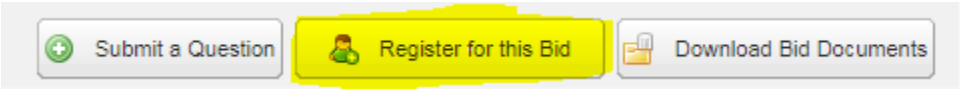
Read the entire package very carefully before preparing a bid.

1.2 ABOUT THE WATERLOO REGION DISTRICT SCHOOL BOARD

The Waterloo Region District School Board is a provincially funded institution reporting to the Ministry of Education of Ontario and is one of the larger school boards in Ontario, operating 121 school locations and serving approximately 64,000 students in the Region of Waterloo.

1.3 DIGITAL PROCUREMENT

All Bidders shall have a Bidding System Vendor account and be registered as a Plan Taker for this Bid opportunity, which will enable the Bidder to download the Bid Call Document, to receive Addenda email notifications, download all documents without the watermark "preview" on them and to submit electronically online.



Additional Contacts on your Bidding System Profile

Your company is strongly urged when creating or updating a Bidding System Vendor account to invite additional contacts to the vendor profile. This will permit these invited contacts that have created their own login to manage (register, submit, edit and withdraw) Bids which your Company is a Registered Plan Taker for. In the event of vacations or illness, these additional contacts may act on your Company's behalf, have the authority to receive addendum notifications from the Bidding System, submit Bids electronically through the Bidding System and/or withdraw and/or edit and/or acknowledge addenda, on your behalf.

To obtain documents online please visit https://wrdsb.bidsandtenders.ca

If you are an invited company contact it is imperative that you create your login from the link contained in the email invitation. Do NOT go directly to the Bidding System website and create a separate vendor account.

1.4 EXAMINATION

Immediately notify to the "submit a question" feature in this bidding system to the attention of: **Klaus Padaric** upon finding design errors, inconsistencies or omissions in the Tender Documents and/or site examination. The Board and/or Consultant will not accept claims for extras from the Proponent, based on the failure to detect and report same found in the Tender Documents, and/or site examination before Tender closing.

1.5 SITE VISIT SCHEDULING INSTRUCTIONS AND PROTOCOL

Due to Covid-19, Proponents are to supply and wear medical grade masks and eye protection and gloves.

Due to the nature of this Tender, a NON mandatory site visit has been deemed necessary.
Failure to attend and register at the time and location(s) specified would NOT result in disqualification.
Representatives for the Proponents are requested to sign in at the NON-mandatory site meet.
The Board at its sole discretion may schedule additional non-mandatory site visits
Proponents are to reference 1.8 Time Table for site meet date and time.
The site visit will take place at: **St. Jacobs Public School, 72 Queensway Dr., St. Jacobs, N0B 2N0**
The site meet is NON- mandatory for the following**: General Contractors**

Notify via the "submit a question" feature in this bidding system to the attention of: "Site Meet Request", the name of your company and staff that would like to attend a scheduled site meet.

Do not show up without submitting your request to attend the site meet.

The size of the groups at the site meet(s) will be limited as per current Covid-19 protocol.

An addenda prior to the site meet will be posted noting the companies and personnel and time for each scheduled site meet

Proponents are to meet in the Main parking lot.

1.6 SUPPLEMENTAL SITE VISIT

Due to Covid-19, Proponents are to supply and wear medical grade masks and eye protection and gloves.

Supplemental site visits will be permitted for interested Proponents and subcontractors to gain access to the site in order to better prepare their bid submission, and are not to be held prior to the mandatory or non-mandatory site visit.

When a supplemental site visit is required, the Proponent or subcontractors may only visit the school after 3:30 P.M., during a scheduled school day. The Proponent or subcontractors shall immediately report to the Main Office, sign in as per the school protocol and ask for the head custodian. The head custodian's role is to ensure that the Proponent or subcontractors are guided to the area of interest regarding this Tender document and to provide access where required.
Proponents or sub-trades may not direct any questions related to this Tender to the head custodian or any other Board staff present. Proponents asking the head custodian or Board staff questions related to the scope or Tender in general will be disqualified.

1.7 COMMUNICATION

For the purpose of this Tender, the only contact for all Proponents, subcontractors if any, and any third-party suppliers of goods or services for all queries, questions and notifications, from the Tender issue date to the bid award notification date is to be directed to the submit a question feature in this bidding system:

Board contact: Klaus Padaric

Responses will be via addenda.

1.7.1 From Issue Date to Deadline for Questions/Queries

Proponents, subcontractors, and third party suppliers of goods or services shall forward questions; report any errors, omissions or ambiguities to the submit a question feature in this bidding system.

1.7.3 Blackout Period: From Deadline for Questions/Queries to Bid Results Notification

All communication from the Proponent to the Board or any consultants are prohibited during the blackout period, unless initiated by the Board's contact.

1.7.4 After the release of the Bid Results Notification

Proponents submitting a bid are entitled to a debriefing. Proponents have 60 days from the issue date of the bid results notification to request a debriefing. Proponents are to forward a written request for debriefing to the Board Contact.

1.7.5 Consequences of not following the Proponent Contact Protocol

Communication initiated by the Proponent, subcontractors, or third party suppliers of goods or services during the blackout period, to the Board or consultant may be grounds for disqualification from the Tender.

Communication by Proponents, subcontractors, or third party suppliers of goods or services, to the consultant or the Board, other than the Board contact from the issue date to the Tender to receiving the award non award notification, may be grounds for disqualification from the Tender.

1.8 TIME TABLE

Issue Date of Tender	**April 26, 2021**
Non Mandatory Site Meet	**May 3, 2021, 3:30 P.M.**
Deadline for Questions/Queries	**May 12, 2021, 2:00 P.M.**
Deadline for Issuing Addenda	**May 13, 2021**
Closing Deadline	**May 17, 2021, 2:00:00 P.M.**
Blackout Period	**Deadline for Questions/Queries to Bid Award Notification**
Anticipated Start Date	**July 2, 2021**
Substantial Completion Date	**August 20, 2021**
Deemed Complete Date	**August 27, 2021**

1.8 WARRANTY AND MAINTENANCE

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

2.0 BOARD PURCHASE ORDER

Goods/Service or Work, as described shall not commence until all of the required documents have been submitted to Procurement Services and the CCDC 2 executed by the Awarded Bidder(s) and the Board. For Payment purposes, a Purchase Order shall be generated and issued to the Awarded Bidder(s). The Purchase Order number must appear on all invoices in order to ensure prompt payment.

3.0 CONSULTANT

The Board has hired the following consultant to assist in the preparation of this Tender**: The Ventin Group Architects Ltd.**

The consultant will assemble addenda as required. Addenda will be the consultant's only form of communication.

The consultant and any sub consultants are not to be contacted by any interested parties from the Tender issue date to the bid award notification. The consultant or any sub consultants will not respond to any direct communication.

In addition to the above, the consultant will be responsible for the contract administration of the project after the purchase order has been issued or the contract has been signed by the Board.

END OF SECTION

1.0 SCOPE OF WORK

1. Interior renovation for provision to upgraded ventilation systems in selected rooms of the school including all fixtures, fitments and associated mechanical and electrical works. Refer to drawings for quantities and locations.
2. Removal and replacement of existing exterior windows. Refer to drawings for quantities and locations of windows.
3. Removal and replacement of existing exterior doors and frames. Refer to drawings for quantities and locations of doors.

END OF SECTION

1.0 VENDOR OF RECORD

1.1 VENDOR REGISTRATION PROCESS

This tender document is open to those who are currently registered under the Board's Vendor Registration System.

The Waterloo Region District School Board, in an effort to build an improved supplier base and to obtain exceptional long term value, has undertaken a project to register vendors

To become a Vendor of Record for this Tender or any future business opportunities go to the Board's public website at www.wrdsb.ca and refer to About, Procurement Services, Vendor Registration, and submit the completed application, as per instructions on the website.

2.0 GENERAL CONTRACTORS

All bid submission from bidders other than Vendor of Record contractors listed below or identified by Addendum will have their Bid ruled informal.

The following General Contractors are Vendors of Record with the Board and are invited to submit bids:

Name	Phone Number	Email
1568796 Ontario Inc. o/a RENOKREW	(416) 604-7042	info@renokrew.com
Bestco Construction (2005) Ltd	(905) 304-4597	estimating@bestcoconstruction.com
Collaborative Structures Limited	(519) 658-2750	jblackler@collaborativestructures.com
Complete Building Systems Inc.	(519) 576-5800	estimating@completebuildinsystems.ca
CPM Group Inc	(416) 227-1612	harslan@cpmgroup.ca
CRD Construction	(519) 822-1801	sbock@crdconstruction.on.ca
Dakon Construction	(519) 746-0920	james@dakon.ca
Devlan Construction Ltd	(519) 763-5800	andrew@devlan.com
Elgin Contracting and Restoration Ltd.	(519) 633-9969	info@elgincontracting.com
Gateman-Milloy Inc.	(519) 748-6500	info@gatemanmilloy.com
Gordner Construction	(519) 741-0052	gordner@sympatico.ca
Golden Gate Contracting Inc	(905) 844-1122	lubna@ggcontracting.ca
Hall Construction	(905) 662-9200	info@hallconstruction.ca
Harrington Construction Inc	(519) 837-3581	jason@harrcon.ca
K&L Construction (Ontario) Ltd	(519) 472-7164	todd.hodgins@kandlconstruction.com
Melloul Blamey Construction	(519) 886-8850	joel.melloul@melloul.com
Morris-Lee Construction Corp.	(519) 746-8545	morrislee@rogers.com
Nith Valley Construction Ltd	(519) 662-1324	mail@nithvalley.com
Norfield Construction Inc.	(905) 951-3030	alves@norfieldconstruction.ca
PM Contracting Ltd	(519) 576-8327	sarahziegler@pm.on.ca
Reid & Deleye Contractors Ltd	(519) 688-2600	gregd@reid-deleye.com
RHC	(519) 249-0758	info@rhcbuilds.ca
Ritestart Limited	(905) 876-0505	jduncan@ritestart.ca
SG Cunningham Ltd	(519) 886-2730	allan@cunningham.on.ca
Sierra Construction	(519) 421-7413	info@sierraconstruction.ca
SPEC Construction Inc.	(519) 650-4030	info@spec-build.com
STM Construction Ltd	(519) 756-7030	robertbox@stmconstruction.com

St. Jacobs Public School

2020 Asbestos Audit Update Report

Project Location:

72 Queensway Drive, St. Jacobs, ON

Prepared for:

Waterloo Region District School Board
51 Ardelt Avenue, Kitchener, ON

Prepared by:

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

August 26, 2020

MTE File No.: C34532-919

Engineers, Scientists, Surveyors.

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

August 26, 2020

MTE File No.: C34532-919

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

RE: 2020 Asbestos Audit Update – St. Jacobs Public School
72 Queensway Drive, St. Jacobs, Ontario

1.0 Introduction

MTE Consultants Inc. (MTE) was authorized by the Waterloo Region District School Board (WRDSB) to conduct the 2020 Asbestos Audit Update for the subject building.

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

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

2.0 Scope of Work

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

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

3.0 Methodology and Assessment Criteria

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

- Locations that may be hazardous to the surveyor, such as electrical equipment;
- Where invasive inspection could cause consequential damage to the property or impair the integrity of the equipment, such as roof systems, underground services or components of mechanical equipment;
- Locations concealed by building finishes that require substantial demolition or removal for access or determination of quantities;
- Materials that is present in such an inconsistent fashion that without complete removal of finishes, the extent cannot be determined.
- Non-permanent items or personal contents, furnishings; and
- Settled dust or airborne agents unless otherwise stated.

3.1 Condition of ACM

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

Monitor Annually

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

Abatement Action Required

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

4.0 Findings

An inspection of the building was conducted by MTE on August 19, 2020. The single-storey school was constructed in 1929 with additions in 1951, 1961, 1968 and 2000. The inspection did not include areas of post 1990 construction or renovation (where all building finishes have been removed and replaced), as applicable.

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

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

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

4.1 Analytical Results

During this inspection, a total of 20 building material samples that are suspect ACM were collected with a total of 15 analyses being performed. Equal to or greater than 0.5%, asbestos by dry weight, the laboratory method detection limit (MDL), classifies the material as ACM according to O. Reg. 278/05. Samples collected were submitted for analysis to Paracel Laboratories Ltd. (Paracel), in Mississauga, Ontario. Paracel is certified under the National Voluntary Laboratory Accreditation Program to perform asbestos analysis of bulk samples by PLM. Laboratory analysis was conducted in accordance with the United States Environmental Protection Agency, Test Method EPA/600-R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, June, 1993 by Polarized Light Microscopy as prescribed by O. Reg. 278/05.

Refer to Appendix C, Table 3 for a detailed summary of the analytical results for each sampled material.

4.2 Removed ACM

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

WRDSB Room 1009, 1032 and 1033:

- 2’x4’ Ceiling tiles.

WRDSB Room 0003:

- Pipe straight and fitting insulation.

4.3 Discovery of Additional ACM

ACM or suspect ACM that was not previously identified includes the following:

Non-Friable:

- 1951 Addition – Floor tile black mastic.
- 1929 Original building – Black interior window pane sealant.
- 1968 Addition – Grey window pane sealant.

4.4 Damaged ACM

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

5.0 Recommendations

5.1 Remedial

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

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

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

5.2 Long Term Management

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

There are no requirements under current legislation to remove ACM from a building simply because it is present. However, O. Reg. 278/05 requires that an Asbestos Management Plan be implemented and maintained. Asbestos awareness training should be provided for staff that may come in contact with ACM during routine duties or in emergency situations.

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

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

6.0 Limitations

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

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

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

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

All of which is respectfully submitted,

MTE Consultants Inc.

Jason Scozzafava, B.Sc., C.Tech.
Senior Technologist, Indoor Environments
519-743-6500 ext. 1354
jscozzafava@mte85.com

Paul Semeniuk, B.E.S., C.E.T.
Project Manager, Indoor Environments
519-743-6500 ext. 1324
psemeniuk@mte85.com

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Appendix A

Asbestos Management Database

	School Name	Legend:	Notes:
	St. Jacobs Public School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **NF** - Non-Friable **F**- Friable	**All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.**
	Date Built:		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**
	Original: 1929		
	Addition(s): 1951, 1961, 1968, 2000		

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
Structure/Additions										
	Original Building	Structure	Concrete	Concrete	-	Non ACM	-	-	-	-
	Original Building	Façade	Brick Veneer	Brick and Mortar	-	Non ACM	-	-	-	-
	Original Building	Façade	Concrete	Concrete	-	Non ACM	-	-	-	-
	Original Building	Deck	Concrete	-	-	Non ACM	-	-	-	-
	Original Building	Deck	Wood	-	-	Non ACM	-	-	-	-
	Original Building	Deck	Metal Pan	-	-	Non ACM	-	-	-	-
	Original Building	Not Inspected	Not Inspected	Roofing Materials	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
	Original Building	Windows	Interior Pane	Black Sealant	NF	ACM	SL	S06ABC	19-Aug-20	0.5% Chrysotile
	Original Building	Window	Exterior Frame	Silicon	-	Non ACM	-	-	-	-
	Original Building	Door	Exterior Frame	Silicon	-	Non ACM	-	-	-	-
	Original Building	Floor	Floor Tile Mastic	Black Mastic	-	Non ACM	SL	S02abc	3-Apr-09	ND
	1951 Addition	Structure	Concrete	Concrete	-	Non ACM	-	-	-	-
	1951 Addition	Façade	Brick Veneer	Brick and Mortar	-	Non ACM	-	-	-	-
	1951 Addition	Façade	Concrete	Concrete	-	Non ACM	-	-	-	-
	1951 Addition	Deck	Wood	-	-	Non ACM	-	-	-	-
	1951 Addition	Deck	Metal Pan	-	-	Non ACM	-	-	-	-
	1951 Addition	Not Inspected	Not Inspected	Roofing Materials	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
	1951 Addition	Window	Interior/Exterior Frame	Silicon	-	Non ACM	-	-	-	-
	1951 Addition	Door	Interior Frame	White Sealant	-	Non ACM	SL	S04AB	19-Aug-20	ND
	1951 Addition	Floor	Floor Tile Mastic	Black Mastic	NF	ACM	SL	S03AB	19-Aug-20	1% Chrysotile
	1961 Addition	Structure	Concrete	Concrete	-	Non ACM	-	-	-	-
	1961 Addition	Façade	Brick Veneer	Brick and Mortar	-	Non ACM	-	-	-	-
	1961 Addition	Façade	Concrete	Concrete	-	Non ACM	-	-	-	-
	1961 Addition	Deck	Wood	-	-	Non ACM	-	-	-	-
	1961 Addition	Deck	Metal Pan	-	-	Non ACM	-	-	-	-
	1961 Addition	Not Inspected	Not Inspected	Roofing Materials	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
	1961 Addition	Window	Interior/Exterior Frame	Silicon	-	Non ACM	-	-	-	-
	1961 Addition	Floor	Floor Tile Mastic	Black Mastic	-	Non ACM	SL	S14abc	3-Apr-09	ND
	1961 Addition	Ceiling	Ceiling Tiles 1'x1'	Brown Mastic	-	Non ACM	SL	S07abc	19-Aug-20	ND
	1968 Addition	Structure	Concrete	Concrete	-	Non ACM	-	-	-	-
	1968 Addition	Façade	Brick Veneer	Brick and Mortar	-	Non ACM	-	-	-	-

School Name	Legend:	Notes:
St. Jacobs Public School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **NF** - Non-Friable **F**- Friable	**All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.**
Date Built: Original: 1929 Addition(s): 1951, 1961, 1968, 2000		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
	1968 Addition	Façade	Concrete	Concrete	-	Non ACM	-	-	-	-
	1968 Addition	Deck	Metal Pan	-	-	Non ACM	-	-	-	-
	1968 Addition	Not Inspected	Not Inspected	Roofing Materials	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
	1968 Addition	Window	Interior/Exterior Frame	Grey Sealant	NF	ACM	SL	S05ABC	19-Aug-20	1% Chrysotile
	1968 Addition	Door	Interior Frame	White Sealant	-	Non ACM	SL	S01ABC	19-Aug-20	ND
	1968 Addition	Door	Exterior Frame	White Sealant	-	Non ACM	SL	S02ABC	19-Aug-20	ND
	1968 Addition	Floor	Vinyl Floor Tile 12"x 12"	Mastic	-	Non ACM	SL	S01 (2017)	7-Jan-17	ND
Basement										
14	Classroom 14	Floor	Vinyl Sheet Flooring	Faux Wood Pattern (2017)	-	Non ACM	-	-	-	-
14	Classroom 14	Wall	Concrete	-	-	Non ACM	-	-	-	-
14	Classroom 14	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
14	Classroom 14	Ceiling	Plaster	-	-	Non ACM	SL	S03ef	3-Apr-09	ND
15	Classroom 15	Floor	Vinyl Floor Tile 12"x 12"	Beige with Dense Fleck	-	Non ACM	SL	S08abc	3-Apr-09	ND
15	Classroom 15	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
15	Classroom 15	Wall	Wood Panel	-	-	Non ACM	-	-	-	-
15	Classroom 15	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	HM	S10	3-Apr-09	ND
15	Classroom 15	Ceiling	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
16	Classroom 16	Floor	Vinyl Floor Tile 12"x 12"	Beige with Dense Fleck	-	Non ACM	HM	S08	3-Apr-09	ND
16	Classroom 16	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
16	Classroom 16	Wall	Wood Panel	-	-	Non ACM	-	-	-	-
16	Classroom 16	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
16	Classroom 16	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1990 Pinchin Report	1990	75% Chrysotile
44	Staff Washroom	Floor	Vinyl Floor Tile 12"x 12"	Brown Dense Fleck (2017)	-	Non ACM	-	-	-	-
44	Staff Washroom	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
44	Staff Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	SL	S10abc	3-Apr-09	ND
44	Staff Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
44	Staff Washroom	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1990 Pinchin Report	1990	75% Chrysotile
44	Staff Washroom	Piping	Pipe Insulation	Air Cell	F	ACM	HM	1990 Pinchin Report	1990	75% Chrysotile
45	Kiln	Floor	Concrete	-	-	Non ACM	-	-	-	-
45	Kiln	Wall	Concrete	-	-	Non ACM	-	-	-	-
45	Kiln	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	SL	S10abc	3-Apr-09	ND
46	Boiler Room	Floor	Concrete	-	-	Non ACM	-	-	-	-

School Name	Legend:	Notes:
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Date Built: Original: 1929 Addition(s): 1951, 1961, 1968, 2000		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
46	Boiler Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
46	Boiler Room	Wall	Wood	-	-	Non ACM	-	-	-	-
46	Boiler Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1990 Pinchin Report	1990	75% Chrysotile
46	Boiler Room	Deck	Concrete	-	-	Non ACM	-	-	-	-
46A	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
46A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
46A	Storage	Wall	Wood	-	-	Non ACM	-	-	-	-
46A	Storage	Deck	Concrete	-	-	Non ACM	-	-	-	-
46B	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
46B	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
46B	Storage	Wall	Wood	-	-	Non ACM	-	-	-	-
46B	Storage	Deck	Concrete	-	-	Non ACM	-	-	-	-
51	Lobby	Floor	Vinyl Sheet Flooring	Faux Wood Pattern (2017)	-	Non ACM	-	-	-	-
51	Lobby	Wall	Concrete	-	-	Non ACM	-	-	-	-
51	Lobby	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
51	Lobby	Ceiling	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
901	Stairwell	Floor	Vinyl Floor Tile 12"x 12"	Beige with Dense Fleck	-	Non ACM	HM	S08	3-Apr-09	ND
901	Stairwell	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
901	Stairwell	Ceiling	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
902A	Storage	Floor	Concrete	-	-	Non ACM	-	-	-	-
902A	Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
902A	Storage	Wall	Textured Plaster	-	-	Non ACM	SL	S09abc	3-Apr-09	ND
902A	Storage	Ceiling	Textured Plaster	-	-	Non ACM	SL	S09abc	3-Apr-09	ND
903	Stairwell	Floor	Vinyl Floor Tile 12"x 12"	Beige with Dense Fleck	-	Non ACM	HM	S08	3-Apr-09	ND
903	Stairwell	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
903	Stairwell	Ceiling	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
Level 1										
1	Classroom 1	Floor	Vinyl Floor Tile 12"x 12"	Grey with White Streak	NF	ACM	SL	S11abc	3-Apr-09	1.5% Chrysotile
1	Classroom 1	Wall	Plaster	-	-	Non ACM	HM	S03 (2017)	7-Jan-17	ND
1	Classroom 1	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	S04	3-Apr-09	1.8% Amosite, Trace Chrysotile
1	Classroom 1	Ceiling	Ceiling Tile 1' x 1'	Cellulose (No Pattern)	-	Non ACM	-	-	-	-
2	Classroom 2	Floor	Vinyl Floor Tile 12"x 12"	White with Grey Fleck	-	Non ACM	SL	S14abc	3-Apr-09	ND

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Date Built: Original: 1929 Addition(s): 1951, 1961, 1968, 2000		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**

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2	Classroom 2	Wall	Plaster	-	-	Non ACM	HM	S03 (2017)	7-Jan-17	ND
2	Classroom 2	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
2	Classroom 2	Ceiling	Ceiling Tile 1' x 1'	Cellulose (No Pattern)	-	Non ACM	-	-	-	-
3	Classroom 3	Floor	Vinyl Floor Tile 12"x 12"	White with Grey Fleck	-	Non ACM	SL	S14abc	3-Apr-09	ND
3	Classroom 3	Wall	Concrete	-	-	Non ACM	-	-	-	-
3	Classroom 3	Wall	Plaster	-	-	Non Acme	HM	S02 (2017)	7-Jan-17	-
3	Classroom 3	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
3	Classroom 3	Ceiling	Wood	-	-	Non ACM	-	-	-	-
4	Classroom 4	Floor	Vinyl Floor Tile 12"x 12"	White with Grey Fleck	-	Non ACM	HM	S14	3-Apr-09	ND
4	Classroom 4	Wall	Concrete	-	-	Non ACM	-	-	-	-
4	Classroom 4	Wall	Plaster	-	-	Non ACM	SL	S02 (2017)	7-Jan-17	-
4	Classroom 4	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
4	Classroom 4	Ceiling	Wood	-	-	Non ACM	-	-	-	-
5	Classroom 5	Floor	Vinyl Floor Tile 12"x 12"	White with Grey Fleck	-	Non ACM	HM	S14	3-Apr-09	ND
5	Classroom 5	Wall	Concrete	-	-	Non ACM	-	-	-	-
5	Classroom 5	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
5A	Washroom	Floor	Vinyl Floor Tile 12"x 12"	White with Grey Fleck	-	Non ACM	HM	S14	3-Apr-09	ND
5A	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
5A	Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
5B	Washroom	Floor	Vinyl Floor Tile 12"x 12"	White with Grey Fleck	-	Non ACM	HM	S14	3-Apr-09	ND
5B	Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
5B	Washroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
6	Kindergarten	Floor	Vinyl Sheet Flooring	Faux Wood Pattern (2017)	-	Non ACM	-	-	-	-
6	Kindergarten	Wall	Drywall	Drywall Joint Compound	NF	ACM	SL	S05 (2017)	27-Jan-17	1% Chrysotile
6	Kindergarten	Wall	Concrete	-	-	Non ACM	-	-	-	-
6	Kindergarten	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
6A	Kindergarten	Floor	Vinyl Sheet Flooring	Faux Wood Pattern (2017)	-	Non ACM	-	-	-	-
6A	Kindergarten	Wall	Drywall	Drywall Joint Compound	NF	ACM	SL	S05 (2017)	27-Jan-17	1% Chrysotile
6A	Kindergarten	Wall	Concrete	-	-	Non ACM	-	-	-	-
6A	Kindergarten	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
8	Classroom 8	Floor	Vinyl Floor Tile 12"x 12"	Beige with Dense Fleck	-	Non ACM	HM	S08	3-Apr-09	ND
8	Classroom 8	Wall	Concrete	-	-	Non ACM	-	-	-	-
8	Classroom 8	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
9	Classroom 9	Floor	Hardwood	-	-	Non ACM	-	-	-	-

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Date Built: Original: 1929 Addition(s): 1951, 1961, 1968, 2000		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**

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9	Classroom 9	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
9	Classroom 9	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	S04	3-Apr-09	1.8% Amosite, Trace Chrysotile
9	Classroom 9	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
9A	Washroom	Floor	Hardwood	-	-	Non ACM	-	-	-	-
9A	Washroom	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
9A	Washroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	S04	3-Apr-09	1.8% Amosite, Trace Chrysotile
9A	Washroom	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
9B	Storage	Floor	Hardwood	-	-	Non ACM	-	-	-	-
9B	Storage	Wall	Plaster	-	-	Non ACM	SL	S03d	3-Apr-09	ND
9B	Storage	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	S04	3-Apr-09	1.8% Amosite, Trace Chrysotile
9B	Storage	Ceiling	Ceiling Tile 1' x 1'	Cellulose	-	Non ACM	-	-	-	-
30	Principal's Office	Floor	Hardwood	-	-	Non ACM	-	-	-	-
30	Principal's Office	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
30	Principal's Office	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	S04	3-Apr-09	1.8% Amosite, Trace Chrysotile
30A	Office	Floor	Hardwood	-	-	Non ACM	-	-	-	-
30A	Office	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
30A	Office	Ceiling	Plaster	-	-	Non ACM	HM	S03	-	-
30B	Washroom	Floor	Vinyl Floor Tile 12"x 12"	Colour	-	Non ACM	SL	S05abc	3-Apr-09	ND
30B	Washroom	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
30B	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
30B	Washroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	S04	3-Apr-09	1.8% Amosite, Trace Chrysotile
31	Electrical Room	Floor	Hardwood	-	-	Non ACM	-	-	-	-
31	Electrical Room	Wall	Plaster	-	-	Non ACM	SL	S03ab	3-Apr-09	ND
31	Electrical Room	Ceiling	Plaster	-	-	Non ACM	HM	S03	-	-
32	-	Floor	Vinyl Floor Tile 12"x 12"	-	-	Non ACM	-	-	-	-
32	-	Wall	Plaster	-	-	Non ACM	HM	S03 (2017)	7-Jan-17	ND
32	-	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	HM	S10	3-Apr-09	ND
32	-	Ceiling	Ceiling Tile 1' x 1'	Cellulose (No Pattern)	-	Non ACM	-	-	-	-
33	Library	Floor	Hardwood	-	-	Non ACM	-	-	-	-
33	Library	Wall	Plaster	-	-	Non ACM	SL	S03c	3-Apr-09	ND
33	Library	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	S04	3-Apr-09	1.8% Amosite, Trace Chrysotile
33	Library	Ceiling	Ceiling Tile 1' x 1'	Medium and Small Pinhole	-	Non ACM	-	-	-	-
33A	Computer Lab	Floor	Hardwood	-	-	Non ACM	-	-	-	-
33A	Computer Lab	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND

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33A	Computer Lab	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	S04	3-Apr-09	1.8% Amosite, Trace Chrysotile
33A	Computer Lab	Ceiling	Ceiling Tile 1' x 1'	Medium and Small Pinhole	-	Non ACM	-	-	-	-
34	General Office	Floor	Hardwood	-	-	Non ACM	-	-	-	-
34	General Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
34	General Office	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
34	General Office	Wall	Drywall	Drywall Joint Compound (2004)	-	Non ACM	-	-	-	-
34	General Office	Ceiling	Ceiling Tile 1' x 1'	Medium and Small Pinhole	-	Non ACM	-	-	-	-
34	General Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
35	Principal's Office	Floor	Carpet	-	-	Non ACM	-	-	-	-
35	Principal's Office	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
35	Principal's Office	Wall	Drywall	Drywall Joint Compound (2004)	-	Non ACM	-	-	-	-
35	Principal's Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
35	Principal's Office	Ceiling	Ceiling Tile 1' x 1'	Medium and Small Pinhole	-	Non ACM	-	-	-	-
35	Principal's Office	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
36	Staff Room	Floor	Vinyl Floor Tile 12"x 12"	New (1995)	-	Non ACM	-	-	-	-
36	Staff Room	Wall	Plaster	-	-	Non ACM	SL	S03 (2017)	7-Jan-17	ND
36	Staff Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
36	Staff Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	S04	3-Apr-09	1.8% Amosite, Trace Chrysotile
36	Staff Room	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
36	Staff Room	Ceiling	Ceiling Tile 1' x 1'	Medium and Small Pinhole	-	Non ACM	HM	S13	3-Apr-09	ND
37	Washroom	Floor	Vinyl Floor Tile 12"x 12"	New (1995)	-	Non ACM	-	-	-	-
37	Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
37	Washroom	Wall	Plaster	-	-	Non ACM	HM	S03 (2017)	7-Jan-17	ND
37	Washroom	Ceiling	Plaster	-	-	Non ACM	HM	S03 (2017)	7-Jan-17	ND
38	Boys Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
38	Boys Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
38	Boys Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
38	Boys Washroom	Ceiling	Plaster	-	NF	ACM	Deemed ACM	Sample prior to removal/disturbance. Unable to sample without significant aesthetic damage.		
39	Girls Washroom	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
39	Girls Washroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
39	Girls Washroom	Wall	Ceramic Tile	-	-	Non ACM	-	-	-	-
39	Girls Washroom	Ceiling	Plaster	-	NF	ACM	Deemed ACM	Sample prior to removal/disturbance. Unable to sample without significant aesthetic damage.		
40	General Purpose Room	Floor	-	-	-	Non ACM	-	-	-	-
40	General Purpose Room	Wall	Concrete	-	-	Non ACM	-	-	-	-

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40	General Purpose Room	Ceiling	Ceiling Tile 1' x 1'	-	-	Non ACM	SL	34532-700-CT-SO1ABC	11/19/2012	-
40A	Stage	Floor	Wood	-	-	Non ACM	-	-	-	-
40A	Stage	Floor	Vinyl Floor Tile 12"x 12"	White with Green Fleck	-	Non ACM	SL	S01 (2017)	7-Jan-17	ND
40A	Stage	Wall	Concrete	-	-	Non ACM	-	-	-	-
40A	Stage	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1990 Pinchin Report	1990	75% Chrysotile
40A	Stage	Deck	Wood	-	-	Non ACM	-	-	-	-
40B	Tuck Shop	Floor	Wood	-	-	Non ACM	-	-	-	-
40B	Tuck Shop	Floor	Vinyl Floor Tile 12"x 12"	White with Green Fleck	-	Non ACM	SL	S01 (2017)	7-Jan-17	ND
40B	Tuck Shop	Wall	Concrete	-	-	Non ACM	-	-	-	-
40B	Tuck Shop	Deck	Wood	-	-	Non ACM	-	-	-	-
41	Gym Storage	Floor	Vinyl Floor Tile 9"x 9"	Orange with White Streak	NF	ACM	SL	S04 (2017)	27-Jan-17	2.19% Chrysotile
41	Gym Storage	Wall	Concrete	-	-	Non ACM	-	-	-	-
41	Gym Storage	Deck	Metal Pan	-	-	Non ACM	-	-	-	-
42	Custodial Room	Floor	Vinyl Floor Tile 12"x 12"	New (1995)	-	Non ACM	-	-	-	-
42	Custodial Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
42	Custodial Room	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	S04	3-Apr-09	1.8% Amosite, Trace Chrysotile
47	Girls Changeroom	Floor	Vinyl Floor Tile 12"x 12"	White with Grey Fleck	-	Non ACM	HM	S14	3-Apr-09	ND
47	Girls Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
47	Girls Changeroom	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	S04	3-Apr-09	1.8% Amosite, Trace Chrysotile
47	Girls Changeroom	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
48	Boys Changeroom	Floor	Vinyl Floor Tile 12"x 12"	White with Grey Fleck	-	Non ACM	HM	S14	3-Apr-09	ND
48	Boys Changeroom	Wall	Concrete	-	-	Non ACM	-	-	-	-
48	Boys Changeroom	Deck	Metal Pan	-	-	Non ACM	-	-	-	-
50	Seminar	Floor	Vinyl Sheet Flooring	Faux Wood Pattern (2017)	-	Non ACM	-	-	-	-
50	Seminar	Wall	Drywall	Drywall Joint Compound	NF	ACM	SL	S05 (2017)	27-Jan-17	1% Chrysotile
50	Seminar	Wall	Concrete	-	-	Non ACM	-	-	-	-
50	Seminar	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
801	Corridor	Floor	Hardwood	-	-	Non ACM	-	-	-	-
801	Corridor	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
801	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
801	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	S03	-	-
801A	Corridor	Floor	Vinyl Floor Tile 12"x 12"	Grey with Grey and White	-	Non ACM	HM	S01	3-Apr-09	ND
801A	Corridor	Floor	Vinyl Floor Tile 12"x 12"	Beige with Brown Streak	-	Non ACM	HM	S02	3-Apr-09	ND
801A	Corridor	Floor	Hardwood	-	-	Non ACM	-	-	-	-

School Name	Legend:	Notes:
St. Jacobs Public School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **NF** - Non-Friable **F**- Friable	**All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.**
Date Built: Original: 1929 Addition(s): 1951, 1961, 1968, 2000		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
801A	Corridor	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
801A	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
801A	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	S03	-	-
801B	Corridor	Floor	Vinyl Floor Tile 12"x 12"	Grey with Grey and White	-	Non ACM	SL	S01abc	3-Apr-09	ND
801B	Corridor	Floor	Vinyl Floor Tile 12"x 12"	Beige with Brown Streak	-	Non ACM	SL	S02abc	3-Apr-09	ND
801B	Corridor	Floor	Hardwood	-	-	Non ACM	-	-	-	-
801B	Corridor	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
801B	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
801B	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	S03	-	-
802	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
802	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
802	Corridor	Ceiling	Ceiling Tile 2' x 4'	Small Fissure Random Pinhole	-	Non ACM	SL	S15ABC	18-Jan-13	ND
803	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
803	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
803	Corridor	Ceiling	Ceiling Tile 2' x 4'	Small Fissure Random Pinhole	-	Non ACM	SL	S15ABC	18-Jan-13	ND
804	Corridor	Floor	Terrazzo	-	-	Non ACM	-	-	-	-
804	Corridor	Wall	Concrete	-	-	Non ACM	-	-	-	-
804	Corridor	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	-	ACM	HM	S04	3-Apr-09	1.8% Amosite, Trace Chrysotile
805	Corridor	Floor	Vinyl Floor Tile 12"x 12"	-	-	Non ACM	-	-	-	-
805	Corridor	Wall	Plaster	-	-	Non ACM	HM	S03 (2017)	7-Jan-17	ND
805	Corridor	Wall	Plaster	-	-	Non ACM	HM	S02 (2017)	7-Jan-17	ND
805	Corridor	Wall	Drywall	Drywall Joint Compound	NF	ACM	SL	S05 (2017)	27-Jan-17	1% Chrysotile
805	Corridor	Wall	Plaster	-	NF	ACM	Deemed ACM	Sample prior to removal/disturbance. Unable to sample without significant aesthetic damage.		
805	Corridor	Ceiling	Ceiling Tile 1' x 1'	Medium and Small Pinhole	-	Non ACM	SL	S13abc	3-Apr-09	ND
805	Corridor	Ceiling	Ceiling Tile 2' x 2'	Long Fissure Random Pinhole	NF	ACM	HM	S04	3-Apr-09	1.8% Amosite, Trace Chrysotile
805	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2013)	-	Non ACM	-	-	-	-
901	Corridor	Floor	Vinyl Floor Tile 12"x 12"	Beige with Dense Fleck	-	Non ACM	HM	S08	3-Apr-09	ND
901	Corridor	Wall	Plaster	-	-	Non ACM	HM	S03 (2017)	7-Jan-17	ND
901	Corridor	Ceiling	Ceiling Tile 1' x 1'	Cellulose (No Pattern)	-	Non ACM	-	-	-	-
902	Stairwell	Floor	Vinyl Floor Tile 12"x 12"	Beige with Brown and White Streak	NF	ACM	SL	S06abc	3-Apr-09	1.4% Chrysotile
902	Stairwell	Floor	Vinyl Floor Tile 12"x 12"	Green with White Streak	NF	ACM	SL	S07abc	3-Apr-09	1.6% Chrysotile
902	Stairwell	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
902	Stairwell	Ceiling	Ceiling Tile 2' x 4'	Long Fissure Random Pinhole	NF	ACM	HM	S04	3-Apr-09	1.8% Amosite, Trace Chrysotile
903	Stairwell	Floor	Vinyl Floor Tile 12"x 12"	Beige with Dense Fleck	-	Non ACM	HM	S08	3-Apr-09	ND

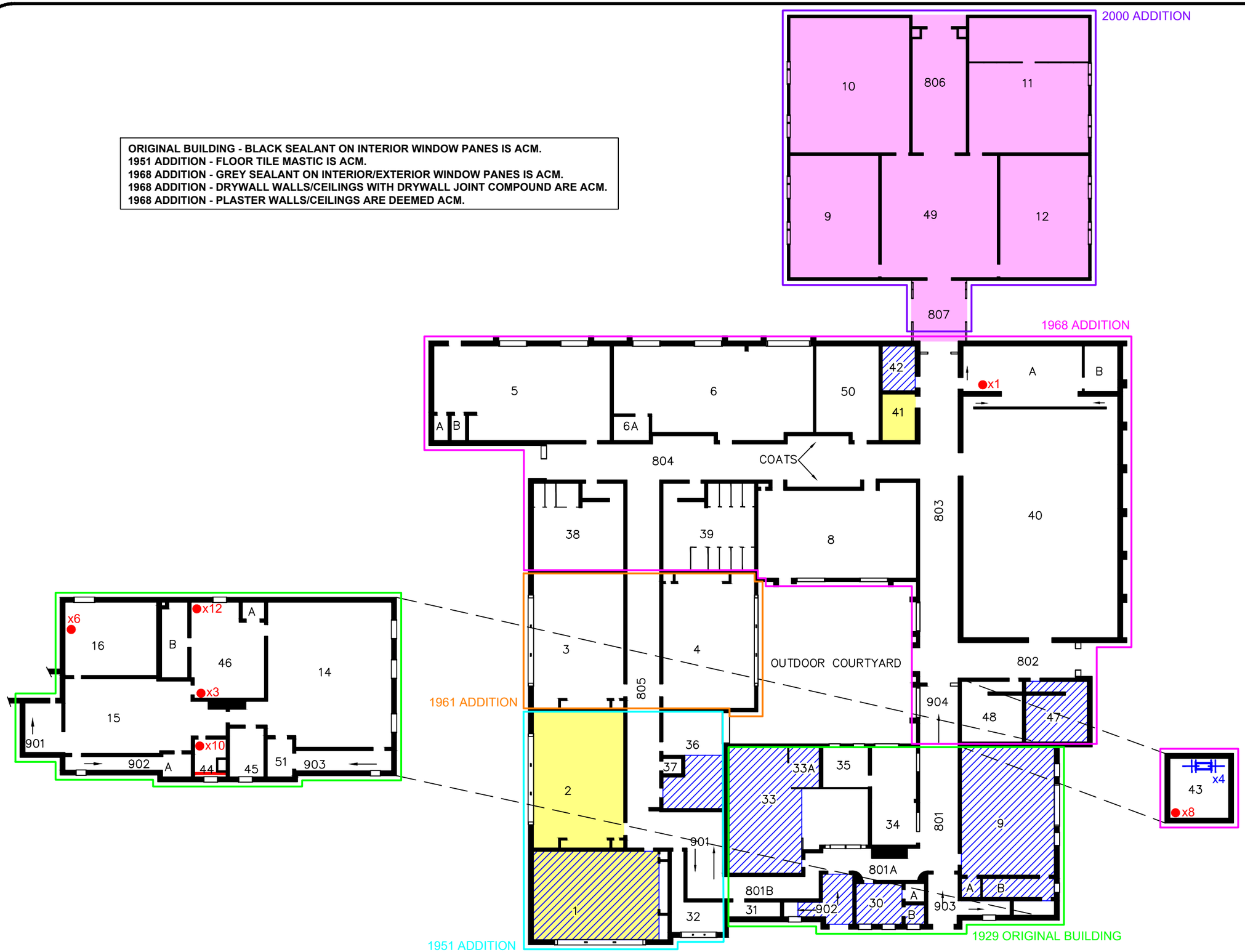
School Name	Legend:	Notes:
St. Jacobs Public School	**HM -** Homogenous Material - homogeneous with previously sampled material **SL** - Sample Location - Material Sampled **VC** - Visually Confirmed - Material not sampled, deemed ACM **NF** - Non-Friable **F**- Friable	**All quantities provided on Figures, if known. Refer to the Asbestos Audit Update Report for condition of ACM and recommended actions.**
Date Built: Original: 1929 Addition(s): 1951, 1961, 1968, 2000		**Dates provided in Material Description/Room Description columns indicates date of installation/renovation and confirms the finishes as non-ACM.**

WRDSB Fixed Reference Number	Room Description	Inspected Item	Inspected Material	Material Description	Friability	Asbestos Classification	Sample / Identification Summary	Sample ID	Sample Date	% Asbestos & Fibre Type
903	Stairwell	Wall	Concrete	-	-	Non ACM	-	-	-	-
903	Stairwell	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2017)	-	Non ACM	-	-	-	-
904	Corridor	Floor	Hardwood	-	-	Non ACM	-	-	-	-
904	Corridor	Wall	Plaster	-	-	Non ACM	HM	S03	3-Apr-09	ND
904	Corridor	Ceiling	Ceiling Tile 2' x 4'	Short Fissure Random Pinhole (2008)	-	Non ACM	-	-	-	-
904	Corridor	Ceiling	Plaster	-	-	Non ACM	HM	S03	-	-
Level 2										
43	Fan Room	Floor	Concrete	-	-	Non ACM	-	-	-	-
43	Fan Room	Wall	Concrete	-	-	Non ACM	-	-	-	-
43	Fan Room	Wall	Brick	-	-	Non ACM	-	-	-	-
43	Fan Room	Deck	Metal Pan	-	-	Non ACM	-	-	-	-
43	Fan Room	Piping	Pipe Fitting	Parged Cement	F	ACM	HM	1990 Pinchin Report	1990	75% Chrysotile
43	Fan Room	Ducting	Flex Joint	-	NF	ACM	Deemed ACM	Sample prior to removal/disturbance	-	-
Summary of Potential ACM Hidden or Not Assessed										
	Throughout Building	Not Inspected	Not Inspected	Wall Cavity Insulation						
	Throughout Building	Not Inspected	Not Inspected	Door Core Insulation						

Appendix B

Figures

ORIGINAL BUILDING - BLACK SEALANT ON INTERIOR WINDOW PANES IS ACM.
1951 ADDITION - FLOOR TILE MASTIC IS ACM.
1968 ADDITION - GREY SEALANT ON INTERIOR/EXTERIOR WINDOW PANES IS ACM.
1968 ADDITION - DRYWALL WALLS/CEILINGS WITH DRYWALL JOINT COMPOUND ARE ACM.
1968 ADDITION - PLASTER WALLS/CEILINGS ARE DEEMED ACM.



NOTES:

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

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

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

Legend

- 13 Fixed Reference Number
- No Access
- Post 2000 Construction

Asbestos-Containing Materials (ACM):

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

MTE

Ph. (519) 743-6500 www.mte85.com

CLIENT
WATERLOO REGION DISTRICT SCHOOL BOARD

PROJECT
2020 ASBESTOS AUDIT UPDATE

DRAWING
ST. JACOBS PUBLIC SCHOOL

LEVEL ONE

Project Manager	P. Semeniuk	Date	October 2020
Design By	WRDSB	Project No.	34532-919
Drawn By	S-P. Lemieux	Drawing No.	1.0
Scale	N.T.S.		

Appendix C

Tables

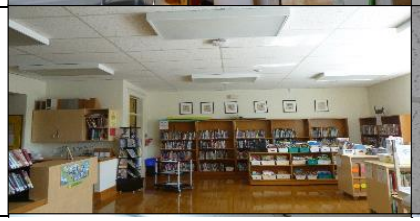
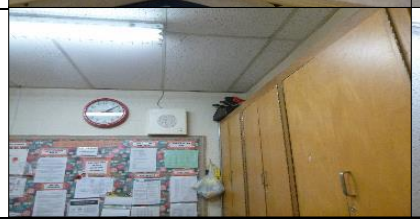
TABLE 1 - INTERNAL ABATEMENT MANAGEMENT							
St. Jacobs PS							
Material	**WRDSB Fixed Reference Number**	**MTE Functional Space Number**	**Material Description**	**Approximate Quantity**	**Photograph - Context**	**Photograph - Detail**	**Required Action**
Asbestos Non-Friable	1	1000	2' x 4' Ceiling Tiles - Long Fissure Random Pinhole	5 Tiles			Monitor Annually
Asbestos Non-Friable	902	1004	2' x 4' Ceiling Tiles - Long Fissure Random Pinhole	4 Tiles			Monitor Annually
Asbestos Non-Friable	30	1005	2' x 4' Ceiling Tiles - Long Fissure Random Pinhole	1 Tile			Monitor Annually
Asbestos Non-Friable	9	1013	2' x 4' Ceiling Tiles - Long Fissure Random Pinhole	2 Tiles			Monitor Annually
Asbestos Non-Friable	33	1018	2' x 4' Ceiling Tiles - Long Fissure Random Pinhole	10 Tiles			Monitor Annually

TABLE 1 - INTERNAL ABATEMENT MANAGEMENT

St. Jacobs PS

Material	WRDSB Fixed Reference Number	MTE Functional Space Number	Material Description	Approximate Quantity	Photograph - Context	Photograph - Detail	Required Action
Asbestos Non-Friable	47	1027	2' x 4' Ceiling Tiles - Long Fissure Random Pinhole	1 Tile			Removal in accordance with O. Reg. 278/05 as a Type 1 Operation
Asbestos Non-Friable	42	1038	2' x 4' Ceiling Tiles - Long Fissure Random Pinhole	1 Tile			Removal in accordance with O. Reg. 278/05 as a Type 1 Operation

Notes:
1) A copy of this report should be provided to all prospective contractors prior to tender or quotation, in accordance with Section 30 of the Occupational Health and Safety Act.
2) Recommended actions are the minimum required actions, as prescribed by the appropriate Acts, regulations, guidelines, standards, codes and general best practice measures. The Contractor may choose to alter the approach and combine or break out sections of work. This is acceptable provided that the appropriate Acts, regulations, guidelines, standards and codes are followed and afford protection for the health and safety of workers, occupants and the public that is at least equal to the protection that would be provided by complying with the minimum requirements.
3) All waste generated is subject to characterization and disposal in accordance with Ontario Regulation 347.

TABLE 2 - EXTERNAL ABATEMENT MANAGEMENT

St. Jacobs PS							
Material	**WRDSB Fixed Reference Number**	**MTE Functional Space Number**	**Material Description**	**Approximate Quantity**	**Photograph - Context**	**Photograph - Detail**	**Required Action**
None Identified During Inspection							

Notes:
1) A copy of this report should be provided to all prospective contractors prior to tender or quotation, in accordance with Section 30 of the Occupational Health and Safety Act.
2) Recommended actions are the minimum required actions, as prescribed by the appropriate Acts, regulations, guidelines, standards, codes and general best practice measures. The Contractor may choose to alter the approach and combine or break out sections of work. This is acceptable provided that the appropriate Acts, regulations, guidelines, standards and codes are followed and afford protection for the health and safety of workers, occupants and the public that is at least equal to the protection that would be provided by complying with the minimum requirements.
3) All waste generated is subject to characterization and disposal in accordance with Ontario Regulation 347.

TABLE 3: BULK ASBESTOS SAMPLING SUMMARY					
Sample #	**Location**	**Material Description**	**Asbestos Content (%)**	**Fibre Type**	**Is Material ACM**
2009 Asbestos Audit Update					
32523-St. Jacobs-S01a	1002	12x12 Floor Tile - Grey with Grey and White Fleck	ND	-	No
32523-St. Jacobs-S01b	1002		ND	-	No
32523-St. Jacobs-S01c	1002		ND	-	No
32523-St. Jacobs-S02a	1002	12x12 Floor Tile - Beige with Brown Streak	Tile: ND	-	No
			Mastic: ND	-	No
32523-St. Jacobs-S02b	1002		Tile: ND	-	No
			Mastic: ND	-	No
32523-St. Jacobs-S02c	1002		Tile: ND	-	No
			Mastic: ND	-	No
32523-St. Jacobs-S03a	1003	Plaster (1929)	ND	-	No
32523-St. Jacobs-S03b	1003		ND	-	No
32523-St. Jacobs-S03c	1018		ND	-	No
32523-St. Jacobs-S03d	1013		ND	-	No
32523-St. Jacobs-S03e	0011		ND	-	No
32523-St. Jacobs-S03f	0011		ND	-	No
32523-St. Jacobs-S03g	-		ND	-	No
32523-St. Jacobs-S04a	**1002**	**2' x 4' Ceiling Tile - Long Fissure Random Pinhole**	**1.8**	**Amosite**	**Yes**
32523-St. Jacobs-S04b	**1002**		**NA**	**Amosite**	**Yes**
32523-St. Jacobs-S04c	**1002**		**NA**	**Amosite**	**Yes**
32523-St. Jacobs-S05a	1006	12x12 Floor Tile - Blue with Blue and White Fleck	Tile: ND	-	No
			Mastic: ND	-	No
32523-St. Jacobs-S05b	1006		Tile: ND	-	No
			Mastic: ND	-	No
32523-St. Jacobs-S05c	1006		Tile: ND	-	No
			Mastic: ND	-	No
32523-St. Jacobs-S06a	**1004**	**12x12 Floor Tile - Beige with Brown and White Streak**	**Tile: 1.4**	**Chrysotile**	**Yes**
			Mastic: ND	-	No
32523-St. Jacobs-S06b	**1004**		**Tile: NA**	**Chrysotile**	**Yes**
			Mastic: ND	-	No
32523-St. Jacobs-S06c	**1004**		**Tile: NA**	**Chrysotile**	**Yes**
			Mastic: ND	-	No
32523-St. Jacobs-S07a	**1004**	**12x12 Floor Tile - Green with White Streak**	**Tile: 1.4**	**Chrysotile**	**Yes**
			Mastic: ND	-	No
32523-St. Jacobs-S07b	**1004**		**Tile: NA**	**Chrysotile**	**Yes**
			Mastic: ND	-	No
32523-St. Jacobs-S07c	**1004**		**Tile: NA**	**Chrysotile**	**Yes**
			Mastic: ND	-	No
32523-St. Jacobs-S08a	0007	12x12 Floor Tile - Beige Dense Fleck	ND	-	No
32523-St. Jacobs-S08b	0007		ND	-	No
32523-St. Jacobs-S08c	0007		ND	-	No
32523-St. Jacobs-S09a	0005	Texture Coat - Wall and Ceiling Texture	ND	-	No
32523-St. Jacobs-S09b	0005		ND	-	No
32523-St. Jacobs-S09c	0005		ND	-	No
32523-St. Jacobs-S10a	0004	2' x 4' Ceiling Tile - Short Fissure Random Pinhole	ND	-	No
32523-St. Jacobs-S10b	0004		ND	-	No
32523-St. Jacobs-S10c	0004		ND	-	No
32523-St. Jacobs-S11a	**1000**	**12x12 Floor Tile - Grey with White Streak**	**Tile: 1.5**	**Chrysotile**	**Yes**
			Mastic: ND	-	No
32523-St. Jacobs-S11b	**1000**		**NA**	**Chrysotile**	**Yes**
32523-St. Jacobs-S11c	**1000**		**NA**	**Chrysotile**	**Yes**
32523-St. Jacobs-S13a	1034	1x1 Ceiling Tile - Medium and Small Pinhole	ND	-	No
32523-St. Jacobs-S13b	1034		ND	-	No
32523-St. Jacobs-S13c	1034		ND	-	No
32523-St. Jacobs-S14a	1023	12x12 Floor Tile - White and Grey Dense Fleck	ND	-	No
32523-St. Jacobs-S14a	1023	Mastic	ND	-	No

TABLE 3: BULK ASBESTOS SAMPLING SUMMARY					
Sample #	**Location**	**Material Description**	**Asbestos Content (%)**	**Fibre Type**	**Is Material ACM**
32523-St. Jacobs-S14b	1023	12x12 Floor Tile - White and Grey Dense Fleck	ND	-	No
32523-St. Jacobs-S14b	1023	Mastic	ND	-	No
32523-St. Jacobs-S14c	1023	12x12 Floor Tile - White and Grey Dense Fleck	ND	-	No
32523-St. Jacobs-S14c	1023	Mastic	ND	-	No
2012 Asbestos Audit Update					
34532-700-CT-SO1A	1028	1' x 1' Ceiling Tile	ND	-	No
34532-700-CT-SO1B			ND	-	No
34532-700-CT-SO1C			ND	-	No
2013 Additional Sampling					
S15A	1033	2' x 4' Ceiling Tile - Small Fissure Random Pinhole	ND	-	No
S15B			ND	-	No
S15C			ND	-	No
2017 Asbestos Audit Update					
S01A	1035	12"x12" Vinyl Floor Tile - White with Blue Fleck	Tile: ND	-	No
			Mastic: ND	-	No
S01B			Tile: ND	-	No
			Mastic: ND	-	No
S01C			Tile: ND	-	No
			Mastic: ND	-	No
S02A	1024	Plaster (1961)	Skim Coat: ND	-	No
			Plaster: NA	-	-
S02B			Skim Coat: ND	-	No
			Plaster: ND	-	No
S02C			Skim Coat: ND	-	No
			Plaster: ND	-	No
S03A	1021	Plaster (1951)	Skim Coat: ND	-	No
			Plaster: NA	-	-
S03B			Skim Coat: ND	-	No
			Plaster: NA	-	-
S03C			Skim Coat: ND	-	No
			Plaster: ND	-	No
S04A	**1037**	**9"x9" Vinyl Floor Tile - Orange with White Streak**	**2.19**	**Chrysotile**	**Yes**
S04B			**NA**	**Chrysotile**	**Yes**
S04C			**NA**	**Chrysotile**	**Yes**
S05A	**1032**	**Drywall Joint Compound (1968)**	**1**	**Chrysotile**	**Yes**
S05B			**NA**	**Chrysotile**	**Yes**
S05C			**NA**	**Chrysotile**	**Yes**
2020 Asbestos Audit Update					
S01A	1968 Addition	Exterior Door Sealant - White	ND	-	No
S01B	1968 Addition	Exterior Door Sealant - White	ND	-	No
S01C	1968 Addition	Exterior Door Sealant - White	ND	-	No
S02A	1968 Addition	Interior Door Sealant - White	ND	-	No
S02B	1968 Addition	Interior Door Sealant - White	ND	-	No
S02C	1968 Addition	Interior Door Sealant - White	ND	-	No
S03A	**1000**	**Floor Tile - Black Mastic**	**1**	**Chrysotile**	**Yes**
S03B	**1000**	**Floor Tile - Black Mastic**	**NA**	**Chrysotile**	**Yes**
S04A	1951 Addition	Interior Door Sealant - White	ND	-	No
S04B	1951 Addition	Interior Door Sealant - White	ND	-	No
S04C	1951 Addition	Interior Door Sealant - White	ND	-	No
S05A	**1968 Addition**	**Interior/Exterior Window Pane Sealant - Grey**	**1**	**Chrysotile**	**Yes**
S05B	**1968 Addition**	**Interior/Exterior Window Pane Sealant - Grey**	**NA**	**Chrysotile**	**Yes**
S05C	**1968 Addition**	**Interior/Exterior Window Pane Sealant - Grey**	**NA**	**Chrysotile**	**Yes**
S06A	**Original Building**	**Interior Window Pane Sealant - Black**	**0.5**	**Chrysotile**	**Yes**
S06B	**Original Building**	**Interior Window Pane Sealant - Black**	**NA**	**Chrysotile**	**Yes**
S06C	**Original Building**	**Interior Window Pane Sealant - Black**	**NA**	**Chrysotile**	**Yes**
S07A	1961 Addition	1x1 Large Medium Pinhole Ceiling Tile - Brown Mastic	ND	-	No

TABLE 3: BULK ASBESTOS SAMPLING SUMMARY					
Sample #	**Location**	**Material Description**	**Asbestos Content (%)**	**Fibre Type**	**Is Material ACM**
S07B	1961 Addition	1x1 Large Medium Pinhole Ceiling Tile - Brown Mastic	ND	-	No
S07C	1961 Addition	1x1 Large Medium Pinhole Ceiling Tile - Brown Mastic	ND	-	No
NA: Not Analyzed due to stop positive method **ND**: No asbestos fibres detected above the laboratory minimum detection limit					

A bulk material sample containing 0.5% or more asbestos therefore establishes that material as asbestos-containing. In accordance with Table 1 of O. Reg. 278/05, a minimum number of samples for the material to be classified as non asbestos. A homogeneous material is defined by O. Reg. 278/05 “as material that is uniform in colour and texture”. Homogeneous samples are identified by an alphabetical suffix to sample names to represent multiple samples of a homogeneous material. When a homogeneous material is analysed it is determined to be asbestos-containing upon the first positive detection of asbestos equal to or greater than 0.5%. Subsequent samples of the same material are therefore not analysed. Some bulk samples are comprised of multiple layers and as such will require multiple analysis. In such cases each layer is isolated at the laboratory and analysed individually to determine asbestos content. As a result the laboratory may report additional samples beyond the submitted number of samples or include multiple analyses as subsets within a sample.

Tambro Construction	(519) 766-1234	btami@tambro.com
TRP Construction	(905) 336-1041	info@trpconstruction.ca
Van Horne Construction Ltd	(905) 677-5150	otekin@vanhorne.ca
Zehr Levesque Inc.	(519) 576-2233	estimating@zehrgroup.ca

2.1 PROJECT TRADES

If the trade classifications listed are required for this tender project, the general contractor is to select from the vendor of record listing below for each trade category. The general contractor is to perform due diligence when selecting all subcontractors and manage them accordingly.

The Board at its discretion may request the names of the trades carried and including all projects trades, not just those listed below (if any). This request may be prior to the tender award or after the award of the tender. The prime/general contractor shall provide this list within two business days of the request.

The following are vendors of record and are invited to submit bids for this tender

ROOFING

Name	Phone Number	Email
Wm. Green Roofing Ltd.	(519) 822-6414	sbrookes@wmgreenroofing.ca
Triumph Roofing & Sheet Metal Inc.	(416) 534-8877	info@triumphinc.ca
Spinton Roofing Limited	(905) 575-3686	mira@spintonroofing.com
Semple Gooder Roofing Limited	(519) 623-3300	jsottile@semplegooder.com
Schreiber Brothers Ltd	(905) 561-7780	marinos@schreiberrroofing.com
Roque Roofing Inc.	(905) 525-9689	sarah@roqueroofing.com
Nedlaw Roofing Limited	(519) 648-2218	greg@nedlawroofing.com
LaFleche Roofing Services	(800) 387-1549	chris@laflecheroofing.com
Flynn Canada Ltd	(519) 624-8797	Joseph.Raposo@flynn.ca
Dean-Thackeray Roofing Company	(519) 745-7386	patrick.dtr@bellnet.ca
Atlas-Apex Roofing (Kitchener) Inc	(519) 894-4422	inquiries@atlas-apex.com
A.M. Roofing Systems Inc.	(905) 529-5111	mike@amroofingsystems.com

WINDOW INSTALLERS

Name	Phone Number	Email
1254867 Ontario Limited O/A Shantz Windows	(519) 669-2629	bruce@shantzwindows.com
Aerloc Industries Ltd.	(905) 628-6061	peterdendekkerjr@aerloc.com
Alwind Industries Ltd	(905) 738-4266	gm@alwind.com
Barton Glass	(905) 385-3599	pdhbartonglass@quickclic.net
Glass Canada Limited	(519) 642-4100	rdamstra@glass-canada.com
KW Glass Systems Inc	(519) 725-9305	rick@kwglass.com
Peninsula Glass Inc.	(905) 735-2901	tim@peninsulaglass.ca
Sherwood Windows Group	(416) 675-3262	bhorton@sherwoodwindows.com
Windspec Inc	(905) 738-8311	wferri@windspec.com

TENDER #7188-KP-21
VENDOR OF RECORD

MECHANICAL

Name	Phone Number	Email
AAA Air Conditioning Inc	(519) 747-9051	igrant.aaaac@gmail.com
Arcadian Projects Inc.	(519) 804-9697	cory@arcadianprojects.ca
Black & McDonald Limited	(905) 560-3100	sfernandes@blackandmcdonald.com
Brenner Mechanical Inc	(519) 746-0439	clanglois@brenner.ca
Conestogo Mechanical Inc	(519) 579-6740	wquickfall@conestogomech.com
Dean Lane Contractors Inc	(519) 585-0903	dean@dean-lane.com
Dordan Mechanical Inc.	(519) 662-9900	danielg@dordanmech.com
Jas 3 Limited	(519) 741-8643	jeffs@jas3heatingcooling.ca
Jay Stewart Mechanical	(519) 576-2663	admin@jaystewart.ca
JTS Mechanical Systems Inc	(519) 635-0022	sgorasso@jtsmechanical.ca
LJ Barton Mechanical Inc.	(905) 304-1976	estimating@ljbarton.com
Nelco Mechanical Ltd	(519) 744-6511	mhobson@nelcomech.com
Reitzel Heating & Sheet Metal	(519) 884-3510	alan@reitzelheating.ca
Roberts Bros Sheet Metal Contractors	(519) 633-1507	robertsbros@bellnet.ca
Roberts Onsite Inc	(519) 578-2230	dmagnus@robertsonsite.ca
SCT Mechanical Inc.	(519) 626-0268	jscott@sctmechanical.com
Sutherland-Schultz Ltd	(519) 653-4123	info@sutherland-schultz.com
Touchstone Building Technologies Inc.	(519) 997-2792	info@touchstonebti.ca
Trade Mark Industrial Inc	(519) 570-1511	tmoore@trade-markind.com
Velocity Mechanical Inc	(519) 896-1119	quotes@velocitymechanical.com
Vollmer Inc.	(519) 966-6100	mshaw@vollmer.ca
Wellington Plumbing & Heating Ltd.	(519) 821-4130	kyle@wellington-plumbing-hvac.com

ELECTRICAL

Name	Phone Number	Email
AIM Industrial Inc.	(519) 747-2255	craigd@aimindustrial.ca
Arcadian Projects Inc.	(519) 804-9697	cory@arcadianprojects.ca
BCG Electrical/Pro Plumbing	(519) 304-8411	trankin@lancastergroup.ca
Boshart Electric Ltd.	(519) 662-1220	patf@boshartelectric.com
Cameron Electric	(519) 465-4614	greg@cameronelectric.ca
CJ's Express Plumbing & Electrical	(519) 621-3111	noliveira@cjsexpress.ca
D&D Electric Ltd	(519) 603-2924	jquehl@ddelectric.ca
Eby Electric Inc.	(519) 635-7642	todd@ebyelectric.com
Eclipse Technology Solutions Inc.	(905) 593-1770	jbacon@eclipsetechnology.ca
Edge Electrical Solutions Inc.	(519) 747-3343	Kevin@EdgeElectricalSolutions.ca
Electricomm Services (ONT) Ltd	(519) 895-0777	gerry@electricomm.com
Electri-tech Services Inc	(519) 743-6518	eric.karn@electri-tech.com
Energize Electric Canada	(519) 589-9630	energize@hotmail.ca
Fairway Electrical Services Inc	(905) 304-1133	cherd@fairwayelectrical.com
Harold Stecho Electric Ltd	(519) 746-0047	steves@stecho.ca
JM Electrical Contracting	(519) 572-3148	johnmader@sympatico.ca
Jones Electric of Kitchener Inc.	(519) 745-5158	Office@JonesElectricofKitchener.ca
Juno Electric	(519) 821-4890	steno@junoelectric.ca
KW E Inc Electrical Contractors	(519) 653-6989	jim@kweinc.com
Live Electric	(519) 265-8566	estimates@live-electric.ca
Mendler Electric Inc.	(519) 616-1733	mendlers@rogers.com
Millers Electric Ltd	(519) 742-3465	scottg@meltd.on.ca
MJM Electric Limited	(519) 824-1989	mlang.mjm@gmail.com
NADELEC CONTRACTING INC	(905) 875-5239	john.nadelec@gmail.com
Nelco Mechanical Ltd	(519) 744-6511	mhobson@nelcomech.com
Pfaff Electric Limited	(519) 235-0909	jeff@pfaffelectric.com
Roberts Onsite Inc	(519) 578-2230	dmagnus@robertsonsite.ca
SENTRY ELECTRIC INC	(705) 436-4530	info@sentryelectric.ca
Sutherland-Schultz Ltd	(519) 653-4123	info@sutherland-schultz.com
Toth Inc	(519) 696-3916	tothelectric@rogers.com
Trade Mark Industrial Inc	(519) 570-1511	tmoore@trade-markind.com
Trade Service Group Inc.	(519) 591-8851	mikewernie@tradeservicegroup.com
Vollmer Inc.	(519) 966-6100	mshaw@vollmer.ca

END OF SECTION

TERMS AND CONDITIONS

1.0 PROVISIONS

1.1 Proceedings against the Board

The Proponent represents and warrants that the Proponent is not a party to any suits, actions, litigation proceedings, arbitration's, alternative dispute resolutions, investigations or claims by or against or otherwise involving the Board and the Proponent. The Board will reject the bid in the view of the current, pending or threatened litigation, arbitration, alternative dispute resolution or disputes involving the Board and Proponent. The Awarded Bidder may also be required, at the discretion of the Board, to sign a Certificate in a form satisfactory to the Board confirming that the Awarded Bidder is not associated with any company involved in litigation with the Board.

1.2 Standard of Behavior

The Board will not knowingly purchase goods and/or services from Awarded Bidders who operate in contravention of local and international laws. Proponents submitting bids are in fact agreeing that they do not purchase or use products that are in contravention of local and international laws. If a product and/or service supplied to the Board is discovered to be in contravention, the Board reserves the right to rectify the issue with the Awarded Bidder that may include the cancellation of the contract.

1.3 Federal, Provincial, Regional, Municipal Laws

The Awarded Bidder must stay current and comply with, for the duration of the agreement, all current laws and bylaws.

1.3.1 No Smoking and Scent Free

The Board has designated all the Board properties to be "smoke free" and most Board properties are “scent free”. Smoking will not be permitted on-site. Offenders will be asked to leave the site, and infractions could result in corrective action.

1.4 Paramountcy Clause

Proponents who have additional and/or supplementary agreements that require the Board’s signature prior to providing the required products and/or services to the Board must submit that said draft agreement with their bid. No additional agreements will be accepted by the Board after the closing date Tender time of the Tender. In the event of any conflict between the provisions of the terms of the Awarded Bidder’s additional and/or supplementary agreement(s) and the provisions of this Tender document, the terms of the Tender contract shall govern.

1.5 Freedom of Information

To comply with the Freedom of Information and Protection of Privacy Act, all bids submitted to the Board become the property of the Board, and as such, are subject to the Freedom of Information and Protection of Privacy Act. Clearly identify any portion of the bid submission that could cause injury if disclosed.

1.6 Criminal Background Checks and Collection of Personal Information

The Board must comply with Regulation 521 (Collection of Personal Information) to the Education Act with respect to criminal background checks and offence declarations.

If required by the Board, the Awarded Bidder will provide the Board, or designate with a Criminal Background Check covering offences under the Criminal Code, the Controlled Drugs and Substances Act, and any other offences which would be revealed by a search of the automated Criminal Records Retrieval System.

An Offence Declaration in a Board-approved form for every individual or employee of the Awarded Bidder who may come into direct contact with Board staff and/or students on a regular basis at any Board site prior to the occurrence, and on or before September 1 each year thereafter is required. The Board will determine in its sole discretion whether an individual or employee of the Awarded Bidder come into direct contact with pupils on a regular basis.

Termination of contracts and indemnification by the Awarded Bidder will result from non-compliance.

1.7 Accessibility

Proponents shall comply with the provisions of the Accessibility for Ontarians with Disabilities Act, 2005, and the Regulations there under with regard to the provision of its goods or service to persons with disabilities. Proponents acknowledge that pursuant to the Accessibility for Ontarians with Disabilities Act, 2005, the Board must, in deciding to purchase goods or service through its procurement process, consider the accessibility for persons with disabilities to such goods or service.

2.0 COMMUNICATION

2.1 Verbal Communication

Neither the Board nor Board consultant will provide verbal direction or clarification during the tender process. As a result, verbal recollections will not be considered valid.

2.2 Addenda

It is the responsibility of the Bidder to have received all Addenda that are issued. Bidders should check online at https://wrdsb.bidsandtenders.ca prior to submitting their Bid and up until Bid closing time and date in the event additional addenda are issued.

If a Bidder submits their bid prior to the Bid closing time and date and an addenda is issued, the Bidding System shall withdraw the Bid submission and the bid status will change to an **INCOMPLETE STATUS** and withdraw the Bid. The Bidder can view this status change in the "**MY BIDS**" section of the Bidding System. The Bidder is solely responsible to:

i) make any required adjustments to their Bid;
ii) acknowledge the addenda; and
iii) Ensure the re-submitted Bid is **RECEIVED** by the Bidding System no later than the stated bid closing time and date.

2.3 Request for Clarification

The Board reserves the right to seek clarification and supplementary information from Proponents after the Bid Submission Deadline. The response received by the Board from a Proponent shall, if accepted by the Board, form an integral part of that Proponent's proposal.

3.0 SPECIFICATION

Bid only on new materials in perfect condition. Demonstrators, seconds or defective materials are unacceptable. Any materials found not to be in a new condition or as specified will be returned to the Awarded Bidder at the Awarded Bidder's expense.

Proponents, if requested by the Board, must furnish with their bid a materials safety data sheet (M.S.D.S.), for all products they are bidding on, where applicable. This is a requirement of the Occupational Health and Safety Act. Subsequently, should any business result from this Tender, the Board will not accept any additional charges or surcharges related to the supplying of M.S.D.S. for any item(s) on this Tender.

All electrical equipment and components must bear a C.S.A. or Electrical Safety Association (E.S.A.) label.

Bid prices must be for goods and/or services exactly as specified.

4.0 BID PREPARATION

The Board will not be liable for any costs incurred by the Proponent for the preparation of their bid.

4.1 Online Submission Forms

All forms are submitted online through the bidding system.

The bidder's signature has the authority to bind the Proponent.

4.2 Bid Price

Bid prices are to be shown as all applicable taxes extra.

Bid prices must be held firm until the project is completed to the satisfaction of the Board.

The bid price herein constitutes the total costs to the Board for all work involved in the respective items and that this cost also includes all insurance, transportation charges, use of all tools and equipment, supervision, bonds, overhead expense, warranty, all profits and all other work, services, conditions furnished in accordance with the requirements of the contract documents.

Bid prices must be in Canadian Funds.

Period for which bids are irrevocable after the tender submission deadline is: **60 days**.

4.3 Bonding Requirements

4.3.1 Bid Amount

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

Bonding is not requested if **the Board** estimates that the project is less than $200,000.00. The Board determines the Bonding requirements and specifies them on the Bid Sheet.

4.3.2 Bid Bond and Agreement to Bond

Bid submissions that request Bonding are inclusive of all taxes and must be accompanied by a bid deposit in the form of a digital Bid Bond in an electronically verifiable and enforceable (e-Bond) format in the amount(s) not less than 10% of the total Contract Value made payable to the Waterloo Region District School Board (the 'Board") as surety that, if the Bid is accepted, a Contract will be entered into for the proper performance of the work. For more information, contact your surety company or visit the Surety Association of Canada website: https://www.surety-canada.com/en/ebonding/index.html

Bidders shall upload their Bid Bond to the Bidding System, in the bid submission file labeled "Bid Bond". All instruction and details for accessing authentication shall be included with the digital Bond uploaded in the Bidding System.

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

The bid deposit of the Bidder whose submission is accepted shall be forfeited by the Bidder should the Bidder fail to execute a Contract or provide the necessary documents as required within this Bid Solicitation document (including signed agreement, satisfactory security, insurance certificate, Workplace Safety and Insurance Board letter of clearance) within the time stipulated as a written notice from the Board.

For bid amounts where Bonding is not requested, the Awarded Bidder agrees to pay to the Board the difference in costs between the bid submitted and the final contract should the Awarded Bidder fail to either execute or deliver the contract documents in accordance with the Bid Solicitation within ten (10) working days of written notification of the award of the contract

4.3.3 Performance Securities

For bid amounts where bonding is required, inclusive of all taxes, upon award the successful Bidder shall provide a digital Bid Performance and Labour and Materials Bond in an electronically verifiable and enforceable (e-Bond) format in the amount(s) of not less than 50% Performance Bond and a 50% Labour and Materials Bond of the total Contract Value made payable to the Waterloo Region District School Board (the 'Board") as surety that, if the Bid is accepted, a Contract will be entered into for the proper performance of the work. For more information, contact your surety company or visit the Surety Association of Canada website: https://www.surety-canada.com/en/ebonding/index.html

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

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

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

The Awarded Bidder must email the bonds to procurement@wrdsb.ca, referencing "Bonding for tender # "in the subject line seven (7) working days of receiving a purchase order.

4.4 INSURANCE

4.4.1 Proof of WSIB Coverage (Onsite work only)

If the Proponent does not provide a policy endorsement for Employer's Liability and Voluntary Compensation, the Proponent shall submit a valid certificate of WSIB coverage to the Board, with the tender submission and any subsequent policy renewal, referencing this Agreement. The Proponent shall ensure that each Subcontractor complies with the WSIB requirements set out in this Article by obtaining similar types of coverage if the Subcontractor does not provide a policy endorsement for Employer's Liability and Voluntary Compensation.

4.4.2 Insurance (Onsite Construction work only)

The proponent is to reference CCDC2-2008 GC 11.1 Insurance and ensure that this section is adhered to.

4.4.3 General & Vehicle

General and vehicle liability insurance covering incidents of property damage or bodily injury (including death) for owned and non-owned vehicle accidents occurring during the work in this Tender, or actions of the employees of the Awarded Bidder while acting within the scope of their duties as required in this Tender shall be maintained. Verification of current "Good Standing" may be requested.

The inclusive per incident minimum amount of coverage is**: Two Million Dollars ($2,000,000).**

5.0 BID SUBMISSION

ELECTRONIC BID SUBMISSIONS ONLY, shall be received by the Bidding System.

Bidders are cautioned that the timing of their Bid Submission is based on when the Bid is received by the Bidding System, not when a Bid is submitted by a Bidder, as Bid transmission can be delayed due to file transfer size, transmission speed, etc.

For the above reasons, it is recommended the Bidders allow sufficient time to upload their Bid Submission and attachment(s) (if applicable) and to resolve any issues that may arise. The closing time and date shall be determined by the Bidding System's web clock.

Bidders should contact bids & tenders support listed below, at least twenty-four (24) hours prior to the closing time and date, if they encounter any problems. The Bidding System will send a confirmation email to the Bidder advising that their bid was submitted successfully. If you do not receive a confirmation email, contact bids & tenders support at support@bidsandtenders.ca.

Late Bids are not permitted by the Bidding System.

To ensure receipt of the latest information and updates via email regarding this bid, or if a Bidder has obtained this Bid Document from a third party, the onus is on the Bidder to create a Bidding System Vendor account and register as a Plan Taker for the bid opportunity.

6.0 BID WITHDRAWAL

Bidders may edit or withdraw their Bid Submission prior to the closing time and date. However, the Bidder is solely responsible to ensure the re-submitted bid is received by the Bidding System no later than the stated closing time and date. Following closing, no bid may be withdrawn

7.0 BID EVALUATION

Preference will be given to the lowest compliant bid.

The “lowest bid price” shall be used to determine the lowest compliant bid. Alternate prices, separate prices and any substitutions that may affect the contract price shall not be considered in determining the “lowest bid price”.

In the event of tie compliant bids, an award will be made to the Proponent with the earliest date time stamp.

The Proponent will not be awarded the tender if the Site Supervisor and/or Project Manager identified by the Proponent are not deemed suitable by the Board.

If the Board has a sense that the Proponent with “lowest bid price” has capacity issues, then the Board will meet with the Proponent after the tender closing date and prior to the Board awarding the Tender.

At the meeting the Proponent will present the following in written form:

1. The Proponent’s capacity resource plan documents which illustrates how the Proponent determines capacity.

2. The level of capacity the Proponent and its resources would be with the award of the Tender.

3. An evaluation of recent projects that the Proponent has completed, where the Proponent was at equal or greater capacity as it relates to the capacity resources available.

In order for the Proponent’s bid to be considered the lowest compliant bid the Proponent will to the Board’s satisfaction have presented in written from the information requested.

8.0 BID RESULTS NOTIFICATION

The Board will forward the results notification to https://wrdsb.bidsandtenders.ca listing the Awarded Bidder and Bid Price.

9.0 AWARD NOTIFICATION

No shipment is to be made or work to commence until a purchase order, contract, or letter of intent is issued by Procurement Services to the Awarded Bidder.

Construction Projects

For construction projects above $200,000 the Awarded Bidder may be required to execute a “Canadian Standard Form of Construction Contract to a Stipulated Sum” (revised 2008) CCDC 2, 2008 including amendments thereto as set out in this Tender.

The Awarded Bidder shall execute the said formal contract as called for, within **seven (7) working days** after notification of acceptance of their Tender or forfeit the amount of Bid Bond enclosed in the Tender.

10.0 POST AWARD

10.1 Bonding (Construction)

The Awarded Bidder is solely responsible for forwarding the Bonding documents, original documents not a copy, to Procurement Services at the Board Education Centre. Payments to the Awarded Bidder will not be processed without bonding being submitted. Failure to submit bonding

to Procurement Services within seven (7) working days may result in the cancellation of the contract.

10.2 Purchase Order

For Payment purposes, a Purchase Order shall be generated and issued to the Awarded Bidder(s). The Purchase Order number must appear on all invoices in order to ensure prompt payment.

10.3 Changes

The Board may order changes in the material or work, in writing, with the contract sum being adjusted accordingly. All changes for additional material or work must be agreed upon and submitted in writing to the Board.

11.0 SUBCONTRACTING

11.1 Subcontracting

Subcontracting, beyond the original list of subcontractors submitted with bid submission, of any portion of the work outlined in these specifications will not be permitted without prior written consent of the Board.

If approval is granted, any work undertaken by subcontractors shall be as set forth in this Tender document and the use of subcontractors shall in no way relieve the Awarded Bidder of their responsibilities.

The Board reserves the right to reject a proposed subcontractor for any reasonable cause.

11.2 Assignment

Any business resulting from this Tender call shall not be assigned to any other company (or individual) without prior written approval of the Board.

12.0 FORCE MAJEURE

If as a result of an event of Force Majeure, a party fails to perform or comply with any of its obligations under this Agreement, such failure shall not constitute a default or breach of the Agreement. Dates and times by which a party is required to render performance under the Agreement shall be postponed automatically to the extent and for the period of time that such party is prevented from meeting them by causes beyond its control, which are not avoidable, by the exercise of reasonable foresight. Such causes (each such cause, an event of “Force Majeure”) shall include but not limited to: Acts of God, Acts of War, Riots, Epidemics, Fire, Strikes, Labour Disruptions or “Lock Outs”.

13.0 TERMINATION

13.1 Sufficient Cause

The Board reserves the right to terminate any contract Tender purchase order resulting from this Tender call for sufficient cause, such as: non-performance, late deliveries, inferior quality, pricing problems, customer service, etc. Should such action be necessary, the Board would provide written notice to the Awarded Bidder.

13.2 Funding Out

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

14.0 RESULT DISPUTE PROCESS

Subsequent to a debriefing a Proponent may dispute the decision of the Board. The process outlined below is to be followed:

(a) The Proponent is to file in writing their protest with the Manager of Procurement & Risk Services by certified mail, within 15 business days of the Debriefing. The Protest Notice shall include:

(i) The name and address of the Proponent.

(ii) Identification of the RFX.

(iii) Detailed and factual statement of the grounds for protest.

(iv) Supporting documentation.

(v) Desired relief, action ruling.

(b) The Manager of Procurement & Risk Services will respond to the Proponent, by certified mail, within 20 business days of receiving the written notice.

(c) If a resolution cannot be met, the Proponent must contact the Superintendent of Business and Financial Services by certified mail, within 10 business days of receiving the first response from the Manager of Procurement & Risk Services. The decision by the Superintendent of Business and Financial Services will be deemed final and the Proponent will receive written notice within 20 business days.

15.0 RIGHTS OF THE BOARD

In addition to any other express rights or any other rights which may be implied in the circumstances, the Board reserves the right to:

(i) Reject any bid received from a Proponent which is party to any past or existing suits, actions, and litigation proceedings, arbitration's, alternative dispute resolutions, investigations, vendor performance evaluations that are below expectations or claims by or against or otherwise involving the Board and the Proponent. Note: the Awarded Bidder(s) may also be required, at the discretion of the Board, to sign a Certificate in a form satisfactory to the Board confirming that the Awarded Bidder(s) is not associated with any company involved in litigation with the Board.

(ii) make public the names of any or all Proponents;

(iii) request written clarification or the submission of supplementary written information from any Proponent;

(iv) waive formalities and accept Bids which substantially comply with the requirements of this tender;

(v) verify with any Proponent or with a third party any information set out in a Bid;

(vi) disqualify any Proponent whose Bid contains misrepresentations or any other inaccurate or misleading information;

(vii) disqualify any Proponent or the Bid of any Proponent who has engaged in conduct prohibited by this tender;

(viii) make changes, including substantial changes, to this tender provided that those changes are issued by way of addenda in the manner set out in this tender;

(ix) accept or reject a Bid if only one Bid is submitted;

(x) accept or reject the lowest or any bid not necessarily accepted by the Board;

(xi) select any Proponent other than the Proponent whose Bid reflects the highest compliant score to the Board;

(xii) cancel this TENDER process at any stage;

(xiii) cancel this TENDER process at any stage and issue a new TENDER for the same or similar services with a minimum substantial change in scope of 10%;

(xiv) accept any Bid in whole or in part;

(xv) discuss with any Proponent different or additional terms to those contemplated in this tender or in any Proponent's Bid;

(xvi) reject any or all Bids in its absolute discretion;

(xvii) negotiate with the leading Proponent prior to award;

(xviii) evaluate and accept Proponent's alternatives whereby possible efficiencies may prove to be advantageous to the Board;

(xix) to all Bids, responses, inquiries, or other related correspondence in reference to this tender , and all reports, charts, and other documentation submitted by Proponents shall become the property of the Waterloo Region District School the Board when received; and the Board shall not be liable for any expenses, costs associated with the preparation and submittal of any proposal(s), or for any travel and or per diem costs that are incurred including any or all product samples that may be requested during the evaluation stage of the proposal, losses or any direct or indirect damages incurred or suffered by any Proponent or any third party resulting from the Board exercising any of its rights under this TENDER or exercising any rights, which may be implied in the circumstances.

By submitting its Bid, the Proponent authorizes the collection by the Board of the information set out under (v), (vi) and (vii) in the manner contemplated in those subparagraphs.

14.1 Volume and Exclusivity

The Board makes no guarantee of the value or volume of work to be assigned to the Awarded Bidder. Any agreement executed with the Awarded Bidder may not be an exclusive contract for the provision of the described goods/services.

END OF SECTION

1.0 GENERAL REQUIREMENTS – SECTION 01001

1.1 CONTRACT BID DOCUMENTS

1.1.1 Examination

Immediately notify the Board contact upon finding design errors, inconsistencies or omissions in the Bid Documents and site examination. The Board contact and Consultants will not accept claims for extras from the Contractor, based on his failure to detect and report same found in the Bid Documents, and site examination before Tender closing.

1.2 PROJECT CO-ORDINATION

1.2.1 Site Examination

1. The Contractor is expected to be totally familiar with site conditions and shall assume full responsibility for the cost involved in repairing any damage to the building, site and it's services, city property, adjacent buildings, etc., during general construction, regardless of the extent of the damage.
2. The Contractor expressly agrees that conditions above existing suspended acoustic tile ceilings but below the level of gypsum board at the underside of the structure shall be considered **exposed conditions** for the purposes of making findings under the provisions of this Contract. There shall be no claims for extra costs for extra Work in these areas.
3. The Contractor shall provide all equipment necessary to make a full and detailed site evaluation. This shall include but not be limited to ladders, flashlights and hand tools.

1.2.2 Site Supervisor and Project Manager

1. The Contractor shall provide if requested, in writing, the name of the Project Manager and Site Supervisor and proof of experience and competence in similar projects.
2. The Project Manager, and/or Site Supervisor shall be replaceable within 24 hour of receipt of such request.

1.2.3 Control of the Work

1. The Contractor shall have total control of the Work and shall effectively direct and supervise the Work so as to ensure conformity with the Contract Documents and within the Contract Time.
2. The Contractor shall be solely responsible for the construction means, methods, sequences, and procedures and for coordinating parts of the Work under the contract.
3. Co-ordinate progress of the Work, progress schedules, submittals, use of site, temporary utilities, construction facilities, safety regulations and fire protection, as per authorities having jurisdiction codes.
4. The Board contact in consultation with the Consultant has the authority to stop the Work whenever it is deemed necessary to protect the interests of the Board.
5. **The Board will obtain & pay for all building permits, but the Contractor is responsible for all other permits, including electrical inspection and fire alarm verification.**

1.2.4 Asbestos and Other Designated Substances

1. An Asbestos Audit, prepared by MTE Consultants Inc. for each facility is available at the school's main office, for review by the Contractor. A duplicate set is also available in the Facility Services department located in the Education Centre. Unless otherwise covered by Cash Allowance or Contingency Allowance, Include in this contract the required removal of all asbestos containing material to complete the Work. No claims for extra cost will be accepted for areas known to contain asbestos containing materials.

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

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

1.2.5 Qualified Fire Alarm Installers

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

1.2.6 Hot Work

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

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

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

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

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

   E. For Work on walls or ceilings, remove combustibles away on other side.

2. For on-site Work (indoor, out of doors), advise the Head Custodian and Principal prior to Work being performed, and of related dangers.

3. In the event of a fire as a result of the Hot Work, notify the fire department and the head custodian immediately, whether extinguished or not.

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

5. Have all necessary doors, windows and/or drapes closed. Request of the head custodian to shut down all fan systems in the area to reduce or eliminate smoke distribution.

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

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

1.2.7 After Hours Work

1. Schedule Work with school staff through the Board's contact so as to limit disruption to school operations. Include for any overtime, to ensure orderly and continuous progression of Work and operation of school.
2. Direct calls from Contractors to Board staff to adjust alarms and to arrange for access will not be accepted. All correspondence must be through the Project Manager.
3. Arrange 48 hours in advance with Board to obtain an access card and adjust security alarms for overtime Work.
4. Bidders are cautioned that the Board will impose a penalty for false alarms. A $100.00 penalty for each false alarm may be levied for false fire alarm activation or security alarm activation.
5. Contractors are responsible for ensuring doors and windows are secured prior to leaving school.

1.3 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1.3.1 Safety Barriers

1. Erect and maintain for the duration of the Work, safety devices and barricades including boarding, as required, to protect the staff, students, public and private property, from injury and damage. The Contractor is to ensure that all requirements from authorities having jurisdiction are met.
2. The Contractor is to assume full responsibility for any damage caused due to his failure to comply with paragraph 1 above.
3. Hazardous conditions on the exterior shall be fenced. The recommended safety barricade: Insta-fence Inc. or approved equal is Board standard.

1.3.2 Lockout Procedures

1. All Work to be done on electrical systems or machinery, where the unexpected switching on of the system or machinery could result in personal injury to a student, staff, employee, or the Contractor’s employee, must be done in accordance with the Contractor’s standard lockout procedure.
2. The Contractor shall provide his/her own locks for the above procedure.

1.3.3 Warning Signs and Notices

1. Wherever the Contractor’s Work may expose a student, staff, or public to danger the Contractor shall notify the supervisor and post notices advising of the hazard.

1.3.4 Dust-tight Screens

1. Provide dust-tight screens or partitions to localize dust generating activities, and for the protection of Workers, finished areas or Work and public.
2. Maintain and relocate protection until such Work is completed.

1.3.5 Sanitary Facilities

1. The use of existing staff sanitary facilities for Workers is permitted. The use of student facilities is not permitted.
2. Maintain in clean condition.

1.3.6 Project Cleanliness

1. Maintain the Work in a tidy condition, free from the accumulation of waste products and debris disposed of in appropriate waste containers as the Work progresses.
2. Waste containers (roll off style or front-end load style) must be supplied by the Contractor and located as directed by Board contact.
3. Clean interior areas prior to start of finish Work, and maintain areas free of dust and other contaminants during finishing operations.

1.3.7 Roof and Structure Protection

1. Ensure no part of Work or existing structures are subjected to a load, which will endanger its safety or will cause permanent deformation.
2. The Contractor when indicated by the Board Contact or Consultant shall provide roof protection. Ensure all precautions are taken to avoid liability for roof damage.
3. Typical roof protection shall consist of a layer of 1inch rigid foam insulation set directly on the roof surface and a layer of 19 mm (3/4 inch) plywood in all places under scaffold legs, ladder legs and in areas of foot traffic or falling debris.

1.3.8 Overhead Lifting

1. Any condition requiring the use of a crane or lifting device over a Board structure must be scheduled and coordinated through the Project Manager.

1.4 INSPECTIONS

1.4.1 Reviews and Inspection

1. The Board reserves the right to perform safety inspections at any time, and will report all safety deficiencies to the Contractor.
2. All safety deficiencies shall be corrected immediately. Failure to do so could result in loss of future business.
3. The Contractor shall report all accidents to the Board's contact immediately.
4. The Board's contact and the Consultant shall have access to the Work. If parts of the Work are in preparation at locations other than the place of Work, access shall be given to such Work whenever it is in progress.
5. Give timely notice requesting review if Work is designated for special tests, reviews by Consultants, inspections by inspectors, or review by authorities having jurisdiction.
6. If the Contractor covers or permits to be covered Work that has been designated for special tests, reviews, inspections, or approvals before such is made, uncover such Work, have the inspections or tests satisfactorily completed and make good such Work at no cost to the Board.
7. The Board's contact or the Consultant may order any part of the Work to be examined if such Work is suspected to be not in accordance with the contract Documents.
8. The Consultant's general review of the Work is for the purposes of informing the Board and Board's contact of the general progress and quality of the Work. It does not relieve the Contractor of his full responsibility for inspection and examination of the Work in whole or in part to ensure compliance with the contract Documents.
9. The Contractor shall bring to the Consultant's attention any part of the Work which does not conform to the requirements of the contract Documents and provides such remedial measures, products and labour required to correct such parts of the Work in order that they meet the requirements of the contract Documents with no cost to the Board or Consultant.

10. The Contractor acknowledges that inspection and supervision form an integral part of the Work. Failure to fully provide such Work constitutes a reduction in the value of the contract, which will result in a commensurate decrease in the contract price through change to the Work, should the Consultant find that such a decrease is warranted.

1.4.2 Independent Inspection Agencies

1. The Board for the purpose of inspecting and/or testing portions of the Work may engage Independent inspection/testing agencies.
2. The Board, under cash allowances shall pay costs of such inspections engaged by the Board, or directly to the inspection agency, and as outlined herein.
3. Provide equipment required for executing inspection and testing by the appointed agencies.
4. The Contractor must comply with current Federal, Provincial Codes, Acts and Regulations, and local By-laws including those listed in other parts of the Contract Documents.
5. Employment of inspection/testing agencies does not relax the Contractor's responsibility to perform Work in accordance with the contract Documents, and to supervise and inspect the progress of the Work to ensure performance of the Work in accordance with the contract Documents.
6. If defects are revealed during inspection and/or testing, the appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defects and irregularities as advised by Consultant at no cost to the Board. Pay costs for all re-testing and/or re-inspection.

1.4.3 Rejected Work

1. Remove defective Work, whether the result of poor Workmanship, use of defective products, or damage, and whether incorporated in the Work or not, which has been rejected by the Board’s contact or the Consultant as failing to conform to the contract Documents. Replace or re-execute in accordance with the contract’s Documents.
2. Make good other Contractor's Work and/or existing conditions affected by the Work damaged by such removals or replacements promptly.
3. If, in the opinion of the Consultant, it is not expedient to correct defective Work or Work not performed in accordance with the contract Documents, the Board may deduct this amount from the contract price. This shall be the difference in value between the Work performed and that called for by the contract Documents, the amount of which shall be found by the Board’s contact or the Consultant.

1.5 MATERIAL AND EQUIPMENT

1.5.1 Product and Material Quality

1. Products, materials, equipment and articles referred to as "Products" throughout the specifications incorporated in the Work, shall be new, not damaged or defective, and of the best quality, compatible with specifications for the purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
2. Defective products will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is a precaution against oversight or error. Remove and replace defective products at own expense, and be responsible for delays and expenses caused by rejections.
3. Should any dispute arise as to the quality or fitness of products, the decision rests strictly with the Board contact, based upon requirements of the Contract Documents.

4. Current Material Safety Data Sheets shall be on file with the successful Contractor and shall be provided to the Board contact upon request, within twenty-four (24) hours.
5. Material safety data sheets are not required for products currently W.H.M.I.S. exempt.

1.5.2 Equipment/Tool Materials Storage, Handling and Protection

1. Handle and store products in a manner to prevent damage, adulterations, deterioration, and soiling, and in accordance with manufacturer's instructions.
2. Store packaged or bundled products in original and undamaged condition, with manufacturer's seals and labels intact.
3. Store products subject to damage from weather in weatherproof enclosures.
4. Provide and maintain tools, equipment and materials in a clean and orderly condition. Board tools, ladders, lifts, power cords, flashlights etc. are not to be used.
5. Materials are to be stored in a manner to cause the least interference with Work activities.
6. The Contractor shall determine with the Board contact, prior to ordering materials, those locations that are suitable for receiving and storage of materials and equipment.
7. All materials and equipment shall be kept in a secure area, at Contractor’s expense, or removed from the job site when Work is not actually in progress.
8. Vehicles, trailers or other similar apparatus may not be stored or parked overnight at site without written authorization from Board contact. Written requests are to be forwarded directly to the Board contact.
9. Approval for parking does not imply any liability or responsibility for safe keeping by the Board.
10. The Contractor may use the existing electrical and water services, as required, for the Work, and the costs of these services shall be borne by the Board.

1.5.3 Workmanship

1. Workmanship shall be the best quality, executed by Workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Consultant if required Work is such as to make it impractical to produce required results.
2. Do not employ any unfit persons or anyone unskilled in their required duties.
3. Decisions as to the quality or fitness of Workmanship in cases of dispute rest solely with the Board contact, whose decision is final.
4. All Contractor personnel are restricted to the job site and necessary access routes. No personnel shall visit other areas or buildings without specific authorization.
5. The Contractor shall make their own arrangements for emergency treatment of accidents. Any accidents shall be reported immediately to the Board contact.
6. The Contractor agrees to hold the Board harmless of any and all liability of every nature and description, which may be suffered through bodily injuries, involving deaths of any persons, by reasons of negligence of the Contractor, his agents, employees, or his sub-Contractors.
7. The Contractor shall supply constant on-site supervision in the form of a Project Superintendent. The Project Superintendent shall have within their authority to negotiate minor changes regarding scheduling, manpower and equipment.

1.5.4 Manufacturer's Instructions

1. Unless otherwise indicated in the specifications, install, apply or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

1.5.5 Tools of the Trade

1. The Board will not pay the Awarded Bidder a fee for tools and equipment that are considered “tools of the trade” that are required to perform the work in this Tender or any change orders.

1.6 CHANGES IN THE WORK

1.6.1 Notification of Changes and Mark-ups

1. The Contractor shall inform the Insurance and Surety Company or Companies who have issued Performance Bonds, Labour and Materials Payment Bonds, Liability Insurance and Fire Insurance for this Contract, of any changes to the Contract in accordance with the Contract Documents. If any changes to the Contract require adjustments of the bonds or insurances the Contractor shall initiate and pay for such adjustments subject to the approval of the Board.
2. Allowable mark-ups on changes to the Work will be subject to the following schedule:

- Contractor on Work of their own forces, 5% overhead, 5% profit
- Sub-Contractor on Work of their own forces, 5% overhead, 5% profit plus
- Contractor on Work of sub-Contractor, 5% overhead only

The above includes all site and office-related overhead costs.

3. On credits, the amount shall be the net cost, without deduction for overhead or profit.
4. Once the Consultant has issued a proposed change order, it shall be the responsibility of the Contractor to ensure that no Work is carried out that may increase the cost of the variation contemplated without prior notice and agreement with project manager.
5. The Board’s contact and Consultant will assess the cost of each change before issuing a change order. To assist the Board contact and Consultant in the task of assessing the Tenders on variations, full details of the following may be required:

- Quantity of each material
- Unit cost of each material
- Man-hours involved
- Cost per hour
- Copies of sub-Contractor quotations
- Approved mark-ups

6. The Board’s contact and Consultant may require further quotations in order to review a breakdown of the costs.
7. Unless stated to the contrary, Work shall not be carried out with respect to all proposed changes, nor shall the Board incur any costs until a Change Order is issued.

1.6.2 Extra Claims

1. No claim can be made by the Contractor (and sub-Contractors) for a price increase to cover the additional cost of shut-down, delay and start-up, if it's Work is stopped due to the discovery of hazardous materials or substances, and/or external forces that are beyond the direct control and influence of the Board. E.g.: Hydro shutdown

1.7 PAYMENTS

1.7.1 Progress Payments

1. Applications for payment on account may be made monthly, as the Work progresses.
2. Applications for payment shall be dated the last day of the agreed monthly payment period and the amount claimed shall be for the value, proportionate to the amount of the contract, of Work performed and products delivered to the place of Work at that time.
3. No claim for payment, in whole or in part, will be accepted for material stored off site.
4. The Contractor shall include a statement based on the schedule of values with each application for payment.
5. The Contractor shall include a summary of changes with their draw or application for payment.
6. Such evidence shall support claims for products delivered to the place of Work, but not yet incorporated into the Work, as the Consultant may reasonably require establishing the value and delivery of the products.

1.7.2 Final Payment

1. When the Contractor considers that the Work is completed, the Contractor shall submit an application for final payment.
2. When the Consultant finds the Contractor's application for final payment valid, the Consultant will issue a final certificate of payment.
3. The Board reserves the rights to withhold all or part of the final payment until school access card(s) have been returned. In the event that the access card(s) cannot be returned, the cost of programming will be deducted from the final payment plus 18% for overhead.
4. The cost to reprogram the card(s) access system is estimated at $100.00 (one hundred dollars) for each card issued.

1.7.3 Payment of Holdback upon Substantial Performance of the Work or Deemed Completion

1. The Contractor shall submit an application for payment of the holdback amount.
2. Submit a sworn statement that all accounts for labour, subcontracts, products, construction machinery and equipment, and other indebtedness, which may have been incurred by the Contractor in the substantial performance of the Work and for which the Board might in any way be held responsible, have been paid in full, except for amounts properly retained as a holdback or as an identified amount in dispute.
3. After the receipt of an application for payment from the Contractor and the sworn statement as provided in paragraph 2 above, the Board will issue a certificate for payment of the holdback amount.

1.8 PROJECT CLOSE-OUT

1.8.1 Inspection/Takeover Procedures

1. The Contractor shall supply, upon completion of the job, two copies of written manufacturer's warranties for any applicable items such as but not limited to, doors, windows, etc. Photocopies are acceptable.
2. The Contractor shall carefully inspect the Work and ensure it is complete, that the major and minor construction deficiencies are complete, defects are corrected, and the building is clean and in condition for occupancy. Notify the Board’s contact and Consultant in writing of satisfactory completion of the Work and request an inspection.

3. During the Board contact's site review, a list of deficiencies and defects will be tabulated. Correct Work noted.
4. When the Board contact considers that deficiencies and defects have been corrected, and requirements of the contract have been performed, make application for Certificate of Substantial Performance.
5. Any defects or damages caused to other equipment by such defects, which appear in any of the Work within two (2) years after the written acceptance of same by the Board's contact, shall be repaired or replaced by the Contractor. These repairs or replacements must be made without delay, expense or inconvenience to the Board.
6. The manufacturer of the materials chosen for each “Assembly” shall provide a written warranty. Warranty is to state that the products used in each assembly will be free from manufacturing defects, so that these products will not break down or deteriorate for the period of the warranty when installed in accordance with the manufacture’s written specifications and guidelines. The warranty to include the cost of labour and material.
7. Extended warranties on parts and labour on manufactured products and extended warranties on the Workmanship may be found in other parts of the Contract Documents.

1.8.2 Deficiencies

1. Upon determination of the defect and deficiency list, submit to the Board’s contact within 5 Working days written notification of any items, which may not be corrected within 28 calendar days.
2. The Board will retain a minimum holdback of 2% of the Contract Price or funds equal to the estimated value of the deficient work, whichever is greater, for the completion of deficiencies.
3. In the event of failure to correct defects and deficiencies within this time, the Board reserves the right to correct defects and deficiencies and deduct the cost thereof from any payments due the Contractor.

1.8.3 Final Cleaning

1. When the Work is substantially completed, remove surplus products, tools, construction machinery and equipment not required for the performance of the remaining Work.
2. Remove waste materials and debris from the site within 48 hours of completion of the Work and prepare site for future, which may include paving or seeding.
3. Leave the Work “broom clean” before the inspection process commences.
4. Remove stains, spots, marks and dirt from decorative Work, fixtures, furniture fitments, walls, and any other exposed areas, as required.
5. Vacuum clean and dust building interior including behind grilles, louvers and screens.

1.9 CUTTING AND PATCHING

1.9.1 Approvals

1. Submit written request in advance of cutting or alteration, which affects:

a. Structural integrity of any element of the project

b. Integrity of weather-exposed or moisture-resistant elements

c. Efficiency, maintenance or safety of any operations element

d. Visual qualities of sight exposed elements.

e. Work of the Board or separate Contractor.

1.9.2 Existing Condition Review

1. Review existing conditions, including elements subject to damage or movement during cutting and patching.
2. After uncovering, inspect the conditions affecting performance of Work.
3. Beginning of cutting and patching means acceptance of existing conditions.

1.9.3 Execution

1. Perform cutting, fitting and patching to complete Work. Perform Work to avoid damage to other Work.
2. Remove and replace defective and non-conforming Work.
3. Prepare surfaces to receive patching and finishing.
4. Restore Work with new products, in accordance with contract Documents.
5. At penetration of fire-rated wall, ceiling or floor construction, completely seal voids with fire-rated and/or fire-resistant materials, to ensure the fire rating of the assembly being penetrated is maintained. Applied materials as outlined by manufacture for the construction element involved.
6. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to the nearest intersection. For assembly, refinish entire unit

1.10 FIRE PROTECTION SYSTEMS

1.10.1 Fire Alarm Shut Down Procedure

1. Any Modifications to Fire Alarm system and it's devices including service, additions and changes in device location must be performed only by a Certified Fire Alarm Technician as per the Ontario Fire Code section 1.1, subsection 1.1.5
2. Do not shut the system down unless you have to. Plan the operation required to reduce system down time to the least amount possible.
3. Wherever possible, shut down only the zone needing Work and schedule this down time in unoccupied school hours. Allow for this in your bid pricing.
4. Discuss the possible down time with the head custodian and principal prior to any partial or whole system shut down.
5. The school administration shall advise all staff of fire alarm system shut down. This will include instructions to call 911 if they see a fire and when system is back on line.
6. A fire patrol may need to be established and will include the following at the Contractor's expense:
   - Patrol all halls and high-risk areas affected.
   - Fire patrol shall have access to a phone and call 911 if they see a fire.
   - Report all other problems they encounter.
   - Remain on patrol until system is back on.
7. Successful Contractor will receive from the Board's contact a contact number for the monitoring service and a school system number.
8. The Contractor shall provide full detail to monitoring company as requested including contact name, company name, and length of time system is down. Call shall be placed just prior to any shut down.
9. Unless indicated, the system will be back on line at the monitor service one hour after shut down call. After such time false alarm penalties noted below shall be levied for each false alarm.

10. Bidders are cautioned that the Board will impose a penalty for false alarms. A $100.00 penalty for each false alarm may be levied for false fire alarm activation or security alarm activation.
11. An approved inspection firm shall verify all new fire alarm devices, in accordance to CSA regulations. Certificate of Verification is required before occupancy.
12. An activated system **must not be reset** until authorized by the Fire Department and the cause of the alarm has been investigated.

1.10.2 Fire Alarm Modifications and Maintenance

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

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

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

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

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

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

The Contractor and sub-Contractors shall include in the bid price for the above ULC Standards requirements referenced in the Ontario Building Code.

1.10.3 Fire Protection Equipment Impairment (hydrants, sprinklers, hose cabinets)

1. Fire Protection Equipment referred to in this section includes sprinkler systems, special fire suppression systems, and kitchen hood suppression systems.
2. The Contractor will take all precautions including restrict all hot Work operations and shut down hazardous processes during all Fire protection equipment impairment.
3. Do not shut the Fire protection equipment down unless you have to. Plan the operation required to reduce system impairment time to the least amount possible.
4. Wherever possible, shut down only the Fire protection equipment needing Work and schedule this impairment time for unoccupied school hours. Allow for this in your bid pricing.

5. Discuss the possible down time with the head custodian and principal prior to any partial or whole system impairment.
6. The school administration shall advise all staff of Fire protection equipment shut down. This will include instructions to call 911 if they see a fire and when system is back on line
7. The Contractor will plan to use temporary protection such as extra extinguishers, charged hose lines and temporary sprinkler protection during all Fire protection equipment impairment.
8. If the sprinkler system is restorable, either in whole or in part, the Contractor or sub-Contractor shall assign someone to restore the system promptly in the event of a fire.
9. A fire patrol may need to be established and will include the following at the Contractor's expense:

- Patrol all halls and high-risk areas affected.
- Fire patrol shall have access to a phone and call 911 if they see a fire.
- Report all other problems they encounter.
- Remain on patrol until system is back on.

10. The Contractor shall inform all sub trades that the Board has a Red Tag Permit System and it shall be used for all Fire protection equipment impairment.
11. For ease of use, a Factory Mutual hanging wall kit has been place at all Board Fire protection equipment locations. Supplies of Red Tag Permits are provided there.

1.11 DRAWING FORMAT

AutoCAD (.dwg) or Revit (.rvt) files are the standard file formats used by the Board. PDF files may be submitted in addition to the other files but not in place of. The files created during all phases of the project must be available to the Board for use by the Board through use of ftp site or similar or provided on CD/DVD. The files must be complete sets matching documentation used at the time of Tender. A further submission is required at the midpoint of construction and at Substantial Completion detailing changes noted in change orders or site instructions. It is also required that the files be showing the as built condition within 60 days of Substantial Completion.

END OF SECTION

APPENDIX A – BUSINESS CONDUCT
FOR BOARD EMPLOYEES

1. Preamble

The Principles of Business Conduct procedure describes the manner in which the Board does business and specifies the standards of behaviour expected from employees. They are a formal guide to ethical practices to be followed in all business dealings. They are not a substitute for personal integrity and good judgement; they are intended to serve as a minimum standard of behaviour.

The Principles of Business Conduct provide guidance to Board employees to ensure its relationship with the private sector is beyond reproach. The overall image of the Board would clearly be harmed by cases of employees receiving, or perceived to be receiving, any undue benefits or otherwise benefiting or appearing to benefit, from their relationships with the private sector.

2. General

The Board is committed to the highest level of personal and corporate ethical standards in the conduct of doing business. A key ingredient in its business dealings is the treatment of all suppliers in a fair and equitable manner.

3. Principles

3.1. Board employees must act honestly and uphold the highest ethical standards. This will maintain and enhance public confidence and trust in the integrity, objectivity and impartiality of the Board.

3.2. Board employees are obligated to perform their official duties and conduct themselves in a manner that will bear the closest public scrutiny.

3.3. When dealing with suppliers, Board employees must declare any conflict of interest (i.e., where an employee's personal interest may be in conflict with the employee's role and responsibility for the Board).

3.4. Civil or criminal action may be taken against any employee who fails to comply with the Board's rules of conduct. If an employee fails to comply with the Principles of Business Conduct, the employee will be disciplined, as appropriate, up to and including dismissal.

4. Guidelines

4.1. *Personal Benefits*

4.1.1. Board employees shall not have private interests in companies that either supply the Board or wish to supply the Board with goods and/or services that would be affected particularly or significantly by Board actions in which the employees participate.

4.1.2. An employee must not use confidential information obtained as part of their job for personal benefit.

4.1.3. Nor should the employee use their influence to award a contract or other commitment to a relative (i.e., family member or friend).

4.2. *Gifts, Hospitality and other Benefits*

4.2.1. An employee must refuse from any persons or organizations doing business with the Board all personal gifts, benefits or hospitality.

4.3. *Bribery and Fraud*

4.3.1. To conform to the laws of Canada an employee must not accept or offer money, valuable consideration, office, place or employment for themselves or someone else while doing their job.

4.3.2. Employees will not give, offer or agree to give, offer, demand, accept or agree to accept a loan, reward, advantage or benefit of any kind as consideration for cooperation, assistance, exercise of influence or an act of omission in connection with the transaction of procurement or a claim against the Board regardless whether the employee has the ability to do so or not.

4.4. *Preferential Treatment*

4.4.1. An employee must not give any advantage or preferential treatment to anyone.

4.4.2. An employee must not enter a contract on the Board's behalf with a friend(s) or family member(s).

4.4.3. An employee must refuse to help outside entities or organizations in any transactions or dealing with the Board in a way that contravenes the provisions of the Principles of Business Conduct.

4.5. *Discrimination*

4.5.1. An employee must not knowingly participate in acts of discrimination or harassment towards any person with whom that employee has business relations.

4.6. *Environmental Issues*

4.6.1. Employees should recognize their responsibility to environmental issues/conflicts consistent with the Board's goals or mission.

When in doubt on the interpretation of the above, the employee should consult with the Executive Superintendent of Business Services and Treasurer.

END OF SECTION

APPENDIX B

VENDOR PERFORMANCE EVALUATION FORM AND GUIDELINES

The Board, in an effort to build an improved supplier base and to obtain exceptional long term value, has undertaken a project to register vendors. In conjunction, performance of vendors, either Prime and/or Sub that are involved with this project may be evaluated.

The evaluation may occur at or near substantial completion.

An evaluation may also occur at any stage of the project in order to request and implement a corrective action to facilitate the successful completion of the project.

The Board will evaluate prime contractors.

Prime contractors will evaluate sub-contractors that do not meet expectations and forward the results to the Board. The Board will initiate a request for corrective action to the subcontractor. This is separate from any corrective action that the prime contractor may have. Prime contractors may address the evaluation form and processes at the start up meeting, but it is the responsibility of the prime contractor and the subcontractors to communicate, understand and adhere to the evaluation form and guidelines.

The Board will forward Performance Evaluations to the evaluated prime contractor and/or Subcontractor, here after referred to as Vendor.

A Vendor Performance Evaluation that:

1) Meets or exceeds expectations:

   Is a very powerful tool that the evaluated vendor can forward as references to prospective clients giving a very accurate indication of their performance and abilities.

   As such, upon request, a vendor performance evaluation will be completed and forwarded to the same vendor, who can then forward it on to their prospective client.

2) Is below expectations:

   Will be forwarded to the vendor with a Request for Corrective Action.
   The Board will also lower the project size capability of the vendor at this time.

Upon the vendor's successful completion and demonstration of the Request for Corrective Action, the Board may increase the project size capability of the vendor.

The Board or vendor upon the successful completion of the Request for Corrective Action may request a meeting in order to move forward in a positive manner.

Procurement Services will provide clarification and/or direction regarding the Request for Corrective Action, if requested, however the Vendor Performance Evaluation will remain as issued.

The Vendor Performance Evaluation, Requests for corrective action, and the vendor's corresponding corrective action will be filed at the Board.

END OF SECTION

APPENDIX C

WRDSB PROJECT WARRANTY CARD

1.0 WRDSB PROJECT WARRANTY CARD

1. The WRDSB Project Warranty Card shall be filled out and completed for any project or work that calls for the replacement or the new installation of any item that has warranty and requires ongoing preventative maintenance.

A. The information for the Warranty Card shall be collected and coordinated by General Contractor responsible for the overall project. The Warranty Card shall be filled out and submitted to the Board at the point in time where the project is deemed “Substantially Complete” or at the start of the Warranty Period for said item. On any project without a General Contractor the Contractor or Trade responsible for the installation of the item shall complete the Warranty Card and submit it to the Board.

B. All items shall include the item name, location, make, model, serial number, and warranty end date.

C. NO Warranty Period shall start without the written permission of the Board prior to the point of “Substantial Completion”

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

END OF SECTION

TENDER #7188-KP-21

APPENDIX C
WRDSB PROJECT WARRANTY CARD

School name/location:._____

Information provided by:_____

Sub Contractor:_____

Please select all that apply

- ❑ Air Compressor
- ❑ Air Handler- ERV, Heat Pump, RTU
- ❑ AC Split -Indoor/Outdoor Unit
- ❑ Automatic Doors
- ❑ Backflow Preventer
- ❑ Boiler
- ❑ Chiller
- ❑ Cooling Tower
- ❑ Elevator/Lift
- ❑ Eyewash Station-location only
- ❑ Fire Panel
- ❑ Grease Trap
- ❑ Hoods- Kitchen/Fume
- ❑ Sprinkler System -area covered
- ❑ Tech Equipment
- ❑ Other Not Listed:

_____

ITEM/ ROOM NUMBER (as selected from above)	MAKE	MODEL	SERIAL NUMBER	WARRANTY END DATE

Maintenance services covered during the warranty period to include as a minimum:
-Air handling equipment filter changes, *3x* per year minimum- fall (at heating service), winter & spring (at cooling service)- as applicable and per manufacturers recommendations. Filters after project turn over set shall be Board supplied - installed by maintenance provider.
- Service for testable backflow protection devices shall include annual inspection and associated municipal fees (if any).
-Maintenance for all other equipment as listed above hall follow the recommendation of each manufacturer.

Contact information for warranty:

General Contractor: _____

General Email Address: _____

Photocopy as required

ARCHITECTURAL

A0.1 Abbreviation, Key Map, Drawing List, Wall Types
D2.1 Demolition Floor Plan
A2.1 Existing Window Plan / Schedule
A2.2 Ventilation Renovation Schematic Floor Plan
A2.3 Existing Roof Plan
D3.1 Demolition Elevations
A3.1 Elevations
A4.1 Section and Plan Details
A4.2 Section and Plan Details
A4.3 Section and Plan Details
A4.4 Section and Plan Details
A6.1 Reflected Ceiling Plan
A8.1 Window Schedule
A8.2 Door and Screen Schedule

STRUCTURAL

S1.1 Structural Notes Schedules and Details
S2.1 Partial Ceiling Framing Plan

MECHANICAL

M1.1 Key Plan, Legend, And Legend
M2.1 Partial Main and Basement Level – Demolition Plans
M3.1 Partial Main and Basement Level – Renovation Plans
M4.1 Roof Plan

ELECTRICAL

E1.0 Key Plans, Legend And Schedules
E1.1 Basement – Demolition
E1.2 Main Level – Demolition
E1.3 Roof - Demolition
E2.1 Basement – Renovation
E2.2 Main Level – Renovation
E2.3 Roof Partial Plan ‘B’- Renovation
E3.1 Electrical Specifications

END OF SECTION

The Standard Construction Document CCDC-2 2008 for Stipulated Price Contract, English version, consisting of the Agreement Between *Owner* and *Contractor*, Definitions, and General Conditions of the Stipulated Price Contract, Parts 1 to 12 inclusive, and including the addition of Part 13, 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.

AGREEMENT BETWEEN OWNER AND CONTRACTOR

ARTICLE A-3 – CONTRACT DOCUMENTS

3.1 Include in the list of *Contract Documents* in paragraph 3.1:

- Supplementary Conditions
- Performance Bond
- Labour and Material Payment Bond

ARTICLE A-5 – PAYMENT

Modify Article A-5 (5.1) as follows:

5.1 "....subject to a holdback of ten per cent (10%), the Owner shall:...."

Add New Article A-5 (5.1) 5.1.4:

5.1.4 Notwithstanding anything herein contained the sum of **2%** of the Contract Price (plus Value Added Tax) for this Project shall be retained by the Owner and released to the Contractor two years after the payment under Article A-5.1.2, has been made, provided that all outstanding deficiencies and defects due to faulty material and workmanship appearing within one year after the payment under Article A5.1.2, has been made, have been remedied.

5.3.1 Delete paragraph 5.3.1 in its entirety and substitute new paragraph 5.3.1:

5.3 Interest

.1 Should either party fail to make payments as they become due under the terms of the *Contract* or in an award by arbitration or court, interest on such unpaid amounts shall be paid under Part I.1 of the Construction Act, commencing the date that the payment was due, at the prejudgment interest rate determined under subsection 127(2) of the Courts of Justice Act.

ARTICLE A-6 – RECEIPT AND ADDRESSES FOR NOTICE IN WRITING

Delete Article A-6.1 and substitute new article 6.1:

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

ARTICLE A-9 – CONFLICT OF INTEREST

Add new Article A-9 – Conflict of Interest:

9.1 The *Contractor*, all of the *Subcontractors,* and any of their respective advisors, partners, directors, officers, employees, agents, and volunteers shall not engage in any activity or provide any services where such activity or the provision of such services creates a conflict of interest (actually or potentially, in the sole opinion of the *Owner*) with the provision of the *Work* pursuant to the *Contract*. The *Contractor* acknowledges and agrees that a conflict of interest includes the use of *Confidential Information* where the *Owner* has not specifically authorized such use.

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

9.3 The *Contractor* covenants and agrees that it will not hire or retain the services of any employee or previous employee of the Owner where to do so constitutes a breach by such employee or previous employee of the employee or previous employee's employment contract or the previous employer's conflict of interest policy, as it may be amended from time to time.

9.4 A breach of this Article by the *Contractor*, any of the *Subcontractors,* or any of their respective advisors, partners, directors, officers, employees, agents, and volunteers shall entitle the *Owner* to terminate the *Contract*, in addition to any other rights and remedies that the *Owner* has in the *Contract*, in law, or in equity.

ARTICLE A-10 – CONFIDENTIALITY

Add new Article A-10 – Confidentiality:

10.1 The *Contractor* agrees to ensure that it shall, both during or following the term of the *Contract*, maintain the confidentiality and security of all *Confidential Information* and *Personal Information*, and that it shall not directly or indirectly disclose, destroy, exploit, or use any *Confidential Information* or *Personal Information*, except where required by law, without first obtaining the written consent of the *Owner*. The *Contractor* may disclose any portion of the *Contract Documents* or any other information provided to the *Contractor* by the *Owner* to any *Subcontractor* or *Supplier* if the *Contractor* discloses only such information as is necessary to fulfill the purposes of the *Contract* and the *Contractor* has included a commensurate confidentiality provision in its contract with the *Subcontractor* or *Supplier*. The *Contractor* acknowledges that it will comply with all requirements at law with respect to the handling of *Personal Information* and *Confidential Information*. The *Contractor* acknowledges that the *Owner* is bound by the provisions of the *Municipal Freedom of Information and Protection of Privacy Act* ("*MFIPPA*"). The *Contractor* further acknowledges that the *Owner* may be required to disclose any or all of the *Confidential Information* and *Personal Information* in the event that it is compelled to do so by law, through a request under *MFIPPA*, or by the rules of any applicable regulatory authority.

DEFINITIONS

Add the following definitions:

27. As-Built Drawings

As-Built Drawings means drawings prepared by the Contractor by marking on a copy of the Drawings the changes from the Drawings which occur during construction including, but are not limited to the exact location of major building components that were shown generally on the Drawings.

28. Confidential Information

Confidential Information means all the information or material of the *Owner* that is of a proprietary or confidential nature, whether it is identified as proprietary or confidential or not, including but not limited to information and material of every kind and description (such as drawings and move-lists) which is communicated to or comes into the possession or control of the *Contractor* at any time, but *Confidential Information* shall not include information that:

1) is or becomes generally available to the public without fault or breach on the part of the *Contractor*, including without limitation breach of any duty of confidentiality owed by the *Contractor* to the *Owner* or to any third party, but only after that information becomes generally available to the public;

2) the *Contractor* can demonstrate to have been rightfully obtained by the *Contractor* from a third party who had the right to transfer or disclose it to the *Contractor* free of any obligation of confidence;

3) the *Contractor* can demonstrate to have been rightfully known to or in the possession of the *Contractor* at the time of disclosure, free of any obligation of confidence; or

4) is independently developed by the *Contractor* without use of any *Confidential Information*.

29. Personal Information

Personal Information has the same definition as in subsection 2(1) of *MFIPPA* and includes an individual's name, address, age, date of birth, sex, and religion, whether recorded in printed form, on film, by electronic means, or otherwise and disclosed to the *Contractor*.

30. 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
- Project record documents, As-Built drawings and manuals to provide instructions for the operation and maintenance of the Work.

31. Act

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

32. OHSA

"OHSA" means the Occupational Health and Safety Act (Ontario).

33. WSIB

"WSIB" means the Workplace Safety and Insurance Board.

34. Proper Invoice

"proper invoice" means a written bill or other request for payment for services or materials in respect of an improvement under a contract, if it contains the following information and, subject to subsection 6.3 (2), meets any other requirements that the contract specifies:

1. The contractor's name and address.

2. The date of the proper invoice and the period during which the services or materials were supplied.
3. Information identifying the authority, whether in the contract or otherwise, under which the services or materials were supplied.
4. A description, including quantity where appropriate, of the services or materials that were supplied including all applicable supplier and subcontractor invoices.
5. The amount payable for the services or materials that were supplied, and the payment terms including all applicable supplier and subcontractor invoices.
6. The name, title, telephone number and mailing address of the person to whom payment is to be sent.
7. Any other information that may be prescribed. 2017, c. 24, s. 7.
8. a current WSIB clearance certificate as proof of good standing with the WSIB;
9. deductions for maintenance security holdback pursuant to GC 12.3 WARRANTY;
10. Other deductions as applicable, including but not limited to deficiencies holdbacks, Contract Close Out Documents holdbacks, and liquidated damages;
11. an updated construction progress report including an updated version of the construction schedule relative to the accepted baseline construction schedule, or any successor or revised schedule accepted by the Owner pursuant G.C 3.5 - CONSTRUCTION SCHEDULE."; and,
12. evidence showing that construction drawings have been updated ("red lined") to mark changes to the Work up to the date of the current payment period."

35. Request for Information/RFI

Request for Information or RFI means written documentation sent by the Contractor to the Owner or to the Owner's representative or the Consultant requesting written clarification(s) and/or interpretation(s) of the Drawings and/or Specifications, Contract requirements and/or other pertinent information required to complete the Work of the Contract without applying for a change or changes to the Work.

GENERAL CONDITIONS OF THE STIPULATED PRICE CONTRACT

1.1 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.

GC 1.1 CONTRACT DOCUMENTS

.1 <u>Add</u> to the end of subparagraph 1.1.2.2

"..., except where the *Consultant* shall be indemnified as a third party beneficiary as provided in subparagraphs 9.2.7.4, 9.2.8.4, 9.5.2.4 and 9.5.3.4 and in 12.1.1"

.2 Add new sentence to the end of paragraph 1.1.6:

The S*pecifications* are divided into divisions and sections for convenience but shall be read as a whole and neither such division nor anything else contained in the *Contract Documents* will be construed to place responsibility on the *Consultant* to settle disputes among the *Subcontractors* and *Suppliers* or as between them and the *Contractor* with respect to such divisions.

.3 Add new subparagraph 1.1.7.5:

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

.4 Delete paragraph 1.1.8 in its entirety.

GC 1.3 RIGHTS AND REMEDIES

.1 Delete the word "No" from the beginning of paragraph 1.3.2 and substitute the words:

"Except with respect to the notice requirements set out in paragraphs 6.4.1, 6.5.4, and 6.6.1, no ...".

GC 1.4 ASSIGNMENT

.1 Delete paragraph 1.4.1 in its entirety and substitute new paragraph 1.4.1:

1.4.1 The *Owner* may assign the *Contract* or a portion thereof without the consent of the *Contractor*. The *Contractor* may not assign the *Contract* or a portion thereof without the consent of the *Owner*, and the granting of such consent shall be in the *Owner's* absolute discretion.

GC 2.2 ROLE OF THE CONSULTANT

.1 Delete paragraph 2.2.4 in its entirety.
.2 Add the word "schedules" after the word "techniques" in paragraph 2.2.6.
.3 Add to the end of the second sentence of paragraph 2.2.6.; "or to adhere to the construction schedule."
.4 Add at the end of paragraph 2.2.9; "The *Owner* and the *Contractor* shall waive any claims against the *Consultant* arising out of the making of such

interpretations and findings in accordance with paragraphs 2.2.7, 2.2.8 and 2.2.9".

.5 Delete the comma after the word "submittals" and add the words "which are provided" before the words "in accordance" in paragraph 2.2.14.

.6 Add new sentence to end of paragraph 2.2.11; "The *Consultant's* obligation to make findings on a large claim or large number of claims is subject to the terms and conditions of the *Owner/Consultant* agreement."

GC 2.4 DEFECTIVE WORK

.1 Add new subparagraphs 2.4.1.1 and 2.4.1.2:

2.4.1.1 The *Contractor* shall rectify, in a manner acceptable to the *Owner* and the *Consultant*, all defective work and deficiencies throughout the *Work*, whether or not they are specifically identified by the *Owner* or the *Consultant*.

2.4.1.2 When applicable, the *Contractor* shall give priority to the correction of any defective work or deficiencies which the *Owner* determines adversely affect day-to-day operations of the *Owner.*

GC 3.1 CONTROL OF THE WORK

.1 Add the word "schedules" after the work "techniques" in paragraph 3.1.2.

.2 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 the proper and complete fabrication, assembly and installation of the *Work* and shall further carefully compare such field measurements and conditions with the requirements of the *Contract Documents*. Where dimensions are not included or exact locations are not apparent in the *Contract Documents*, the *Contractor* shall immediately notify the *Consultant* in writing and obtain *Supplemental Instructions* from the *Consultant* before proceeding with any part of the affected work.

.3 Add new paragraph 3.1.4:

3.1.4 All critical barrier free dimensions for [OBC] [and] [or] [FADM] are to be provided as dimensioned on the drawings and required per [OBC] [and] [or] [FADM]. Barrier free

requirements are to be reviewed and confirmed by the General Contractor on site that all dimensions and minimum clearances are provided and inform the Architect of any conflicts prior to installing work and obtain Supplemental Instructions from the Architect before proceeding with any part of the affected work.

GC 3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS

.1 Delete subparagraph 3.2.2.1 in its entirety

.2 Delete subparagraph 3.2.2.2 in its entirety

.3 Add new subparagraph 3.2.3.4:

3.2.3.4 Subject to General Condition 9.4 - CONSTRUCTION SAFETY, where paragraph 3.2.4 of General Condition 3.2 - CONSTRUCTION BY OWNER OR OTHER CONTRACTORS applies, for the *Owner's* own forces and for other contractors performing work identified in the *Contract Documents*, assume overall responsibility for compliance with all aspects of the applicable health and safety legislation in the *Place of the Work*, including all of the responsibilities of the constructor as that term is defined in the *Occupational Health and Safety Act*.

.4 Add the following paragraphs:

3.2.7 Entry by the *Owner's* own forces and by other contractors shall not mean acceptance of the *Work* and shall not relieve the *Contractor's* responsibility to complete the *Work.*

3.2.8 Placing, installation, application, and connection of work by *Owner's* forces or by other contractors on and to, the *Work* shall not relieve the *Contractor's* responsibility to provide and maintain the specified warranties.

GC 3.4 DOCUMENT REVIEW

.1 Delete paragraph 3.4.1 in its entirety and substitute new paragraph 3.4.1:

3.4.1 The *Contractor* shall review the *Contract Documents* and shall report promptly to the *Consultant* any error, inconsistency, or omission the *Contractor* may discover. Such review by the *Contractor* shall be undertaken with the standard of care described in paragraph 3.14.1 of the *Contract*. Except for its obligation to make such review and

report the result, the Contractor does not assume any responsibility to the Owner or to the Consultant for the accuracy of the *Contract Documents.* The *Contractor* shall not be liable for damage or costs resulting from such errors, inconsistencies, or omissions in the *Contract Documents*, which the *Contractor* could not reasonably have discovered through the exercise of the required standard of care. If the *Contractor* does discover any error, inconsistency, or omission in the *Contract Documents,* the *Contractor* shall not proceed with the work affected until the *Contractor* has received corrected or missing information from the *Consultant*.

.2 Add new paragraph 3.4.2:

3.4.2 If, at any time, the *Contractor* finds errors, inconsistencies, or omissions in the *Contract Documents* or has any doubt as to the meaning or intent of any part thereof, the *Contractor* shall immediately notify the *Consultant*, and request a *Supplemental Instruction, Change Order,* or *Change Directive,* as the case may require. Neither the *Owner* nor the *Consultant* will be responsible for the consequences of any action of the *Contractor* based on oral instructions.

GC 3.5 CONSTRUCTION SCHEDULE

.1 Delete paragraph 3.5.1 in its entirety and substitute new paragraph 3.5.1:

3.5.1 The *Contractor* shall,

.1 within 10 days following the award of the *Contract*, prepare and submit to the *Owner* and the *Consultant* for their review and acceptance, a construction schedule that indicates the timing of the activities of the *Work* and provides sufficient detail of the critical events and their inter-relationship to demonstrate the *Work* will be performed in conformity with the *Contract Time* and in accordance with the *Contract Documents.* Unless otherwise agreed to in writing, in advance by the *Owner* and the *Contractor*, when required by the *Specifications* to employ construction scheduling software, the *Contractor* shall employ the software Microsoft Project or a comparable software as acceptable to the *Consultant* or the *Owner*, in generating the construction schedule, which permits the progress of the *Work* to be monitored in relation to the critical path established in the schedule. The *Contractor* shall provide the construction schedule and any successor or revised schedules to the

Owner in electronic format and paper copy. When required by the *Specifications* to employ construction scheduling software, the *Contractor* shall provide the construction schedule to the *Owner* in editable format, together with a record version in PDF format. Once accepted by the *Owner* and the *Consultant*, the construction schedule submitted by the *Contractor* shall become the baseline construction schedule;

.2 provide the expertise and resources, such resources including manpower and equipment, as are necessary to maintain progress under the accepted baseline construction schedule or any successor or revised schedule accepted by the *Owner* pursuant to General Condition 3.5 – CONSTRUCTION SCHEDULE;

.3 monitor the progress of the *Work* on a weekly basis relative to the baseline construction schedule, or any successor or revised schedule accepted by the *Owner* pursuant to General Condition 3.5 – CONSTRUCTION SCHEDULE, update the schedule on a monthly basis and advise the *Consultant* and the *Owner* in writing of any variation from the baseline or slippage in the schedule; and

.4 if, after applying the expertise and resources required under subparagraph 3.5.1.2, the *Contractor* forms the opinion that the variation or slippage in schedule reported pursuant to subparagraph 3.5.1.3 cannot be recovered by the *Contractor*, it shall, in the same notice, indicate to the *Consultant* and the *Owner* if the *Contractor* intends to apply for an extension of *Contract Time* as provided in PART 6 of the General Conditions - CHANGES IN THE WORK.

.2 <u>Add</u> new paragraph 3.5.2:

3.5.2 If, at any time, it should appear to the *Owner* or the *Consultant* that the actual progress of the *Work* is behind schedule or is likely to become behind schedule, or if the *Contractor* has given notice of such to the *Owner* or the *Consultant* pursuant to subparagraph 3.5.1.3, the *Contractor* shall take appropriate steps to cause the actual progress of the *Work* to conform to the schedule or minimize the resulting delay and shall produce and present to the *Owner* and the *Consultant* a recovery plan demonstrating how the *Contractor* will achieve the recovery of the schedule. If the *Contractor* intends to apply for a change in the *Contract Price* in relation to a schedule recovery plan,

then the *Contractor* shall proceed in accordance with General Condition 6.5 – DELAYS.

GC 3.6 SUPERVISION

.1 Delete paragraph 3.6.1 in its entirety and substitute new paragraph 3.6.1:

3.6.1 The *Contractor* shall be solely responsible to provide all necessary supervision and appoint competent representatives who shall be in attendance at the *Place of the Work* while work is being performed. The appointed representatives shall not be changed except for valid reasons, and upon the *Contractor* obtaining the *Owner's* written consent, which consent will not be unreasonably withheld.

.2 Add new paragraph 3.6.3:

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

GC 3.7 SUBCONTRATORS AND SUPPLIERS

.1 Add new paragraph 3.7.7:

3.7.7 Once accepted by the *Owner,* the *Contractor* may not change any Subcontractor without valid reason. The *Contractor* shall advise the *Consultant* and the *Owner* in writing of a proposed change in Subcontractor, giving valid reason for the change. No change may be made without prior written approval of the *Owner*. Any change in contractors made by the *Contractor* without proper notification and written approval from the *Owner*, may be considered a breach of the *Contract*."

GC 3.8 LABOUR AND PRODUCTS

.1 Delete paragraph 3.8.2 and replace with new paragraph 3.8.2:

3.8.2 Unless otherwise specified in the Contract Documents, Products provided shall be new and as specified. The *Contractor* shall not provide substitutions for specified Products without the express written consent of the Consultant and the Owner.

.2 Add new paragraph 3.8.4:

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

GC 3.9 DOCUMENTS AT THE SITE

.1 Amend paragraph 3.9.1 as follows:

"....*Contract Documents* including Addenda, Changes to the Work, *Supplemental Instructions, Submittals, ...*"

GC 3.10 SHOP DRAWINGS

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

.2 Add "and Submittals" after the words "Shop Drawings" in paragraphs 3.10.1, 3.10.2, 3.10.4, 3.10.7, 3.10.8, 3.10.8.2, 3.10.9, 3.10.10, 3.10.11 and 3.10.12.

.3 Delete 3.10.3 in its entirety and substitute new paragraph 3.10.3;

3.10.3 The *Contractor* shall prepare a schedule of the dates for provision, review and return of *Shop Drawings* and *Submittals* and submit it to the *Consultant* for review.

.4 Delete the last sentence in paragraph 3.10.9.

.5 Delete the words "so as to cause no delay in the performance of the Work" in paragraph 3.10.12.

GC 3.11 USE OF THE WORK

.1 Add new paragraph 3.11.3:

3.11.3 The *Contractor* shall abide by and enforce directives and policies of the *Owner* and the Municipality, including any by-laws, regarding signs, advertisements, fires and smoking at the *Place of the Work* as directed by the *Owner* or required by law.

Add new General Conditions 3.14 and 3.15:

GC 3.14 PERFORMANCE BY CONTRACTOR

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

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

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

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

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

GC 3.15 RIGHT OF ENTRY

3.15.1 The *Owner* shall have the right to enter or occupy the *Work* in whole or in part for the purpose of placing fittings and

equipment or for other uses before *Substantial Performance of the Work*, if, in the reasonable opinion of the *Consultant* and *Contractor*, such entry or occupation does not prevent or substantially interfere with the *Contractor's* completion of the *Contract* within the *Contract Time*. Such entry or occupation shall not be considered as acceptance of the *Work* or in any way relieve the *Contractor* from responsibility to complete the *Contract*.

GC 4.1 CASH ALLOWANCES

.1 Delete paragraph 4.1.4 in its entirety and substitute new paragraph 4.1.4:

4.1.4 Where the actual cost of the *Work* under any cash allowance exceeds the amount of the allowance, any unexpended amounts from other cash allowances shall be reallocated, at the *Consultant's* direction, to cover the shortfall, and, in that case, there shall be no additional amount added to the *Contract Price* for overhead and profit. Only where the actual cost of the *Work* under all cash allowances exceeds the total amount of all cash allowances shall the *Contractor* be compensated for the excess incurred and substantiated, plus an amount for overhead and profit on the excess only, as set out in the *Contract Documents*. Where the actual cost of the *Work* under all cash allowances is less than the total amount of all cash allowances, the *Owner* shall be credited for the unexpended portion of the total of all cash allowances, but not for *Contractor's* overhead and profit on such amount.

.2 Delete paragraph 4.1.5 in its entirety and substitute new paragraph 4.1.5:

4.1.5 The net amount of any unexpended cash allowances, after providing for any reallocations as contemplated in paragraph 4.1.4, shall be deducted from the *Contract Price* by *Change Order* without any adjustment for the *Contractor's* overhead and profit on such amount.

.3 Delete paragraph 4.1.7 in its entirety and substitute new paragraph 4.1.7:

4.1.7 The *Contractor* shall prepare a schedule that shows when the *Owner* must authorize ordering of items called for under cash allowances to avoid delaying the progress of the work.

.4 Add new paragraph 4.1.8:

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.

GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

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

.2 Delete paragraph 5.1.1 in its entirety and substitute new paragraph 5.1.1:

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

.3 Delete paragraph 5.1.2 in its entirety.

GC 5.2 APPLICATIONS FOR PROGRESS PAYMENT

.1 Delete GC 5.2 and GC 5.3, and replace them with the following:

5.2.1 A "proper invoice" (as that term is defined in the Construction Act) shall be delivered to the Owner and the Consultant by the first day of every month for the previous month's work. Subject the terms of the Contract Documents, including the holdback provisions of the Contract Documents and the Construction Act, and subject to any notice of non-payment delivered by the Owner under the Construction Act, the Owner shall pay the amount approved and certified by the Consultant as payable under a proper invoice no later than 28 days after receiving the invoice from the Contractor.

5.2.2 The copy of the proper invoice delivered to the Owner shall be provided by email along with a hard copy .

5.2.3 No less than 7 days prior to the delivery of a proper invoice, the Contractor shall submit to the Owner and the Consultant a payment certificate (in a form prescribed by the Consultant) and all necessary supporting documentation, a WSIB clearance certificate and a Statutory Declaration of Progress Payment Distribution. For clarity, no proper invoice shall be

submitted earlier than 7 days following submission of a duly completed payment certificate.

5.2.4 Notice of non-payment may be made by email to the Contractor. For greater clarity, this provision constitutes the consent of the Contractor to service of the notice of non-payment in this manner.

5.2.5 The Contractor shall, within 10 days of signing the Contract, and prior to the first claim for payment, submit to the Owner a detailed breakdown of the lump sum tender price for the purpose of establishing monthly expenses. The Owner, acting reasonably, reserves the right to modify costs allocated to the various breakdown items to prevent unbalancing.

5.2.6 Payment for mobilizing and setting up plant, temporary buildings and services, premiums and other disbursements, shall be prorated based on the value of the Work performed during a billable period.

5.2.7 Payment for bonds and insurance will be paid 100 percent on the first progress payment, provided that respective invoices are submitted as proof of payment. Any *Products* delivered to the *Place of the Work* but not yet incorporated into the *Work* shall remain at the risk of the *Contractor* notwithstanding that title has passed to the *Owner* pursuant to General Condition 13.1 - OWNERSHIP OF MATERIALS.

5.2.8 Prior to the first progress draw, the Contractor shall submit a monthly projected payment schedule based on the detailed construction schedule for the duration of the Contract."

.2 <u>Add</u> new paragraphs 5.2.8, 5.2.9, and 5.2.10:

5.2.8 The second and all subsequent applications for payment made by the *Contractor, Subcontractor,* or *Supplier* shall include, without limitation, the following:

.1 A Statutory Declaration CCDC 9A-2001 Document, amended as follows:
"....by the said contract relating to Payment Certificate No._____ Except the accounts listed on Schedule "A" attached hereto and holdback monies property retained."

.2 A "Certificate of Standing" from the Workplace Safety & Insurance Board stating that the *Contractor* has complied with the requirements of the Act and is in good standing as of the date of Certificate.

5.2.9 The *Contractor* shall prepare current *As-Built Drawings* during the course of the *Work*, which current *As-Built*

Drawings shall be maintained by the *Contractor* and made available to the *Consultant* for review with each application for progress payment. The *Consultant* may retain a reasonable amount and up to a maximum of the amounts outlined in paragraph 5.4.6, from any progress payment for the value of the *As-Built Drawings* not presented for review until the *As-Built Drawings* are presented for review.

5.2.10 No additional certification of payments shall be issued after Substantial Performance of the Work until the Contractor has achieved total completion of the Works.

GC 5.3 PROGRESS PAYMENT

.1 Delete paragraph 5.3.1 in its entirety and substitute new paragraph 5.3.1:

5.3.1 After receipt by the Owner of a complete application for payment submitted by the Contractor in accordance with GC 5.2 - APPLICATIONS FOR PROGRESS PAYMENT:

.1 the Consultant will issue to the Owner, with a copy to the Contractor, no later than 10 calendar days after receipt of the application for payment, a certificate for payment in the amount applied for, or in such amount as the Consultant determines to be properly due. Should the amount owing as determined by the Consultant differ from the amount of the Contractor's application for payment, the Owner may give notice of non-payment to the Contractor at the email address for the Contractor as set out in Article A-6 within the fourteen (14) day period from receipt of the application for payment as described in the Construction Act; and,

.2 subject to the delivery of a notice of non-payment by the Owner to the Contractor in accordance with 5.3.1.1 and section 6.4(2) of the Construction Act, the Owner shall make payment to the Contractor on account as provided in Article A-5 of the Agreement - Payment within the twenty eight (28) day period from receipt of the application for payment as described in the Construction Act."

.3 "There shall be no additional application of payments after Substantial Performance of the Work until the Contractor has achieved total completion of the Works."

GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK

.1 Delete paragraph 5.4.3 in its entirety and substitute new paragraph 5.4.3:

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

.2 Add new paragraphs 5.4.4, 5.4.5, 5.4.6, 5.4.7, 5.4.8 and 5.4.9:

5.4.4 Within 7 calendar days of receiving a copy of the certificate of *Substantial Performance of the Work* signed by the *Consultant*, the *Contractor* shall publish a copy of the certificate in a construction trade newspaper (as that term is defined in the *Construction Act*) and shall provide to the *Consultant* and the *Owner* the date of publication and the name of the construction trade newspaper in which the publication occurred. If the *Contractor* fails to comply with this provision, the *Owner* may publish a copy of the certificate and charge the *Contractor* with the costs so incurred.

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

.1 guarantees;
.2 warranties;
.3 certificates;
.4 testing and balancing reports;
.5 distribution system diagrams;
.6 spare parts;
.7 maintenance manuals;
.8 samples;
.9 existing reports and correspondence from authorities having jurisdiction in the *Place of the Work*;

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

5.4.6 Where the *Contractor* is unable to deliver the documents and materials described in paragraph 5.4.5, then, provided

that none of the missing documents and materials interferes with the use and occupancy of the *Project* in a material way, the failure to deliver shall not be grounds for the *Consultant* to refuse to certify *Substantial Performance of the Work*. If the *Contractor* fails to deliver any of the materials required in subparagraphs 5.4.5.7 or 5.4.5.8, the *Consultant* shall retain from the payment of holdback under General Condition 5.5 - PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF THE WORK, the amount set out in paragraph 5.4.7., until the materials required pursuant to subparagraphs 5.4.5.7 or 5.4.5.8 are delivered.

5.4.7 Should the *As-Built Drawings* not be delivered in accordance with subparagraph 5.2.10 or any documents or materials not be delivered in accordance with paragraph 5.4.5 by the earlier of 60 days following publication of the certificate of Substantial Performance of the Work and the submission of the Contractor's application for final payment under paragraph 5.7.1 of General Condition 5.7 – FINAL PAYMENT, then the amount previously retained pursuant to paragraph 5.2.10 or 5.4.7 shall be forfeit to the *Owner* as compensation for the damages deemed to have been incurred by the *Owner*, and not as a penalty, arising from the failure to deliver the documents or materials, and the *Contract Price* shall be reduced accordingly.

5.4.9 Together with the submission of its written application for *Substantial Performance of the Work*, the *Contractor* shall submit to the *Consultant* and to the *Owner* a statutory declaration setting forth in reasonable detail any then outstanding and unresolved disputes or claims between the *Contractor* and any *Subcontractor* or *Supplier,* including any claims allegedly arising from delay, which are, directly or indirectly, related to any then outstanding or anticipated disputes or claims between the *Contractor* and the *Owner,* and this disclosure shall, at a minimum:

.1 identify the parties involved;

.2 identify the amount in dispute;

.3 provide a brief statement summarizing the position of each party;

.4 include copies of any correspondence or documents in support of either party's position;

.5 include copies of any documents of any court or arbitration process related to the matter;

.6 identify the dispute or claim between the *Contractor* and the *Owner* to which the matter relates; and

.7 include a copy of any written agreement or a summary of any oral agreement between the parties related to resolution of the matter.

The disclosure requirements detailed herein are of a continuing nature and survive completion of the *Work*. Accordingly, the *Contractor* shall supplement the information provided with the original statutory declaration with additional materials pertaining to new or existing disputes or claims, as they become available. The *Contractor* shall not be entitled to recover from the *Owner* any amount pertaining to any claim or dispute referred to in this paragraph, if the provisions of this paragraph have not been fully complied with. For greater certainty, the *Contractor* is not obliged to make the aforementioned disclosure with respect to any dispute or claim that is not related to or does not touch upon any then outstanding and unresolved dispute or claim between the *Contractor* and the *Owner*.

GC 5.5 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF THE WORK

.1 Add new subparagraph 5.5.1.3:

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

.2 Delete from line 1 of paragraph 5.5.2, the words, “the statement” and substitute the words:

“the documents”.

.3 Delete paragraph 5.5.3 in its entirety.

GC 5.7 FINAL PAYMENT

.1 Delete paragraph 5.7.1 in its entirety and substitute new paragraph 5.7.1:

5.7.1 When the *Contractor* considers that the *Work* is completed, the *Contractor* shall submit an application for final payment. The *Contractor’s* application for final payment shall be

accompanied by any documents or materials not yet delivered pursuant to paragraph 5.4.5. The *Work* shall be deemed not to be performed until all of the aforementioned documents have been delivered.

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

"*Working Days*".

.3 Delete from the second line of paragraph 5.7.4 the words, "5 calendar days" and substitute the words:

"*20 Calendar Days*".

.4 Add new paragraph 5.7.5:

5.7.5 Prior to the release of the finishing holdback provided for under the *Construction Act*, the *Contractor* shall submit:

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

.2 a Statutory Declaration CCDC 9A-2001;

.3 a final Workplace Safety & Insurance Board Clearance Certificate.

GC 5.8 WITHHOLDING OF PAYMENT

.1 Add new paragraph 5.8.2:

5.8.2 The architect may determine that certain RFIs issued by the contractor are unnecessary and shall, in responding to such unnecessary RFIs, give the reasons for the determination in each case.

1. If the contractor continues to issue unnecessary RFIs, the architect, after having identified a minimum of five RFIs as unnecessary, will invoice the client for the additional administrative cost of responding to each of the subsequent unnecessary RFIs.
2. The architect will notify the contractor and client each time such an additional administrative cost is charged.
3. The client shall reimburse the architect for the monthly total of such additional administrative costs; and the monthly total of such additional administrative costs shall be charged to the general contractor by showing the monthly total as a credit on each subsequent Certificate for Payment. This constitutes a change to the contract price and must be handled as a Change Order.

GC 6.2 CHANGE ORDER

.1 Add new paragraph 6.2.3:

6.2.3 In the case of changes in the work resulting in additional work to be paid for under labour and material breakdown method, the cost to the Owner shall be the actual cost, after all credits included in the change have been deducted, plus percentages covering overhead and profit as follows:

.1 Five (5) per cent of the cost of the work performed by the General Contractor's own forces plus five (5) per cent mark up by the General Contractor for a total combined ten (10) per cent mark up.

.2 Ten (10) per cent of the cost where the work is performed by the General Contractor's Subcontractors forces plus a five (5) per cent mark up for the General Contractor for a total combined fifteen (15) per cent mark up.

.3 For deleted work, the credit shall be zero (0) per cent.

Note: Duplication of overhead and profit mark-up will not be permitted between subtrades, as occurs, for example, when the plumber is a subtrade of the ventilation Subcontractor, or vice versa."

.2 Add new paragraph 6.2.4:

6.2.4. All costs for a Change Notice or a Change Directive shall be submitted breakdowns clearly indicating labour, time and cost, material cost or unit price costs where applicable and any Change in Contract Time.

.3 Add new paragraph 6.2.5:

6.2.5 In the case of changes in the work to be paid under labour material breakdown method, the Contractor and Subcontractors shall prepare and present to the Architect a detailed estimate of Sub-Contractor's costs, including labour and material; labour burden which, for the purpose of this paragraph, shall comprise assessments under the Workplace Safety and Insurance Act, the Employment Insurance Act, Canada Pension Act, sickness and/or hospitalization benefits premiums assessed under statutes of

Canada or the Province, vacations with pay, all sums for welfare assessed against the Subcontractor and their Subcontractors under their labour agreements; their Subcontractors' overhead and profit; showing them separately. In the estimate, labour shall be shown in man hours on an itemized basis.

.4 Add new paragraph 6.2.6:

6.2.6 The cost for material for changes shall be the Subcontractor's net cost from their supplier. The Subcontractor shall submit copies of material invoices, or quotations in the case of materials not supplied.

.5 Add new paragraph 6.2.7:

6.2.7 Mark-up is defined for these purposes as costs added on account of overhead and profit only.

.6 Add new paragraph 6.2.8:

6.2.8 Overhead shall include but shall not be limited to:

.1 the Contractor's head office expenses;

.2 the salaries of superintendents, engineers, timekeepers, accountants, clerks, watchpersons and similar personnel employed directly on the Work; (wages of workers and forepersons and the assessments thereon for workers' compensation, unemployment insurance, vacations with pay and Canada Pension payments, etc., being considered part of actual cost);

.3 use of temporary offices, sheds etc. including cost of telephone, light, power and heat used therein;

.4 insurance premiums;

.5 licences and permits except when these are special for a particular item of the work;

.6 Contractor's travelling costs;

.7 financing costs, including holdback;

.8 additional general temporary site support facilities including garbage disposal costs and general cleaning;

.9 additional bonding and permit fees.

.10 As-built drawings; and all safety requirements and protection requirements.

.7 Add new paragraph 6.2.9:

6.2.9 In the case of changes in the Work to be paid for under unit price cost method, the value of changes shall be based on the net difference in quantities with the appropriate unit rate applied.

.8 Add new paragraph 6.2.10:

6.2.10 For Change Notice and Change Directive cost submissions the Contractor and Sub-Contractors shall be permitted to charge overhead and profit mark-up to work added as indicated in the tender form.

Calculations for changes are to be made after all credits in the contemplated Change Notice or Change Directive have been deducted.

Percentages indicated on Tender Form shall apply to extras not exceeding $20,000.00. Extras or credits above this amount should invoice smaller percentages for overhead and profit with respect to both extras and credits, and should be fairly negotiated accordingly.

.9 Add new paragraph 6.2.11:

6.2.11 When both additions and deletions covering related *Work* or substitutions are involved in a change to the *Work*, payment, including *Overhead* and profit, shall be calculated on the basis of the net difference, if any, with respect to that change in the *Work.*

.10 Add new paragraph 6.2.12:

6.2.12 No extension to the *Contract Time* shall be granted for changes in the *Work* unless the *Contractor* can clearly demonstrate that such changes significantly alter the overall construction schedule submitted at the commencement of the *Work.*

.11 Add new paragraph 6.2.13:

6.2.13 The *Owner* and the *Consultant* will not be responsible for delays to the *Work* resulting from late, incomplete or inadequately broken down valuations submitted by the *Contractor.*

GC 6.3 CHANGE DIRECTIVE

.1 Delete paragraph 6.3.3 in its entirety.

.2 Delete subparagraph 6.3.7.1(1) and replace it with:

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

.3 Delete subparagraph 6.3.7.1(2) and replace it with

"(2) intentionally left blank."

.4 Amend subparagraph 6.3.7.1(3) so that, as amended, it reads:

"(3) engaged in the preparation of *Shop Drawings,* fabrication drawings, coordination drawings and *As-Built Drawings*: or…"

.5 Amend subparagraph 6.3.7.1(4) so that, as amended, it reads:

"(4) including clerical staff engaged in processing changes in the *Work*."

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

by such careful investigation undertaken prior to the submission of the bid.

GC 6.5 DELAYS

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

", but excluding any consequential, indirect or special damages."

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

", but excluding any consequential, indirect or special damages."

.3 Delete subparagraph 6.5.3.3 and place the word "or" at the end of 6.5.3.2.

.4 Add new paragraph 6.5.6.

6.5.6 If the *Contractor* is delayed in the performance of the *Work* by abnormally adverse weather conditions beyond a period of 3 calendar days or, in any event, which has the effect or the possible effect of delaying the *Contract Time*, the *Contractor* shall immediately notify the *Consultant* in an attempt to mitigate any delays to the *Contract Time* as a result of the abnormally adverse weather conditions.

.5 Add new paragraph 6.5.7.

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

date of *Substantial Performance of the Work* achieved by the *Contractor.*

GC 6.6 CLAIMS FOR A CHANGE IN CONTRACT PRICE

.1 Delete paragraph 6.6.5 in its entirety and substitute new paragraph 6.6.5;

6.6.5 The *Consultant's* findings, with respect to a claim made by either party will be given by Notice in Writing by the *Consultant* to both parties within reasonable time after receipt of the claim information noted in paragraph 6.6.3.

.2 Add new paragraph 6.6.7;

6.6.7 The *Owner* may make claims arising out of the costs incurred for additional services provided by the *Consultant* resulting from the *Contractor's* failure to reasonable perform the *Work* in accordance with the terms and conditions of the *Contract,* including the *Contractor's* issuance of unnecessary Requests for Information. The *Consultant* will notify the *Owner* and *Contractor* where it has been determined that additional services will be required or have been provided in order not to cause a delay. The *Owner* shall make claims based on the *Consultant's* invoices.

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

.1 Revise the heading, **"OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK OR TERMINATE THE CONTRACT"** to read, **"OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, SUSPEND THE WORK OR TERMINATE THE CONTRACT"**

.2 Delete paragraph 7.1.6 and add new paragraphs 7.1.6, 7.1.7, 7.1.8, 7.1.9, 7.1.10,:

7.1.6 In addition to its right to terminate the Contract set out herein, the *Owner* may terminate this *Contract* at any time for any other reason and without cause upon giving the *Contractor Notice in Writing* to that effect. In such event, the *Contractor* shall be entitled to be paid for all *Work* performed including reasonable profit, for loss sustained upon *Products* and *Construction Equipment*, and such other damages as the *Contractor* may have sustained as a result of the termination of the *Contract*, but in no event shall the *Contractor* be entitled to be compensated for any loss of

profit on unperformed portions of the *Work*, or indirect, special, or consequential damages incurred.

7.1.7 The *Owner* may suspend *Work* under this *Contract* at any time for any reason and without cause upon giving the *Contractor Notice in Writing* to that effect. In such event, the *Contractor* shall be entitled to be paid for all *Work* performed to the date of suspension and be compensated for all actual costs incurred arising from the suspension, including reasonable profit, for loss sustained upon *Products* and *Construction Equipment*, and such other damages as the *Contractor* may have sustained as a result of the suspension of the *Work*, but in no event shall the *Contractor* be entitled to be compensated for any indirect, special, or consequential damages incurred. In the event that the suspension continues for more than 180 calendar days, the *Contract* shall be deemed to be terminated and the provisions of paragraph 7.1.6 shall apply.

7.1.8 In the case of either a termination of the *Contract* or a suspension of the *Work* under General Condition 7.1 - OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, SUSPEND THE WORK OR TERMINATE THE CONTRACT or General Condition 7.2 - CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the *Contractor* shall use its best commercial efforts to mitigate the financial consequences to the *Owner* arising out of the termination or suspension, as the case may be.

7.1.9 Upon the resumption of the *Work* following a suspension under General Condition 7.1 - OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, SUSPEND THE WORK OR TERMINATE THE CONTRACT or General Condition 7.2 - CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the *Contractor* will endeavour to minimize the delay and financial consequences arising out of the suspension.

7.1.10 The *Contractor's* obligation under the *Contract* as to quality, correction, and warranty of the *Work* performed by the *Contractor* up to the time of termination or suspension shall continue after such termination of the *Contract* or suspension of the *Work*.

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

.1 Delete paragraph 7.2.2 in its entirety.

.2 Delete subparagraph 7.2.3.1 in its entirety.

.3 Delete subparagraph 7.2.3.3 in its entirety and substitute new subparagraph 7.2.3.3:

7.2.3.3 the *Owner* fails to pay the *Contractor* when due the amount certified by the *Consultant* or awarded by arbitration or a court, except where the *Owner* has a bona fide claim for set off, or

.4 Delete from subparagraph 7.2.3.4, the words:

", except for General Condition 5.1 - FINANCING INFORMATION REQUIRED OF THE OWNER,"

.5 Delete from the end of paragraph 7.2.4 the words "or terminate the *Contract*" and substitute the words:

"until the default is corrected, provided, however, that in the event of such suspension, the provisions of subparagraph 7.1.10 shall apply. If the *Contractor's Notice in Writing* to the *Owner* was given pursuant to subparagraph 7.2.3.3, then, 180 days after the delivery of the *Notice in Writing*, the *Contractor* may terminate the *Contract,* provided, however, that in the event of such termination, the provisions of subparagraph 7.1.10 shall apply."

GC 8.1 AUTHORITY OF THE CONSULTANT

.1 Amend paragraph 8.1.2 as follows:

"....and paragraphs 8.2.3 to 8.2.15 of GC8.2...."

.2 Delete last sentence of 8.1.3 and substitute the following sentence:

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

GC 8.2 NEGOTIATION, MEDIATION AND ARBITRATION

.1 Delete paragraphs 8.2.6, 8.2.7, and 8.2.8 in their entirety and substitute new subparagraph 8.2.6:

8.2.6 When a dispute has not been resolved through negotiation or mediation, within 10 *Working Days* after the date of termination of the mediated negotiations under paragraph 8.2.5, either party may give a *Notice in Writing* to the other party and to the *Consultant* inviting the other party to agree to submit the dispute to be finally resolved by arbitration, pursuant to provisions of the *Arbitration Act, 1991*. If the other party wishes to accept the invitation to submit the dispute to arbitration, it shall so indicate by the delivery of a responding *Notice in Writing* within 10 *Working Days* of receipt of the invitation. If, within the required times, no invitation is made or, if made, is not accepted, either party may refer the dispute to the courts or to any other form of dispute resolution, including arbitration, which the parties may agree to use.

.2 Add the following:

8.2.9 Within five days of receipt of the notice of arbitration by the responding party under paragraph 8.2.6 the *Owner* and the *Contractor* shall give the *Consultant* a written notice containing:
(a) a copy of the notice of arbitration
(b) a copy of supplementary conditions 8.2.9 to 8.2.15 of this *Contract,* and;
(c) any claims or issues which the *Contractor* or the *Owner,* as the case may be, wishes to raise in relation to the *Consultant* arising out of the issues in dispute in the arbitration.

8.2.10 The *Owner* and the *Contractor* agree that the *Consultant* may elect, within ten days of receipt of the notice under paragraph 8.2.9, to become a full party to the arbitration under paragraph 8.2.6. if the *Consultant:*
(a) has a vested or contingent financial interest in the outcome of the arbitration;
(b) gives notice of election to the *Owner* and the *Contractor* before the arbitrator is appointed;
(c) agrees to be a party to the arbitration within the meaning of the rules referred to in paragraph 8.2.6, and
(d) agrees to be bound by the arbitral award made in the arbitration.

8.2.11 If the *Consultant* is not given the written notice required under paragraph 8.2.9, both the *Owner* and the *Contractor* are stopped from pursuing an action, counter claim or other proceeding or

making an application against the *Consultant* arising out of the issues in dispute in the arbitration between the *Owner* and the *Contractor* under paragraph 8.2.6.

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

8.2.13 The arbitrator in the arbitration in which the *Consultant* has elected under paragraph 8.2.10 to become a fully party may:

(a) on application of the *Owner* or the *Contractor,* determine whether the *Consultant* has satisfied the requirements of paragraph 8.2.10, and;

(b) make any procedural order considered necessary to facilitate the addition of the *Consultant* s a party to the arbitration.

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

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

8.2.16 "Notwithstanding any other paragraph, the Contractor or the Owner may at any time refer to adjudication a dispute in accordance with the Construction Act. However, subject to 8.2.19, adjudication may not be commenced if the notice of adjudication is given after the date the Contract is completed, unless the parties agree otherwise in writing."

8.2.17 "A notice of adjudication may not be given by either party during the period December 20 to January 5 inclusive, on Saturdays or Sundays, or on holidays as defined in the Legislation Act including the Civic holiday."

8.2.18 "In accordance with section 13.5 (1) of the Construction Act, and notwithstanding the completion of the Contract, the parties may refer to adjudication a dispute with the other party to the Contract respecting any of the following matters:

.1 disputes regarding 9.4.3 or 12.1.1 INDEMNIFICATION;

.2 disputes regarding the Contractor's obligation to perform warranty work pursuant to GC 12.3 WARRANTY; and

.3 disputes regarding the delivery of Close Out Documents."

8.2.19 "In accordance to the powers prescribed in section 13.12(1) of the Construction Act, the adjudicator shall have the following powers:
.1 compelling a party to perform warranty work pursuant to GC 12.3 WARRANTY;
.2 to stay an adjudication where there is an abuse of process; and
.3 compelling the parties to attend a settlement meeting."

GC 9.1 PROTECTION OF WORK AND PROPERTY

.1 Delete subparagraph 9.1.1.1 in its entirety and substitute new subparagraph 9.1.1.1:

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

.2 Delete paragraph 9.1.2 in its entirety and substitute the following new paragraph 9.1.2:

9.1.2 Before commencing any *Work*, the *Contractor* shall determine the locations of all underground utilities and structures indicated in or inferable from the *Contract Documents*, or that are inferable from an inspection of the *Place of the Work* exercising the degree of care and skill described in paragraph 3.14.1.

.3 Add new paragraph 9.1.5:

9.1.5 With respect to any damage to which paragraph 9.1.4 applies, the *Contractor* shall neither undertake to repair or replace any damage whatsoever to the work of other contractors, or to adjoining property of the *Owner* or any third party, nor acknowledge that the same was caused or occasioned by the *Contractor*, without first consulting the *Owner* and receiving written instructions as to the course of action to be followed from either the *Owner* or the *Consultant*. Where, however, there is danger to life, the environment, or public safety, the *Contractor* shall take such emergency action as it deems necessary to remove the danger.

.4 Add new paragraph 9.1.6:

9.1.6 The *Contractor* shall be responsible for securing the *Place of Work* at all times and shall take all reasonable precautions necessary to protect the *Place of Work*, its contents, materials (including *Owner*-supplied materials) and the public from loss or damage during and after working hours. Where the Consultant or the *Owner* deems the provision of security guard services to be necessary, the *Contractor* shall provide those services at the *Owner's* expense.

GC 9.2 TOXIC AND HAZARDOUS SUBSTANCES

.1 Add new subparagraph 9.2.5.5

9.2.5.5 take all reasonable steps to mitigate the impact on Contract Time and Contract Price

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

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

.3 Add "and the *Consultant"* after the word *"Contractor"* in subparagraph 9.2.7.4.

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

"...or that any toxic or hazardous substances or material 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,"

.5 Add to subparagraph 9.2.8.3 immediately before the comma, the following new words:

"and as a result of the delay"

.6 Add "and the *Consultant"* after the word *"Owner"* in subparagraph 9.2.8.4.

GC 9.4 CONSTRUCTION SAFETY

.1 Delete paragraph 9.4.1 in its entirety and substitute new paragraph 9.4.1

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

.2 Add new paragraphs 9.4.2, 9.4.3 and 9.4.4:

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

.1 a current Workplace Safety & Insurance Board Clearance Certificate;

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

.3 documentation setting out the *Contractor's* in-house safety programs;

.4 a copy of the Notice of Project filed with the Ministry of Labour naming itself as "constructor" under the *Occupational Health and Safety Act*.

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

not extend to any consequential, indirect or special damages.

9.4.4 The *Owner* undertakes to include in its contracts with other contractors and in its instructions to its own forces the requirement that the other contractor or its own forces, as the case may be, comply with the policies and procedures of and the directions and instructions from the *Contractor* with respect to occupational health and safety and related matters. Prior to admission to the *Place of the Work*, the *Contractor* may, as a condition of admission, require any other contractor or the *Owner's* own forces to sign a written acknowledgement in the following form:

Acknowledgement

The undersigned acknowledges that the *Work* it will perform on behalf of the *Owner* requires it to enter a *Place of the Work* which is under the total control of a *Contractor* that has a *Contract* with the *Owner*, pursuant to which the *Contractor* has assumed overall responsibility for compliance with all aspects of the applicable health and safety legislation, including all the responsibilities of the "constructor" under the *Occupational Health and Safety Act*, as well as responsibility to co-ordinate and schedule the activities of our *Work* with the *Work* of the *Contractor* under its *Contract*. The undersigned agrees to comply with the *Contractor*'s directions and instructions with respect to health, safety, co-ordination, and scheduling and acknowledges that its failure to do so will be cause for termination of employment or of the undersigned's *Contract* with the *Owner,* as the case may be. The undersigned also agrees to have the *Contractor* named as an additional insured on any comprehensive liability insurance policy, where such insurance is required.

_____
Name:
Title:
Date:

GC 9.5 MOULD

.1 Add to subparagraph 9.5.2.3 immediately before the comma, the following new words:

"and as a result of the delay"

.2 Add "and the *Consultant"* after *"Owner"* in subparagraph 9.5.2.4.

.3 Add "and the *Consultant"* after *"Contractor"* in subparagraph 9.5.3.4.

GC 10.1 TAXES AND DUTIES

.1 Add new paragraph 10.1.3:

10.1.3 Where the *Owner* is entitled to an exemption, reduction or a recovery of sales taxes, customs duties, excise taxes or *Value Added Taxes* applicable to the *Contract*, the *Contractor* shall, at the request of the *Owner*, assist with application for any exemption, recovery or refund of all such taxes and duties and all amounts recovered or exemptions obtained shall be for the sole benefit of the *Owner*. The *Contractor* agrees to endorse over to the *Owner* any cheques received from the federal or provincial governments, or any other taxing authority, as may be required to give effect to this paragraph.

GC 10.2 LAWS, NOTICES, PERMITS, AND FEES

.1 Add to the end of paragraph 10.2.4 the following words:

" The *Contractor* shall notify the Chief Building Official or the registered code agency, where applicable, of the readiness, substantial completion, and completion of the stages of construction set out in the *Ontario Building Code*. The *Contractor* shall be present at each site inspection by an inspector or registered code agency. If any laws, ordinances, rules, regulations, or codes conflict, the more stringent shall govern."

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

"Subject to paragraph 3.4.1, the".

GC 10.3 PATENT FEES

.1 Delete paragraph 10.3.2 in its entirety.

GC 10.4 WORKERS' COMPENSATION

.1 Add to subparagraph 10.4.1 immediately after the first comma, the following new words:

"again with each application for progress payment, and"

.2 Add to the beginning of subparagraph 10.4.2 the following new words:

"The *Contractor* shall ensure that each *Subcontractor* complies with the workers' compensation legislation at the *Place of the Work.*

.3 Add new paragraph 10.4.3:

10.4.3 Where a *Subcontractor* is not required to participate in the insurance plan provided for under the workers' compensation legislation, the *Contractor* shall require the *Subcontractor* to provide a sworn declaration of its exemption as a condition of the *Subcontractor's* admission to the *Place of Work*. When requested by the *Owner,* the *Contractor* shall require the *Subcontractor* to provide a letter of exemption under the workers' compensation legislation.

GC 11.1 INSURANCE

.1 Delete paragraph 11.1.2 in its entirety and substitute new paragraph 11.1.2:

11.1.2 In all instances in paragraph 11.1.1 where the *Contractor* is required to obtain insurance coverages naming or jointly naming the *Owner*, such policies shall also name the Architect and all Consulting Engineers. Each of the policies of insurance shall also contain a provision requiring not less than 30 days' written notice to each named insured prior to cancellation or any change that would reduce coverage. At least 10 calendar days prior to commencement of the *Work* and upon any renewal, amendment, or extension of all or any part of the insurance, the *Contractor* shall promptly provide the *Owner* with confirmation of coverage and, if required, a certified true copy of the policies certified by an authorized representative of the insurer together with copies of any amending endorsements applicable to the *Work*.

.2 Add new subparagraph 11.1.9:

11.1.9 The parenthetical reference in CCDC 41 - INSURANCE REQUIREMENTS, paragraph 4 which reads: "(excluding flood and earthquake)" is deleted and replaced with the following: "(including flood, earthquake, testing, and commissioning)".

GC 11.2 CONTRACT SECURITY

.1 Delete paragraph 11.2.1 in its entirety and substitute new paragraph 11.2.1:

11.2.1 The *Contractor* shall, prior to commencement of the *Work*, provide to the *Owner*:

.1 a performance bond, in the form set out in the *Contract Documents*, in an amount equal to 50% of the *Contract Price*, covering the performance of the *Contract*, including the *Contractor's* requirements with respect to the correction of deficiencies and the fulfillment of all warranties; and

.2 a labour and material payment bond, in the form set out in the *Contract Documents*, in an amount equal to 50% of the *Contract Price* covering payment for labour, *Product*, or both.

.2 Delete paragraph 11.2.2 in its entirety and substitute new paragraph 11.2.2:

11.2.2 The bonds referred to in paragraph 11.2.1 shall be issued by a duly licensed surety company authorized to transact the business of suretyship in the province or territory of the *Place of the Work* and shall be maintained in good standing, with respect to the bond in 11.2.1.1, until 24 months following the date of the final Certificate of Payment, and, in respect of the bond in 11.2.1.2 above, until 90 days following the date of the final Certificate of Payment.

.3 Add new paragraph 11.2.3:

11.2.3 If approved changes pursuant to the *Contract* result in approved increase or cumulative increases to the *Contract Price* the *Contractor* shall promptly acquire additional bonding at the *Owner's* expense. Where additional bonding premiums are paid by the Owner, the *Contractor* shall promptly submit written confirmation that the premiums were paid to the surety and promptly provide the *Owner* with the original revised performance bond(s).

GC 12.1 INDEMNIFICATION

.1 Add new clause 12.1.1.3

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

GC 12.2 WAIVER OF CLAIMS

.1 Delete the reference to "395 calendar days" in the last line of paragraph 12.2.2 and substitute "120 calendar days".

.2 Delete the last sentence of subparagraph 12.2.3.4 and substitute:

"Substantial defects or deficiencies" mean those defects or deficiencies in the *Work* where the reasonable cost of repair of such defects or deficiencies exceeds:

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

.2 if the *Contract Price* exceeds $2 million, the sum of $100,000, before *Value Added Taxes*;

but, in any event, a defect or deficiency in the *Work* which affects the *Work* to such an extent or in such a manner that a significant part or the whole of the *Work* is unfit for the purpose intended by the *Contract Documents* shall be deemed to be a "substantial defects or deficiencies" regardless of the cost of repair.

.2 Amend paragraph 12.2.5 by adding ",12.2.3.4" immediately after the reference to paragraph 12.2.3.3.

GC 12.3 WARRANTY

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

"Subject to paragraph 3.14.1, the…".

.2 Add new paragraph 12.3

12.3 It is the Contractor's responsibility to schedule a meeting with the Client, the Architect and the Contractor and anyone he deems necessary at least one month prior to the expiration of the Warranty period. Failure to do so would deem the extension of the warranty period until one month beyond the date that the meeting occurs.

Add new PART 13 as follows:

PART 13 OTHER PROVISIONS

GC 13.1 OWNERSHIP OF MATERIALS

13.1.1 All *Work* and *Products* delivered to the *Place of the Work* by the *Contractor* shall be the property of the *Owner*. The *Contractor* shall remove all surplus or rejected materials when notified in writing to do so by the *Consultant*. Notwithstanding that ownership of the *Work* and *Products* may vest in the *Owner*, the risk of all *Work* and *Products* shall remain with the *Contractor* until the *Work* and *Products* are accepted and assumed by the *Owner* as otherwise set out in the *Contract*.

GC 13.2 CONSTRUCTION LIENS

13.2.1 In the event that a claim for lien is registered against the *Project* by a *Subcontractor* or *Supplier*, and provided the *Owner* has paid all amounts properly owing under the *Contract*, then the *Contractor* shall, at its own expense within 10 calendar days, ensure that any and all claims for lien and certificates of action are discharged, released, or vacated by the posting of security or otherwise.

13.2.2 In the event that the *Contractor* fails to comply with the requirements of paragraph 13.2.1, the *Owner* may fulfil those requirements without *Notice in Writing* to the *Contractor* and set off and deduct from any amount owing to the *Contractor*, all costs and associated expenses, including the costs of posting security and all legal fees and disbursements associated with discharging or vacating the claim for lien or certificate of action and defending the action on a substantial indemnity basis. If there is no amount

owing by the *Owner* to the *Contractor*, then the *Contractor* shall reimburse the *Owner* for all of the said costs and associated expenses.

GC 13.3 CONTRACTOR DISCHARGE OF LIABILITIES

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

GC 13.4 RECORDS/DAILY REPORTS/DAILY LOGS

13.4.1 The *Contractor* shall maintain and keep accurate *Project* records (which means all tangible records, documents, computer printouts, electronic information, books, plans, *Drawings*, *Specifications*, accounts or other information relating to the *Work*) in its office in accordance with requirements of law, but in any event for not less than 6 years from *Substantial Performance of the Work* or until all claims have been settled. During this time, the *Contractor* shall allow the *Owner* and the *Consultant* access to the *Project* records during normal business hours upon the giving of reasonable notice. The *Contractor* shall ensure that equivalent provisions to those provided herein are made in each subcontract and shall require the *Subcontractors* and *Suppliers* to incorporate them into every level of contract thereunder for any part of the *Work*.

END OF SECTION

PART 1 GENERAL

1.1 REPORTS

1. Attached 2020 Asbestos Audit Update Report – St. Jacobs Public School dated August 26, 2020 as prepared by MTE Consultants for the Waterloo Region District School Board.

2. The information given in this report was obtained for the use of the Owner in the execution of the design. It is presented in good faith to assist the Contractors and their sub-trades.

3. It is incumbent upon the Contractors to make whatever additional materials investigation they feel may be required for the proper execution of the Contract at no additional cost to the Owner.

1.2 SCOPE OF WORK

1. The work of asbestos abatement is part of the Base Contract. Refer to reports referenced herein for scope and procedures.

2. The extent of abatement is limited to only those parts of the building in which the Work of this Contract (renovation) is being done. Coordinate between the drawings and the reports references herein to determine the exact scope.

3. Any areas discovered during construction requiring abatement which are not indicated within the attached report(s) will be completed as part of a cash allowance.

4. The methods and procedures for the Work of this section shall as per the enclosed report(s) and as required by National, Provincial and Local regulations.

1.3 SITE CONDITIONS

1. Examine the conditions on the site, present site conditions.

1.4 AWARENESS OF HAZARDOUS MATERIALS

1. Each Contractor shall be constantly aware of the possible discovery of additional unknown hazardous materials. Should the Contractor encounter any hazardous material or suspected hazardous material, the Contractor shall immediately stop work in the area affected and report the condition to the Architect.

2. If the Contractor encounters any additional unknown hazardous material or suspected hazardous material, the Contractor agrees to immediately

initiate the required procedures of the Canadian Environmental Protection Act, 1999, and/or federal or provincial agencies having jurisdiction to protect any and all persons exposed to the affected areas or areas affected thereby.

3. Upon written notification by the Contractor to the Architect, the Contractor will engage an industrial hygienist to sample and test the suspected hazardous material.

    5. Should the test prove negative, and proper clearance obtained from the industrial hygienist, the work will then proceed.

    6. Should the test prove positive, the work will be put on hold and the Contractor will conduct corrective measures and/or disposal program in accordance with applicable laws and regulations.

4. The work in affected areas shall not be resumed until the Contractor has separately arranged for the hazardous material to be removed or rendered harmless, and the hazardous material is removed or rendered harmless in accordance with all applicable laws and regulations and has been certified safe by appropriate authorities.

5. Each Contractor and/or Subcontractor shall be responsible to inform all of its employees on the site of the provisions in these paragraphs. Instruct each employee of the jobsite procedures in reporting any and all suspected materials.

6. Absolutely no material will be allowed on site that does not have a manufacturer's label stating contents.

PART 2 PRODUCTS - Not Used

PART 3 <u>EXECUTION</u> - Refer to reports referenced herein

END OF SECTION

PART 1 GENERAL

1. DESCRIPTION

1. Unless specified otherwise, the following instructions shall apply to all sections of the work.

2. Conform to the latest Ontario Building Code, CEC CSA C22, CAN3-B44 and CSA W59.1 - latest amendments, where applicable, to the Canadian Code for Construction Safety, as currently amended, and to the Construction Safety Act, Ont. as currently amended, and to all other applicable codes and Building By-Laws hereinafter referred to as Codes; and to the requirements of the authorities having jurisdiction, including public utilities, referred to in the Contract Documents as the authorities.

3. Conform to regulations of Municipality having jurisdiction regarding clean up of tracking on streets and protection of sidewalks and curbs, and all other applicable laws, By-laws and Regulations.

4. Read General Work - Section 01015, for instructions and requirements regarding General Work and Services, Miscellaneous Work and Services and Temporary Work and Services. Trades requiring own offices, sheds, etc. shall provide, maintain, relocate and remove same in a manner satisfactory to Contractor.

5. Establish rates of wages, hours and conditions of work, in accordance with Provincial Codes and as generally recognized and accepted in locality. Wherever possible, give preference to use of local labour, building mechanics, suppliers and subcontractors.

6. Install and arrange ducts, piping, tubing, conduit, equipment and fixtures in such a way as to conserve head room and space as much as possible, to provide minimum interference and to be neat, orderly and tidy. Unless otherwise noted, run pipes, ducts, tubing and conduit vertical, horizontal and square with building grid. Conceal pipes, ducts, tubing and conduit above ceilings, behind furrings, in walls, except in mechanical rooms, equipment rooms and unfinished spaces, unless indicated or specified otherwise.

7. In all cases where a device or part of the equipment is herein referred to in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the installation.

8. Definitions

    1. Wherever the word ‘Contractor’ is used, it shall refer to either the General Contractor or the Trade Contractor, whomever is performing the Work being described. Wherever the Work has not be allowed for by the Trade Contractor, such Work shall be deemed as the General Contractor’s responsibility and as such, included in the base Contract Value.

2. Wherever the words 'approved', 'satisfactory', 'directed', 'permitted', 'inspected', 'instructed', 'required', 'submit', 'ordered', or similar words or phrases are used in the Contract Documents, it shall be understood, unless the context provides otherwise, that the words 'by (to) the Architect' follow.

3. The words 'by others' when used in the Specifications or on the Drawings shall not mean by someone other than the Trade Contractor. The only means by which something shown or specified shall be indicated as not being in the Contract is by the use of the initials 'NIC' or the words 'not in (the) Contract', 'by Client', or by another Contractor.
4. Exposed: means when visible by the occupants at completion of the work, unless scheduled or specified otherwise.

5. The use of scope, related work, or similar articles in the specifications shall not relieve the contractor from their responsibility to assign the various parts of the work to the appropriate subcontractors and forces and shall not impose upon the Architect or Client the duty to arbitrate disputes between the Contractor and the Subcontractor, nor shall it relieve the subcontractors from their responsibility for carefully examining all the Drawings and Specifications and coordinating their work with each other and the Contractor.

2. CO-OPERATION

1. Co-operate and co-ordinate 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. Provide forms, templates, anchors, sleeves, inserts and accessories required to be fixed to, or inserted in work, and set in place or instruct related trades as to their location. Pay cost of extra work caused by and make up time lost, as a result of failure to provide in adequate time, the necessary co-operative information of items to be fixed to, or built in.

2. Allow for four (4) site tours by the Owner to be scheduled throughout construction. Provide safety helmets and vests for twelve (12) persons. It is the General Contractor’s responsibility to lead the tour to ensure safe passage through the work area.

3. MATERIALS

1. Reject material damaged in transit. Store packaged materials in original undamaged containers with manufacturer's labels and seals intact. Handle and store materials in accordance with manufacturers' and suppliers' recommendations. Prevent damage. Remove from site and replace damaged materials.

2. Conform to the Products, tables and standards in Section 01016 for the following:

    1. Metals

    2. Gauges & Equivalent Thickness

    3. Glass

    4. Concrete, Masonry, Paving

    5. Finish for Aluminum, Baked on Coatings

    6. Pencil Hardness Test

    7. Finish for Aluminum, Hard Anodizing

4. EXAMINATION

1. The Contractor affirms that before tendering, they did examine the site and ascertain the extent and nature of all conditions affecting the performance of the work including the existing conditions; and including the location of all concealed or buried services which may have to be protected, removed or relocated. No extras will be allowed for anything which would have been revealed in the course of such an examination.

2. The Contractor affirms that before tendering they did examine the Specifications, Drawings, and other tender documents thoroughly. It shall be assumed that the Contractor thoroughly understands these documents, including those particular items about which questions have been asked and written instructions given.

3. Examine work upon which your work depends. Application of your work or any part of it shall be deemed acceptance of work upon which your work, or that part of it which has been applied, depends.

4. Drawings are in part, diagrammatic and incomplete, and are intended to convey scope of work and indicate general and approximate location, arrangement and size of fixtures, equipment, ducts, piping, conduit and outlets. Obtain more accurate information about locations, arrangement and sizes, from study and coordination of construction drawings, including architectural, structural, mechanical and electrical and become familiar with conditions and spaces affecting these matters before proceeding with work.

5. Where job conditions require reasonable changes in indicated location and arrangements, make changes at no extra cost to Client. Install and arrange ducts, piping, conduit, equipment and fixtures in such a way as to conserve head room and space as much as possible.

5. SCAFFOLDING

1. The Contractor shall provide at their own expense all manner of materials, labour, scaffolding, ladders, hand tools, and appliances necessary for the due execution and proper completion of work described herein, unless otherwise specified in tender specifications.

2. Erect scaffolding independent of walls. Use scaffolding so as to interfere as little as possible with other trades. When not in use, move scaffolding as necessary to permit installation of other work. Construct and maintain scaffolding in rigid, secure and safe manner. Remove scaffolding promptly when no longer required. Scaffolding must comply to Occupational Health and Safety Act.

6. FLOOR SURFACES

1. Adequately protect existing and new floors and finishes from damage. Take special measures when moving heavy loads or equipment on them.

2. Keep floors free of oils, grease, or other material likely to damage them, discolour them, or affect bond of applied finishes.

7. PROTECTION AND MAKING GOOD

1. Protect existing property, adjacent public and private property and work of other sections from damage while doing work.

2. Damaged work and property shall be made good (includes replacing, fixing, re-finishing) wherever possible by those performing work originally, but at expense of those causing damage.

3. Attach and fasten fixtures 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 a result of vibration or other causes in normal use of building.

4. If, during work, any buildings, curbs, walks, roads or landscaping are damaged, repair or replace them to the satisfaction of Architect and the local jurisdiction.

5. Protect glass and other finishes against heat, slag and weld spatter, by erecting sturdy plywood or other heavy shield.

6. If tape or strippable coatings are used to protect finished metal surfaces, do not allow them to become baked on or to thermoset.

8. IMPACT DRIVEN FASTENINGS

1. Do not use impact driven (explosive, hammer, etc., but not twist driven) fastening devices without written approval. Properly size holes in concrete and drill cleanly to avoid oversizing for expansion anchors. When drilling upward, use jig to hold drill steady and plumb.

9. ALTERATIONS AND MAKING GOOD

1. Wherever it becomes necessary to cut or interfere in any manner with existing services and apparatus, do so at such times as approved by the Architect. Give minimum advance notice of one week and provide sufficient information of such requirements.

2. Take into account existing installations to ensure best arrangement of pipes, conduit, ducts and mechanical, electrical and other equipment in available space. For critical locations, prepare interference and installation drawings showing work of various sections as well as existing installations, for approval, before commencing work.

3. Comply with Section 01045 Cutting and Patching for additional information

10. STANDARDS

1. Where initials of an organization are used, followed by number or combination of numerals and letters, this designates a standard produced by the organization. Conform to issue of standard so designated, as amended and revised to date of contract. When designation does not indicate particular edition of standard edition current at date of Contract shall apply.

2. Wherever a standard confers upon a person, a body politic or a body corporate the right to approve, to select, to exercise authority or to interpret the standard, and refers to that person, body politic or body corporate as the Authority having jurisdiction, the Authority, the Engineer, the Department, the Purchaser, the Contracting Officer (e.g. U.S. Fed. Spec.) or by some other such designation, the Architect shall have the right to exercise the powers of any such person, body politic, or body corporate.

3. Where standards and manufacturer's instructions conflict with the Contract Documents, the Contract Documents shall govern.

11. FINISHED DIMENSIONS AND ELEVATIONS

1. See Article on Setting Out, in Section 01015. Give particular attention to finished dimensions and elevations of the work. Make finished work fit indicated spaces accurately. Make finished work flush, plumb, true to lines and levels and accurate in all respects

12. NON-PAYMENT

1. All those doing work or supplying materials shall notify the Architect in writing if the Contractor fails to make payment when due. Failing such notice, the Architect will assume that payments have been duly made.

13. CLEANING AND CONTRACT CLOSE-OUT

1. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

2. Store volatile wastes in covered metal containers and remove from premises daily.

3. Prevent accumulation of wastes which create hazardous conditions.

4. Provide adequate ventilation during use of volatile or noxious substances.

5. Use only cleaning materials recommended by manufacturer on surface to be cleaned, and as recommended by cleaning material manufacturer.

6. Refer also to Section 01710 Cleaning and Dust Control.

7. Final Inspection and Closeout

    1. Submit proposed closeout procedures and schedule of inspection to Architect for approval before final inspections commence.

    2. Arrange for, conduct and document final inspections, closeout and take-over at completion of work of this specification in accordance with procedures described in OAA/OGCA TAKE-OVER PROCEDURES, OAA/OCGA Document No. 100, December 2007.

    3. Substantial completion cannot be applied for until the building is approved for occupancy by the local Building Authority, maintenance manuals and as-builts have been submitted, operating instructions to the Client have been completed and percentage of completion as per the Construction Lien Act has been obtained.

    4. Comply with Section 01700 – Contract Close-Out.

14. TRADEMARKS AND LABELS

1. Trademarks and labels shall not be visible in the finished work except for labels of ULC and other similar authorities and except where necessary to identify mechanical and electrical equipment, for maintenance and replacement and except where specified otherwise.

2. Except as provided in the foregoing paragraph, locate trademarks and labels on concealed or inconspicuous surfaces or remove by grinding if necessary or paint out where surface painted, if located conspicuously.

15. BURIED SERVICES

1. The Contractor shall be responsible for all required locates and keeping records of all buried services indicated in the locates and wherever discovered on site. The subcontractors concerned shall provide the Contractor with all necessary dimensions required to accurately locate those services.

16. EXISTING SERVICES

1. Where work involves breaking into or connecting existing services, carry out work at times directed by governing authorities, with minimum of disturbance to the operation of the facility, pedestrian and vehicular traffic.

2. Before commencing work, establish location and extent of service lines in area of work and notify Architect of findings.

3. Where unknown services are encountered, immediately advise Architect and confirm findings in writing.

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

5. Remove abandoned service lines to distance of six feet from foundations. Cap or otherwise seal lines at cut-off points, in manner approved by authorities having jurisdiction over service.

6. Record locations of maintained, re-routed and abandoned service lines. The sub-contractors concerned shall provide the General Contractor with all necessary dimensions required to accurately locate those services.

7. The appropriate Sub-contractor shall assume full responsibility for the locations and protection of all under and above ground utilities, such as water, sewer and gas mains and building connections, hydro and telephone poles, wires and conduits, etc. when excavating or digging below grade whether they are shown on the plans or not.

8. Where the location of any of these utilities has been shown on the plans, such information is not guaranteed. It is the appropriate Sub-contractor's responsibility to verify locations, invert elevations, etc., immediately after moving on the site. If for any reason the information obtained necessitates changes in procedures or design, advise the Architect at once. If this verification of existing conditions is not done at the outset and any problems arise, the responsibility for same will be entirely the Contractor's.

9. Contractor to provide temporary support of existing service lines and pipes where work requires excavation below existing lines for construction of new footings, foundations, etc.

17. EMBEDDED CONDUIT, PIPE AND SLEEVES

1. Concrete Slabs

   1. All pipes and conduits shall be depressed to pass under concrete slabs on grade.

   2. Sleeves, conduits and pipes which pass through suspended slabs, beams or walls, shall be in approved locations which do not impair the strength of the construction. Space them all not less than three diameters o.c.

18. SAFETY

1. The General Contractor will be responsible for submitting their safety program used in the ongoing operation of their company and any safety recommendations specifically relating to the tendered project.

2. Safety measures or procedures taken by the General Contractor i.e. site safety meetings, site construction fences, etc., will not relieve the Contractor of their responsibilities for the safety of persons and property, and for compliance with the federal, provincial and local statutes, rules, regulations and orders applicable to the conduct of the work.

3. Submit copies of all Safety Meeting Minutes to Architect and Client.

4. Comply with Section 01545.

21. SITE

1. The work to be done at 325 Louisa Street, Kitchener, ON.

23. EXAMINATION

1. The site shall be accepted by the Contractor in their present condition. The Contractor will be held to have visited the site and to have carefully examined all conditions affecting the site, the work to be done there on, including the location of all services which may have to be protected, removed or relocated. The Contractor shall accept sole responsibility for any error or neglect on their part in this respect. Submission of Tender shall be deemed confirmation that tenderer has inspected site and is thoroughly conversant with existing conditions. No claims for extra payment will be considered for extra work, expense or difficulties encountered due to conditions on site which were visible upon or reasonably

inferable from an examination of the said site prior to the closing of tenders.

2. Examine the specifications, drawings and soils report thoroughly. Report to Architect all ambiguities, discrepancies, omissions, errors, departures from Building By Laws, or from good practice, discovered during examination as early in the tender period as possible to allow clarification by addenda to be issued to all bidders. No claims for extra payment will be considered for work, expense or difficulties which are reasonably inferable from an examination of the documents prior to the closing of tenders.

3. The drawings and specifications complement each other, and neither is to be considered alone. Hence, any item omitted in one, but mentioned or implied in the other, must be provided.

4. All changes to the contract documents which result in an extra or a credit to the contract amount are not to be executed until written instructions have been received and the extra or credit agreed to in writing by all parties to the contract.

5. The Contractor shall execute variations, alterations and substitutions which do not affect the contract amount as instructed by the Owner or its representatives.

24. PROCEDURES AND SUPPLY OF CRITICAL MATERIALS

1. Submission of a tender shall constitute the Tenderer's agreement that they will commence work immediately upon award of the Contract, and that they will execute the same without interruption until completion, including the furnishing of all necessary supplies and equipment for winter operations. Contractor shall assure themselves before submitting a tender that they are in a position to furnish adequate supplies of all materials, critical or otherwise, at such times necessary to ensure immediate commencement of the work and continuous operation without delays on the project. The Contractor shall include in their tender amount, sufficient sums for the purchase of critical materials from any source available. After award of the contract, the Client will not grant increases to the tender amount to obtain critical materials at premium prices, nor will delays or interruption of the work be tolerated.

25. LAWS, CODES AND REGULATIONS

1. The tenderer is assumed to have made themselves familiar with and abide by the Federal National Authorities, Provincial, Municipal and local laws, rules and regulations which in any manner affect those engaged or employed in the work, or in any way affect the work, and no plea of misunderstanding will be considered on account of ignorance thereof. If the Bidder shall discover any provisions in the drawings, specifications or contract which are contrary to or inconsistent with any law, rule of regulation, Contractor shall at once report it to the architect in writing.

26. SITE ACCESS

1. Contractor to remove all debris from site daily.

2. Location of all trailers, storage units, and construction fences by contractor shall be reviewed and approved by the Client and Architect at a preliminary site meeting prior to contractor moving on to site.

3. Parking for construction workers shall be on site as directed by the General Contractor, only when parking spaces are available.

4. Site access for construction to be confirmed at first site meeting.

27. CONSTRUCTION SAFETY

1. Safety measures or procedures taken by the Contractor, i.e. site safety meetings, protective street hoarding, site construction fences, etc. will not relieve the contractor of their responsibilities for the safety of persons and property, and for compliance with the federal, provincial and local statues, rules, regulations and orders applicable to the conduct of the work.

2. This Contractor shall be liable for any costs, fines, penalties, etc. levelled against the Client or Consultant due to violation of the Construction Safety Act by this Contractor or any Subcontractors on this project.

3. This Contractor will be responsible for submitting to the Client their safety program used in ongoing operation of their company and any safety recommendations specifically relating to the tendered project.

28. PROJECT SCHEDULE

1. The successful bidder will be required within one (1) week after award of a Letter of Intent to forward to the Architect, a schedule indicating construction sequences, manpower and equipment required in order to complete the work. This schedule is to be posted on site at all times. Schedule is to be updated on a weekly basis.

2. When the Architect deems that the Contractor's work has fallen behind schedule, the contractor will provide the necessary manpower and work the necessary overtime to bring the work back on schedule at no cost to the Client.

3. Contractor shall commence shop drawings immediately once acceptance of tender has been given by the Client. A complete shop drawing and sample submission schedule is to be provided within seven days of tender award. This will be reviewed by Architect.

4. Commence construction on the Project as soon as Building Permit is obtained.

5. Refer also to Section 01310 Construction Schedules.

29. PROTECTION AND MAKING GOOD

1. Protect existing property, adjacent public and private property and work of other sections from damage while doing work.

2. Damaged work and property shall be made good wherever possible by those performing work originally, but at expense of those causing damage. The General Contractor is solely responsible for all subtrades and any damage.

3. Attach and fasten fixtures 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 a result of vibration or other causes in normal use of building.

4. If, during performance of the work, any buildings, curbs, walks, roads or landscaping are damaged, repair or replace them to the satisfaction of Architect and the local jurisdiction at no additional cost to the Client.

30. MATERIALS AND EQUIPMENT

1. All materials and equipment supplied for the work shall be new, of the best quality, and in accordance with the latest applicable specifications of the Canadian Standards Association.

2. The particular method, material, procedure or equipment specified in this tender shall be used as a standard.

3. M.S.P.S. (Material Safety Data Sheets) for all materials being used on this project are to be kept on site and made available for use by all concerned.

4. Controlled substances: the use of any controlled substance of any kind must be reviewed by Client and written acceptance of its use obtained.

5. Where particular products are specified and approved alternate manufacturers are listed, it is the responsibility of the contractor to ensure that any products carried in their tender from one of the approved manufacturer's meets or exceeds the original specified product. The Owner shall make the final ruling on their acceptability.

6. During and upon completion of the work, the Contractor shall remove from the premises all surplus materials, equipment and debris.

31. GENERAL NOTES

1. The contractor will be required to keep and maintain a set of as-built drawings for each project. These drawings will be used for no other purpose than recording the exact location of buried or covered services and all changes to the contract documents. The as-built drawings will be submitted to the Architect along with

guarantees, maintenance data, extra supplies, etc. at the substantial performance of the contract.

2. The contractor will turn over to the Architect at the completion of the contract all **project close out documents, as-built drawings, material, etc.** These documents, material, etc. including occupancy permit, will be accepted only with a transmittal and at no other time than when submitting a written request for substantial performance of the contract. For purposes of determining a value of this work it will be considered as **$5,000.**

3. The contractor is not to act on verbal instruction from the Client, Consultants, or Architect on work they consider to be extra to their contract scope. Extra work can only be authorized by the Architect and in a written form only. The written form must also include that this work is an extra to the contract scope, and the method by which extra costs will be tabulated.

4. Ensure the building is maintained weather tight, safe and secure. Furnish all temporary protection as may be required.

5. Remove and dispose of all resultant debris.

6. Work shall be done in accordance with best standard practice, unless special methods or performance standards are specified or given in writing by the Client. Only skilled mechanics shall be used where such are required to produce a first-class job. Where required by code or other by-laws and regulations, trades people shall be licensed in their trades.

7. Use, install and handle manufactured materials in accordance with manufacturer's instructions.

8. Conform to the latest Ontario Building Code, CEC CSA C22, (latest Edition as currently amended) CAN3-B44, and CSA W59.1, where applicable, to the Canadian Code for Construction Safety, as currently amended, and to the Construction Safety Act, Ont. as currently amended, and to all other applicable codes and Building By-Laws hereinafter referred to as Codes; and to the requirements of the authorities having jurisdiction, including public utilities, referred to in the Contract Documents as the authorities.

9. Conform to regulations of Municipality having jurisdiction regarding clean-up of tracking on streets and protection of sidewalks and curbs, and all other applicable laws, By-laws and Regulations.

10. Any work not acceptable to the Architect or Client or local authorities shall be removed and replaced when and as directed by them. The cost of re-executing such work shall be borne by the Contractor.

11. All mechanical maintenance pads and penetrations to be by Division 15, and all electrical maintenance pads and penetrations to be by Division 16.

12. The contractor shall provide internet service on the jobsite and make access available to the Owner and Consultant and shall maintain this service until the date of substantial performance of the contract.

13. The contractor shall maintain access to the buildings and portable buildings on site and shall restrict access to construction areas.

14. The contractor shall provide temporary drainage as required at construction access points to prevent the build-up of dirt and mud and the migration of this onto municipal streets. Periodic cleaning of municipal streets is to be provided when required and whenever specifically requested by the municipality.

PART 2 PRODUCTS - Not Used

PART 3 EXAMINATION - Not Used

END OF SECTION

PART 1 GENERAL

1. EXAMINATION

   1. Throughout the project, examine the work of all trades and promptly notify the Consultant if any conditions do not or will not comply with the drawings and specifications.

2. SETTING OUT

   1. Lay out work from control bench marks and indicated verified reference points. The General Contractor shall have a qualified land surveyor, registered to practice in Province of Ontario and approved by Consultant, verify accuracy of layout and certify that building foundations and finish grade levels and locations are in accordance with the contract documents. File certification with Building Department and Consultant immediately after foundations are completed. Payment for the Land Surveyor will be carried out by the General Contractor not under the Cash Allowance.

   2. The Land Surveyor shall provide four lines and one benchmark for the General Contractor to layout their work to. The General Contractor will provide these layout lines and benchmarks for work on all other areas once they begin work on the site.

   3. Protect and preserve bench marks and reference points. Inform Consultant immediately if bench marks or reference points are disturbed or damaged by any work and pay for their repair and/or replacement.

   4. Locate and fix grid lines and locations of walls, partitions, shafts and all parts of the construction as work proceeds.

   5. Verify grades, lines, levels and dimensions indicated, particularly with road and sidewalk elevation, and report any errors or inconsistencies to the Consultant before commencing work. Confirm job dimensions at once to allow prompt checking of shop and other drawings.

   6. As work progresses, provide and maintain bench marks at each floor, giving exact elevation of finished floor.

3. PROTECTION

   1. Conform to Ontario Building Code, latest amendments, and The Construction Health and Safety Act, all as currently amended.

   2. Provide spare safety helmets for and enforce their use by Owner, Consultant, their representatives and any authorized visitors to site.

   3. Protect excavation, trenches, and buildings from damage by rain, water, ground water, backing up of drains or sewers and other water, frost and all other weather conditions. Do not allow footings or slabs to be placed on frozen ground. Do not permit excavations to reach full depth indicated when freezing temperature may

be expected unless footings or slabs can be placed immediately after excavation has been completed. Protect excavations from frost by placing of suitable approved insulating material to adequate depth, if placing of concrete is delayed and after placing of concrete until backfilling occurs or freezing conditions terminate. Provide necessary pumps (including spare pumps) and temporary drainage for keeping project free of water throughout construction period. Pump water to public sewers or ditches by approved means. Refer to soils report for details. Control grading around excavations to prevent surface water from draining into excavation and from damaging adjoining property.

4. Protect building from movement and damage, especially during filling and compaction and until elements are securely anchored and cannot be damaged or moved by filling or compaction. Obtain approval of authorities having jurisdiction for such work and make changes as required by them.

5. Provide temporary construction fence to enclose construction area, and pavement protection as required for protection of public, and of public and private property and as required by law and by authorities having jurisdiction. Erect sturdy railings around shafts, stair wells and the like to protect workers and public from injury. Equip foregoing protection with warning lights and signs. Alter, remove and relocate or replace hoardings, barriers, and entrances therein as required by authorities having jurisdiction and by the work. Hazards requiring such protection shall be eliminated as soon as possible and protection devices removed. Maintain fences, gates until construction is complete. Keep free from unauthorized signs.

6. Provide wood hoarding protection as indicated on drawings and in conformance with the local authority having jurisdiction along all streets where new construction is within 6 metres of the street sidewalk.

7. Provide and maintain in working order, adequate, temporary Canadian Underwriters labelled, chemical solution (soda acid) Class A.1, fire extinguishers and locate in prominent positions to approval of authorities having jurisdiction.

8. Utilities and Services - Before starting the work contact the Public Utilities for location of underground services.

4. <u>AS BUILT DRAWINGS</u>

1. Maintain as work progresses, accurate records of changes to the Drawings and concealed services. Accurate locations, depth, size, and type of underground utilities shall be included in these as built drawings. The General Contractor will be supplied with digital drawings in AutoCad®, 2012 or later and PDF format of the floor plans for making these recordings. As built drawings will be reviewed at each site meeting and must be properly maintained to receive Consultant's approval before the monthly certificate draw will be approved.

2. Keep a daily record showing progress of the work and all factors affecting the work, i.e., weather, strikes, accidents, shipping delay, etc.

3. The General Contractor shall also provide as built drawings in AutoCad 2012 (or later) by a professional drafting service.

4. Completed as built drawings and instruction and warranty manuals shall be submitted prior to requesting substantial completion.

5. STORAGE AREA

1. Storage Area: General Contractor to provide storage area at site for products and tools. Include construction and operating hardware, with security locks, as required. Separate storage for painter's materials and tools from other storage areas. Locate storage area where directed by Owner's Representative and provide security.

6. WASHROOM CONVENIENCES

1. General Contractor to provide washroom facilities as per the Construction Health and Safety Act for use of subcontractors and employees. Facilities shall be provided with a screen and contents shall be removed regularly during construction. Maintain it without offense to neighbourhood and adjacent public and private areas. At completion of building, washroom facilities and contents shall be removed, and the ground carefully levelled and cleared. Employees on work must avail themselves of this convenience. It shall be to the satisfaction of local Health Authority.

2. Use of permanent toilets is forbidden.

7. TEMPORARY DRAINS

1. Excavations and building site shall be kept free from water at all times by means of trenches to sewers or pits from which it shall be pumped away and disposed from the site.

8. TEMPORARY WATER SERVICE

1. The General Contractor shall provide and pay for all temporary water and connections for water used for construction operations. Water for compaction and watering of seed or sod shall be trucked to the site and paid by for the General Contractor.

9. TEMPORARY ELECTRICAL SERVICE

1. The General Contractor shall provide and pay all temporary light and power necessary to the operations under this contract, including all connections necessary to supply to the Trade Contractors on site.

10. TEMPORARY HEATING

1. Provide temporary heat, heating equipment, and shelter, to keep that work which requires protection from cold, adequately warm and sheltered from elements and to allow it to be done safely and well, maintaining minimum temperature of 16

degrees Celsius (60 degrees F.) when finishing is being done and when building is closed in, until completion of work. Provide heating for materials affected by cold, both in storage and during construction. Construction requiring heat shall be suitably enclosed.

2. Do not use salamanders. Use temporary heaters of forced warm air type, operated in well-ventilated location and vented to exterior, or radiant panel type. If used in areas of completed building, provide protection on floors and adjacent surfaces to prevent damage to floors and adjacent surfaces, particularly when re-fuelling.

3. Provide temporary heat for interior spaces to maintain a minimum temperature of 16 degrees Celsius (60 degrees F.) throughout the building at all times once the building is enclosed.

11. TEMPORARY USE OF PERMANENT HEATING SYSTEM

1. Permanent heating and ventilation system may be used for temporary heating and ventilation only if the Consultant gives their approval to do so in writing, and when piping is complete, all units are connected, all pumps and valves are installed and operating properly, all strainers are installed and permanent or temporary filters are installed, and entire system has been tested and is safe operating condition, and when no further shut-down of system will be necessary for future conditions.

2. Do not use air distribution system until permanent or temporary filters are in place. Filter air distribution system to prevent dirt and dust from entering units via return air. Keep unused ducts sealed to prevent entry of air. Replace or clean filters frequently during construction to minimize entry of dirt. Clean (if cleanable) or replace filters before turning over system to Owner.

3. Put system in charge of fully trained and experienced operator at all times. If required, operators shall be selected jointly by Owner and Contractor with a view to permanent employment by Owner upon completion. Operators shall qualify as set out in Operating Engineers Act, if applicable.

4. Clean, maintain and repair heating and ventilation system as require throughout its use during construction. Notify manufacturer and Consultant immediately before turning over new heating equipment to Owner so that heating items may be checked for possible damage during temporary heating period. Make good damage to heating and air distribution equipment. Replace all worn parts and turn over system to Owner in clean, new condition, operating with circulating water properly treated chemically.

5. Permission might be given by the Consultant in writing only upon 100% operation completeness of the systems. Neither the Owner nor the Consultant are under any obligation to grant permission to use permanent heating system during construction period.

12. SITE ACCESS FOR CONSTRUCTION ACTIVITIES

1. The Contractor shall construct and maintain in good condition, such temporary service roads, culverts that may be necessary to provide safe, convenient and adequate access for materials, and other supplies at all times while the General Contractor is working on site, all to the approval of the Consultant. NOTE: The Contractor shall protect existing roads, sidewalks, curbs and provide mud mats to the satisfaction of the Local Authorities and replace any that become damaged due to any operations under this contract.

13. DELIVERY AND STORAGE OF MATERIALS

1. Arrange for early deliveries necessary for execution of work without delay and have materials on job well in advance of the time it is needed.

2. Deliver, store and handle materials to exclude foreign material and prevent damage, soiling or breakage.

3. Materials to be stored on site, which need to be protected from weather shall be so protected.

4. Packaged materials shall be delivered in packages with manufacturer's seals and all labels intact.

14. BUILDING AND PREMISES

1. Owner reserves right to take over any completed portion prior to specified completion date, provided it does not affect completion of remaining work.

2. If Owner is forced to occupy building or parts thereof prior to completion, but after date of Substantial Performance, Contractor shall not be entitled to indemnity for interference with the performance of the work.

15. OWNERSHIP OF MATERIALS

1. All work or material delivered on the site or premises to form part of the works shall be considered the property of the Owner and shall not be removed without the consent of the Consultant, but the Contractor shall have the right to and shall remove the surplus materials after he has completed the work. If so directed by the Consultant, such surplus materials shall be removed at any time prior to the completion of the work.

2. All materials which are to be removed from the existing site and are not called for to be re-used or specifically called for in the specifications to be turned over to the Owner, shall become the property of the General Contractor and shall be removed from the site.

16. DETAILS AND MEASUREMENTS

1. Ensure that necessary job dimensions are taken, and trades are coordinated for the proper execution of the work. Assume complete responsibility for the accuracy and completeness of such dimensions, and for co-ordination.

2. Verify that work, as it proceeds, is executed in accordance with dimensions and positions indicated which maintain levels and clearances to adjacent work, as set out by requirements of the drawings, and ensure that work installed in error is rectified before construction continues.

3. Check and verify dimensions referring to work and interfacing of services. Dimensions, when pertaining to work of other trades, shall be verified with trade concerned.

4. Do not scale directly from the drawings. If there is ambiguity or lack of information, immediately inform the Consultant and await his instructions before proceeding. Be fully responsible for rectifying, altering or redoing any work resulting from disregarding this clause.

5. All details and measurements of any work which is to fit or to conform with work installed shall be taken at the site.

6. Should revised drawings be issued after work has commenced, Contractor shall immediately return to Consultant previous drawings which refer to said work. The Contractor will be held responsible for work being carried out in accordance with said revised drawings.

17. WORKMANSHIP

1. Work shall be done in accordance with best standard practice. Only skilled mechanics shall be used where such are required to produce a first class job.

2. Use, install and handle manufactured materials, equipment and appliances in strict accordance with manufacturer's directions and instructions, unless specified otherwise.

18. FROST PROTECTION

1. Provide proper frost protection, including heating for materials to ensure scheduling of work without delay.

2. Similar protection shall be given to work done.

3. Work or materials damaged by frost shall be replaced by Contractor.

4. Snow and ice shall not be allowed to remain on any part of structure, except finished roofs, and shall be removed by Contractor.

19. PROJECT MEETINGS

1. Arrange regular meetings every week and notify the representatives of the Owner, Consultant, Engineer and each subcontractor concerned with the current progress.

2. Contact all subcontractors concerned at least 24 hours in advance and request their presence at job meeting.

3. Review approved progress schedule for rapid and efficient completion of work according to Contract requirements, with suppliers of materials and sub-contractors.

4. Post and forward copies of progress schedule for advice of interested parties.

5. Record the minutes of each meeting and send copies to all attending and interested parties not later than two days after the meeting. In addition, send copies to the Consultant, Consultants and Owner. Contractor to provide updated change order register and shop drawing register attached to each record of minutes to indicate exactly what has been issued and the status of approvals and/or distribution.

6. Keep Consultant informed of progress, delays and of potential delays during all stages of work to avoid delays.

20. BROKEN GLASS

1. Replace all broken, damaged or scratched glass and mirrors. Glass which has been broken, scratched or damaged in installation shall be replaced by installer.

21. TREE PROTECTION

1. Protect tops, trunks and roots of existing trees on project site that are to remain. Box, fence or otherwise protect trunks of existing trees which may be subject to construction damage before any work is started. Do not permit heavy equipment or stockpiles within branch spread. When approved, remove interfering branches without injury to trunks and cover scars with tree paint.

2. Wherever excavating is required within branch spread of trees that are to remain, do not cut tree roots, but tunnel or trench under or around roots by careful hand digging and without injury to roots.

22. CHECK FLOOR DRAINS

1. Just before acceptance of building by Owner, check floor drains and see that they are clean, clear and functioning properly.

23. FIRE PROTECTION AND ACCESS TO EQUIPMENT AND EXITS

1. Take necessary precautions to eliminate fire hazards and to prevent damage to work, equipment and other property both public and private having to do with the work. Inspect work of this contract at least once a week for this purpose.

2. Provide and maintain in working order suitable Underwriters' labelled fire extinguishers and locate in prominent positions, to approval of authorities.

3. When welding, brazing and performing any operation with an open flame, a portable fire extinguisher shall be kept within 10 feet (3000 mm) of the operator at all times.

4. Store and locate materials and equipment packed in cardboard cartons, wood crates and other combustible containers in orderly and accessible manner. Place approved types of firefighting equipment in vicinity of materials or equipment packed in this type of crate or carton until permanent fire protection and equipment are available.

5. Store all rags and waste containing oil, grease or other flammable materials in an approved metal container and remove from the site at the end of each working day.

6. Only fire resistant tarpaulins are permitted on site.

7. Locate temporary buildings and storage areas in relation to their hazards and probability of damage to existing buildings under construction. Unless constructed of non-combustible materials, wherever possible locate them at least 33 feet (10 m) away from buildings. If constructed of combustible materials separate these structures into small, detached units.

8. Provide and maintain free access at all times from the street to fire hydrants and to outside connections for standpipes or other fire extinguishing equipment whether permanent or temporary. Do not place material or construction equipment within 10 feet (3 m) of hydrants or connection, nor between them and centre line of the street.

   Maintain free access at all times to control valves and hose on fire lines within building and to all portable extinguishers.

9. Install fire doors and put into operating condition at the earliest possible time.

10. Comply with requirements of 01545 Safety Requirements.

24. SAFETY

1. Take all precautions necessary to protect and safeguard workers from dangerous conditions including fumes; lead paints, etc.; asbestos; and silica hazardous to health.

2. Comply with requirements of 01545 Safety Requirements.

25. EXISTING/ADJACENT BUILDING

1. Particular attention shall be paid to prevention of fire and elimination of fire hazards which would endanger new work or existing property.

2. No existing footings, foundations, pipe lines, electrical conduit and wiring shall be undermined or otherwise damaged or endangered by digging, butting of any other operation in the performance of the work of this Contract. Any existing work so affected shall be immediately repaired and made good to the Consultant's satisfaction at the Contractor's expense.

3. Active services to the adjacent buildings shall be protected.

4. In case of damage to active services, notify Consultant, Utilities and Authorities immediately and make all required repairs under direction of appropriate utility. Carry out repairs during off hours if required.

26. NOTES TO GENERAL CONTRACTOR

1. Ensure that the building is maintained weathertight and secure. The General Contractor shall furnish all temporary protection, enclosures, tarpaulins, etc., as may be required to weatherproof openings in the work.

2. Demolish and clean up all existing trees, scrub and debris and any other items found on the site not indicated to remain.

3. The General Contractor shall carry out all removal and disposal of all resultant debris.

4. In case of damage to active services, notify Consultant, Utilities and authorities immediately and make all required repairs under direction of appropriate utility. Carry out repairs during off hours if required. In absence of specific requirements or direction, plug or cap unused or abandoned utility lines at least 3 feet (1000 mm) outside of new building walls, or as required by utilities, codes and authorities.

5. The location of construction shacks and trailers to be approved by the Consultant and Owner.

6. Take all precautions necessary to protect and safeguard workers from dangerous conditions including fumes, lead and silica products that may be present during the construction that are hazardous to health.

7. Restore disturbed areas to original condition unless shown otherwise on drawings or stated in specifications.

27. CONSTRUCTION PARKING

    1. Parking will be permitted on site provided it does not disrupt the performance of Work.

28. PROTECTION FOR OFF-SITE & PUBLIC PROPERTY

    1. Protect surrounding private and public property from damage during performance of work.

    2. Be responsible for damage incurred.

29. SIGN AND ADVERTISEMENTS

    1. Erect no other signs, except those signs which are necessary to give direction or for safety, or warning signs, without the Consultant's permission. Where other signs are required or wanted, obtain Consultant's approval.

30. PROTECTION OF BUILDING FINISHES & EQUIPMENT

    1. Provide protection for finished and partially finished building finishes and equipment during performance of work.

    2. Provide necessary screens, covers, hoardings as required.

    3. Be responsible for damage incurred due to lack of or improper protection. Replace or repair finishes or equipment so damaged.

31. SECURITY

    1. Extent of security services shall be at the discretion of the Contractor. Note that the fit, finish and new appearance of the finished building will not be comprised. Materials, products, finishes, etc. damaged due to vandalism are to be restored and/or replaced to an as-new condition.

PART 2 PRODUCTS - Not Used

PART 3 EXAMINATION - Not Used

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

1. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard, warranties on products; special warranties; and comparable products.

2. Related Requirements:

    1. Section 01500 – Substitutions (for requests for substitutions).

1.3 DEFINITIONS

1. **Products**: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

2. **Named Products**: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.

3. **New Products**: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.

4. **Comparable Product:** Product that is demonstrated and approved by Architect through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

5. **Basis-of-Design Product Specification**: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description,

product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

6. **Subject to Compliance with Requirements:** Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. Submit a comparable product request, if applicable.

1.4 REFERENCE STANDARDS

1. The Standards listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

2. Aluminum Association (AA)

    1. AA ADM (2010) Aluminum Design Manual

    2. AA ASM-35 (2000) Specifications for Aluminum Sheet Metal Work in Building Construction Manual Series Section 5

    3. AA DAF-45 (2003; Reaffirmed 2009) Designation System for Aluminum Finishes

    4. AA PK-1 (2009) Pink Sheets: Designations and Chemical Composition Limits for Aluminum Alloys in the Form of Castings & Ingot

3. American National Standards Institute (ANSI)

    1. ANSI H35.1/H35.1M – Standard Specification for Aluminum-Alloy 6061-T6

4. American Standard for Testing and Materials (ASTM)

    1. ASTM A653/A653M-18: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

    2. ASTM B221M-14: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire Profiles and Tubes

    3. ASTM B308/B308M-10: Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.

4. ASTM B361-16: Standard Specification for Factory-Made Wrought Aluminum and Aluminum-Alloy Welding Fittings.

5. Canadian Standards Association

1. SA Standard CAN3-S157-M83: Strength Design in Aluminum.

2. CSA Standard S190-1969: Design of Light Gauge Aluminum Products.

3. CSA Standard S244-1969 "Welded Aluminum Design and Workmanship".

1.5 ACTION SUBMITTALS

1. Comparable Product Request Submittal: Submit request for consideration of each comparable product. Identify basis-of-design product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven (7) days of receipt of a comparable product request. Architect will notify Contractor through Construction Manager of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

1. Form of Architect's Approval of Submittal: As specified in Section 01300 – Submittals.

2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

3. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01300 submittals. Show compliance with requirements.

1.6 QUALITY ASSURANCE

1. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

1. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

2. Delivery and Handling:

    1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.

    2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

    3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

    4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

3. Storage:

    1. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

    2. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

    3. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

    4. Protect stored products from damage and liquids from freezing.

    5. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.8 PRODUCT WARRANTIES

1. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

2. **Manufacturer's Warranty**: Written warranty furnished by individual manufacturer for a product and specifically endorsed by manufacturer to Owner.

3. **Special Warranty**: Written warranty required by the Contract Documents to provide specific rights for Owner.
4. **Special Warranties**: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.

2. See other Sections for specific content requirements and requirements for submitting special warranties.

3. Submittal Time: Comply with requirements in Section 0700 – Contract Closeout.

PART 2 PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

1. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.

4. Where products are accompanied by the term "as selected," Architect will make selection.

5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

7. Submit additional documentation required by Architect through Construction Manager in order to establish equivalency of proposed products. Evaluation of "or equal" product status is by the Architect; whose determination is final.

2. Product Selection Procedures:

1. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.

1. Limited list of products may be indicated by the phrase: "Subject to compliance with requirements, provide one of the following: ..."

2. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.

1. Limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, provide products by one of the following: ..."

3. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

1. For approval of products by unnamed manufacturers, comply with requirements in Section 01500 - Substitutions for convenience.

2.2 COMPARABLE PRODUCTS

1. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied.

2. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.

2. Evidence that proposed product provides specified warranty.

3. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.

4. Samples, if requested.

3. Submittal Requirements: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

2.3 METAL

1. Where a product is named in the Specifications by one of the following names or by any name followed by the number of one of the following articles, the product shall conform to the standard named in the corresponding article, except as specified or indicated otherwise.

2. Aluminum (A1)

1. Bar, rod, wire, extruded shapes; architectural: CSA HA. Series (AA/AnS1 6063) (Alcan 50S) condition T5.

2. Bar, rod, wire, extruded shapes; Structural: CSA HA Series (AA/ANS1 6061) (Alcan 65S) Condition T6.

3. Plate, sheet, coil; utility: CSA HA Series Alloy MC10, (AA/ANS1 3003) (Alcan D3S); condition H14 (sheet, coil), F (plate).

4. Plate, sheet, coil; anodizing: CSA HA Series Alloy 990C, (AA/ANS1 1100) (Alcan D2S); condition H14.

5. Specially anodized aluminum (hard anodized): (AA-M21 or M12C22A42) conform to Finishes, Aluminum, Hard Anodized (FA.HA) attached to Section 01016.

6. Painted aluminum: conform to Finishes, Aluminum, Baked on Coatings FABC attached to Section 01016.

7. Anodized Aluminum: AA-M21 or M12C22A31.

8. Aluminum for elevated floor plates: (Bruce EDP) US Fed. Spec.QQ-A-591c, Ty A380 (mil-HDBK-H1C code 20087).

9. Aluminum sand casting: (signs, etc.) AA 443.0.

3. Sheet Gauges

1. Gauges and equivalent thicknesses of sheet, plate, coil and strip shall conform to the table of gauges and equivalent thicknesses (GET) attached to Section 01016. See 1.3.4 and 1.3.6 special application of gauges to structural sheet.

4. Galvanized Sheet Steel

1. ASTM A525 and 526, commercial quality sheets, plain commercial galvanized, stretcher levelled, or temper rolled to stretcher levelled standard of flatness if specified.

2. Same as 1.3.1 except wipe coated instead of plain commercial galvanized.

3. Same as 1.3.1 except mill phosphatized instead of plain commercial.

4. ASTM A446 structural quality, Grades A or B, max. permissible working stress: Grade A, 20,000 psi; Grade B, 22,400 psi. plain commercial galvanized. Gauges shall apply to core sheet and shall be msg. Coating thickness shall be added to core thickness to determine thickness of coated sheet (see 1.2 .1).

5. Same as 1.3.4 except wiped coated instead of plain commercial, with a coating not less than .050 oz. per sq. ft. (see 1.1.4).

6. Same as 1.3.4 except wiped coated instead of plain commercial galvanized (see 1.2.1).

7. Preparation for painting, in ship, ASTM D2092-68.

5. Copper Metals

1. Nickel Silver (white bronze): Anaconda American Brass Alloy 796 (leaded nickel silver) (has higher zinc content than any of the nickel silvers in ASTM B122-71a):

Copper	45%
Zinc	42%

Nickel	10%
Lead	1%
Manganese	2%

2. Sheet copper and strip copper for roofing, flashing and building construction: ASTM B370, cold rolled temper, 16 oz. or as specified otherwise.

3. Monel: (nickel 63-70%, approx. 5% other metals, remainder copper) plate, sheet, strip, hot rolled, annealed and pickled, AST B127; (Inco Monel 400).

4. All applicable copper metals: ASTM B248.

5. Architectural Bronze (Red Brass), ASTM B36, No. 3 (85% CU + 15% Nl).

6. Stainless Steel

1. Plate, sheet and strip; CSA G110.6-1968, Type 302 or 304 as specified, or as specified otherwise; finish: No. 4 unless specified otherwise.

2. Structural shapes and bars, CSA G110, 4-1968, Type 302, 304 or 316 as specified; No. 4 finish unless specified otherwise.

7. Sheet Steel

1. Sheets, cold-rolled carbon steel, commercial quality, ASTM A366 stretcher levelled or temper rolled to stretcher levelled standard of flatness if specified.

2. Porcelain enamelling steel, ASTM A424, Commercial Quality, Type 1 or 2.

1. Same as 1.6.1 except special quality for electro deposited coatings.

2. Same as 1.3.4. except un-galvanized.

3. Hot-rolled, carbon steel sheets and strip, structural quality ASTM A570-70, 5 grades (stair treads, risers, etc.).

4. Hot-rolled carbon steel sheet and strip, commercial quality ASTM A569-66T.

8. Prepainted:

    1. CSSB1 Technical Bulletin No. 5, as currently amended (modified silicone alkyd, 2000).

    2. CSSB1 Technical Bulletin No. 5, as currently amended, except humidity resistance 5000 hours; salt spray resistance 400 hours; resistance to accelerated weathering 2500 hours (fluoropolymer, 10,000).

    3. CSSB1 Technical Bulletin No. 5, as currently amended, except humidity resistance 3000 hours (silicone alkyd, 5000).

9. Sheet Steel (Cold Rolled)/Structural Steel (Hot Rolled)

    1. When steel thickness is indicated by gauge or by decimal fractions of inches, it is sheet steel (1.6) or galvanized sheet steel (1.3) or stainless steel (1.5). When steel thickness is indicated by common fractions of inches, it is structural steel (1.8). However, some sheet steels are structural quality, (i.e., having guaranteed strength).

10. Structural Steel

    1. CAN/CSA G40.21-M87, 38W or 44.

11. Soldering Materials

    1. Solder: Solder for Div. 15 to conform to Div. 15 specifications. Under no circumstances shall any lead containing solder be used on any potable water piping systems throughout the project.

    2. Flux: on stainless steel:

        1. Muriatic acid killed by the addition of zinc until all effervescence stops and no excess of zinc remains; improved by the addition of a small amount of ammonium chloride, plus 10% acetic acid; or

        2. muriatic acid: ferric chloride: nitric acid 90:50:3, by weight; or

        3. Approved commercial flux designed especially for use with stainless steel, such as EutecSol 682, or approved equal.

    3. Flux: on copper and galvanized steel:

        1. killed muriatic acid as specified in 1.9 b.1; or

        2. suitable rosin type.

12. Galvanizing

    1. All steel except (1.3), CSA G164 Hot Dip Galvanizing of irregular Shaped Articles. Must be done after all welding complete. No welding of galvanized products allowed.

13. Welding Materials

    1. CSA W59, CSA W 55.2; for stainless steel, ASTM A371; for aluminum, ASTM B285.

    2. Metal Filler

14. Epoxy: Hysol 6C epoxy adhesive kit (or 4297 in bulk) manufactured by Hysol (Canada) Limited or approved equal.

15. Plating (Electrodeposited Coatings)

    1. Cadmium (on steel): ASTM A165, Type NS (13 mu), OS (7.6 mu), TS (3.8 mu).

    2. *Chrome (on steel):* ASTM B.456, Fe Ni20b Cr r unless specified otherwise, bright unless dull specified.

    3. Chrome (on copper and copper-base alloys): ASTM B456, Type FC unless KC or QC specified; bright unless dull specified. (In this case FC is thick and QC is thin.)

    4. Weight of zinc coating and thickness to be added to base metal to determine thickness of coated material.

(Source: ASTM A-446, Tables 2 and 4)

Coating Class oz. Per sq. ft.	Triple-Spot Test, Minimum Check Limited oz. per sq. ft.	Thickness in
2.75	2.35	0.0041
2.5	2.1	0.0037
2.25	1.85	0.0033
2	1.65	0.003
1.75	1.4	0.0026
1.5	1.15	0.0022
1.25 commercial	0.9	0.0019

Wipe Coated (Colourbond or Satin coat in Canada only)	0.25	0.0005

NOTE: Light Commercial not available in Canada.

16. Paint (See 1.6.7)

    1. Shop primer on steel: CAN/CGSB 1-GP-40d.

    2. Bituminous paint: CAN/CGSB 1-GP-108c.

    3. Baked enamel on steel: primer, CA/CGSB 1-GP-81e, Type 2; finish CANCGSB 1-GP-88e, baking alkyd enamel.

    4. Baked enamel on aluminum: FA.BTAE, attached to Section 01016.

PART 3 EXECUTION - Not Used

END OF SECTION

PART 1 GENERAL

1. CASH ALLOWANCES

1. Include the following Cash Allowances in the Contract Price. These allowances shall be expended in whole or in part, when authorized by the Architect in writing. The unused portion of the Allowances shall be credited to the Owner.

3. The Contract Price and not the cash allowance, includes the Construction Manager's overhead and profit in connection with such cash allowance.

   No refund of overhead and profit will be expected on any unspent portion of Cash Allowances. Likewise, no overhead and profit will be allowed on total amount by which all Cash Allowances are exceeded.

4. Expend cash allowance as directed by the Consultant in writing. Allowance will be adjusted to actual cost, but no adjustment will be made to Construction Manager's charges including overhead and profit which are included in the Contract Price.

5. Cash allowances are designed for work and services deemed to be necessary by the Owner, from time to time, throughout the execution of the Work. Where a cash allowance refers to an item or category of work already included in the Contract Documents, it shall be assumed to cover work or services in addition to that included, unless specifically indicated otherwise.

6. Construction Manager may be required from time to time, to assist in tendering of certain items of work or services covered by allowance, as directed by Consultant.

7. Material Supply Items:

   1. Scope for material supply items covered by Cash Allowance includes:

      1. Net cost of material.
      2. Applicable taxes and duties.
      3. Delivery to site.

   2. In addition to above scope covered by Cash Allowance include in Contract Price costs for:

      1. Handling at site, including unloading, uncrating, storage and hoisting.
      2. Protection from elements, from damage.
      3. Labour, installation and finishing.
      4. Other expenses required to do cash allowance work (i.e. contract co-ordination).
      5. Overhead and Profit.

8. Material and Installation Items:

    1. Scope of each material and installation item covered by Cash Allowance includes:
        1. Net cost of material.
        2. Applicable taxes and duties.
        3. Delivery to site.
        4. Handling at site, including unloading, uncrating, storage and hoisting.
        5. Labour, installation and finishing.

    2. In addition to above scope covered by Cash Allowance include in Contract Price costs for:
        1. Protection from elements, from damage.
        2. Overhead and Profit.
        3. Other expenses required to do cash allowance work (i.e. contract co-ordination).

9. Inspection and Testing Work:

    1. Scope for inspecting and testing covered by Cash Allowance includes:

        1. Net cost of testing laboratory services and field inspection.
        2. In addition to above scope covered by Cash Allowance include in Contract Prices for:
            1. Overhead and Profit.
            2. Supply of material tested, patching and completion of work tested.
            3. Other testing on re-testing work specified in Section 01400.
            4. Other expenses required to do cash allowance work (i.e. contract co-ordination).

10. The following is a breakdown of the Cash Allowance Items **to be included** in the Contract Price:

NO.	ITEM	VALUE + HST
1	Inspection and Testing May include but not limited to: • additional asbestos & haz. mat. Testing	**$3,000.00**
2	Hardware Allowance	**$20,000.00**
	Subtotal of Above Cash Allowances (Item 2.10) (Not Including Contingency Allowance) **+HST**	**$23,000.00**

This figure $23,000.00 is to be included in the Base Bid Amount.

11. Progress payments on accounts of work authorized under cash allowances shall be included in the Consultant's monthly certificate for payment. Copies of invoices are to be submitted to substantiate claims.

END OF SECTION

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

1. Requirements and limitations for cutting and patching the Work.

1.2 RELATED SECTIONS

1. General Requirements - Section 01010
2. General Work - Section 01015
3. Individual Sections - Cutting and patching incidental work of the section. Advance notification to other sections required.

1.3 SUBMITTALS

1. Submit written request in advance of cutting or alteration which affects:
    1. Structural integrity of any element of Project.
    2. Integrity of weather-exposed or moisture-resistant elements.
    3. Efficiency, maintenance, or safety of any operational element.
    4. Visual qualities of sight-exposed elements.
    5. Work of the Owner or separate contractor.
2. Include in request:
    1. Identification of Project.
    2. Location and description of affected work.
    3. Statement on necessity for cutting or alteration.
    4. Description of proposed work, and products to be used.
    5. Alternatives to cutting and patching.
    6. Effect on work of the Owner or separate contractor.
    7. Written permission of affected separate contractor.
    8. Date and time work will be executed.

1.4 GENERAL

1. Execute cutting, fitting, and patching including excavation and fill, to complete the Work.
2. Fit the several parts together, to integrate with other work.

3. Uncover work to install ill-timed work.

4. Remove and replace defective and non-conforming work.

5. Remove samples of installed work for testing if requested by Consultant.

6. Provide openings in non-structural elements of Work for penetrations of mechanical and electrical work.

1.5 INSPECTION

1. Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

2. After uncovering, inspect conditions affecting performance of work.

3. Beginning of cutting or patching means acceptance of existing conditions.

1.6 PREPARATION

1. Provide supports to assure structural integrity of surroundings; devices and methods to protect other portions of project from damage.

2. Provide protection from elements for areas which may be exposed by uncovering work; maintain excavations free of water.

1.7 PERFORMANCE

1. Execute work by methods to avoid damage to other work, and which will provide proper surfaces to receive patching and finishing.

2. Use material to match existing.

3. For a change in material submit request for substitution under provisions of Section 01500 – Substitutions.

4. Employ qualified trade contractor to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight exposed surfaces.

5. Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed without prior approval.

6. Restore work with new products in accordance with requirements of Contract Documents.

7. Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

8. Refinish surfaces to match adjacent finishes: For continuous surfaces refinish to nearest intersection.

END OF SECTION

PART1- GENERAL

1.1 SUMMARY

1. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

2. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

    1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

    2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

1.2 SUBMITTAL PROCEDURE

1. Provide submittals electronically in Portable Document Format (PDF).

2. Submissions must be clear, to scale, complete, specific and correctly transmitted.

3. Submittals are to be numbered in the sequence which they are submitted. Submittal numbering to be as follows 001, 002, 003 etc.

4. Processing: To avoid the need to delay installation as a result of the time required to process submittals such as samples and shop drawings , allow enough time for submittal review, including time for resubmittals.

    1. Allow Consultant five (5) working days to respond to Request for Information (RFI).

    2. Allow ten (10) days for initial review of shop drawings and samples. Allow additional time if the Consultant must delay processing to permit coordination with subsequent submittals.

    3. The Consultant will return to the Contractor indicating that, the items been:

        1. Reviewed (no re-submittal required).

        2. Reviewed as indicated (no submittal required).

        3. Revise and resubmit (re-submittal required).

    4. Review by the Consultant is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean that the Consultant approves the detail design inherent in the shop drawings, responsibility for which shall remain with the Subcontractor, and such review shall not relieve the Subcontractor of his responsibility for errors / omissions in the shop drawings or of his Documents. The Contractor

is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to the processes or techniques of construction and installation and for co-ordination of all sub-trades.

5. The Contractor will advise all Trades, Subcontractors and suppliers of the limits of the Consultant's responsibility with respect to Shop Drawings and other submittals.

6. If an intermediate submittal is necessary, process the same as the initial submittal.

7. No extension of contract time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.

1.3 SHOP DRAWINGS

1. Submit shop drawings as per indicated procedure and as required in various sections of these specifications and on the drawings.

2. Review submittals prior to submission. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated by the General Contractor and identified as to specific project will be returned without being examined and considered rejected.

3. Notify, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

    1. Verify field measurements and affected adjacent Work are coordinated.

    2. Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review of submittals.

    3. Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant's review.

    4. Keep one reviewed copy of each submission on site.

    5. Submit Shop Drawings as specified in the following Sections:

SHOP DRAWINGS	
Section	**Title**
05500	Miscellaneous Metals
07270	Firestopping and Smoke Seals
08520	Aluminum Windows
08800	Glass and Glazing

09500	Acoustical Treatment (ACT)
09900	Paint Draw Downs
	Mechanical
	Electrical

1.4 SAMPLES

1. Submit samples as listed in List of Samples below.

2. Samples of materials, both manufactured and otherwise, proposed for the use on the work shall be submitted to the Architect for approval as required by the Contract Document and/or reasonably required by the Architect. The work shall be in accordance with approved samples. All samples shall be supplied and delivered to the Architect free of charge. The approval of samples shall not be construed as an acceptance of work subsequently carried out.

3. Samples shall be labelled indicating date of submission, name of project, names of contractor and manufacturer, and complete identification of locations at which materials are to be installed.

SAMPLES	
Section	**Title**
08800	Glass and Glazing
09500	ACT (to match ex. As close as possible)

1.5 EXTENDED WARRANTIES

1. In addition to the warranty requirements of GC 12.3 of CCDC Document 2, 2008, and as revised in the Supplementary General Conditions, the Contractor shall note that the following extended warranty periods are required by the Contract Documents for the individual items under respective Sections.

2. Note: This table is meant to be used as a guide. Extended warranties are dictated by individual sections.

EXTENDED WARRANTIES	
Section	Title
08520	Aluminum Windows - 5 years; Glass - 10 years
08800	Glass & Glazing - 10 years
Mechanical	Refer to Mechanical
Electrical	Refer to Electrical

1.6 MAINTENANCE MANUALS

MAINTENANCE MANUALS	
Section	**Title**
05500	Miscellaneous Metals
07270	Firestopping and Smoke Seals
08520	Aluminum Windows
08800	Glass and Glazing
09500	Acoustical Treatment (ACT)
09900	Paint Draw Downs
	Mechanical
	Electrical

1.7 EXTRA MATERIAL

1. Submit extra material as specified in the following Sections:

EXTRA MATERIAL	
Section	**Title**
09500	ACT – 5% of total area
09900	Painting - See Section
	Mechanical
	Electrical

CERTIFICATE OF PAYMENT APPLICATION FORM

Contractor: _____ Application No. _____

Work: _____ Date: _____

Period Covered: _____

Description	Contract Amount	% To Date	Value Performed to Date	Value Previously Performed	Value Current Period	Balance to Complete
This Section to show breakdown of Contract such details as:						
General Conditions	$	$	$		$	$
Excavation						
Concrete Footings						
Concrete Walls, Cash Allowances, Hardware, etc.						
SUB-TOTAL						
Change Orders No. 1 No. 2 No. 3						
TOTAL CONTRACT						

NOTE: HST TO BE INCLUDED IN EACH OF THE FOLLOWING VALUES:

SUMMARY (HST to be included in all items)

Value of Work Completed to date $ _____

Less Holdback of 10% $ _____

Holdback Released $ _____
Current Holdback (Net Retained) $ _____
Sub-Total $ _____

Less Previous Certificates $ _____

Amount of this Claim $ _____

Total of H.S.T. included above ($ _____)

GENERAL CONTRACTOR'S H.S.T. NO. _____

PART 1 GENERAL

1.1 DESCRIPTION

1. See Individual Specifications Sections for full listing of inspections and approvals.

2. Architect's approvals required:

3. Architect's and Consultant's approval before interfering with existing services and apparatus. One week notice to be given. Section 01010.

4. Architect's approval of work schedule (Progress Schedule) - 01310.

5. Architect's and Consultant's approval of substitutions - 01500.

2. Notify Architect:

1. Notify Architect for Deficiency Inspection upon agreed Substantial Performance.

2. Notify Architect for One-Year Holdback Inspection.

3. Notify Client for Two Year Inspection of Extended Warranties

4. Notify Client for Three Year Inspection of Extended Warranties

5. Notify Client for Five Year Inspection for Extended Warranties

6. Notify Client for Ten Year Inspection for Extended Warranties.

3. Submit samples for approval.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

PART 1 GENERAL

1.1 CONSTRUCTION SIGNAGE AND ADVERTISEMENTS

1. Erect no other signs, except those signs which are necessary to give direction or for safety, or warning signs, without the Architect's permission. Where other signs are required or wanted, obtain Architect's approval.

PART 2 – PRODUCTS Not Used

PART 3 – EXECUTION Not Used

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

1. Before commencing any work, the Construction Manager, along with their trade contractors, are to prepare working / interference drawings, to ensure that all components are to be properly accommodated within the spaces provided, ensuring all clearances required by jurisdictional authorities and for proper maintenance are indicated and maintained.

2. Schedule meetings on site with all associated trades to review all interference areas until all issues have been coordinated and required interference drawings issued.

3. Prepare drawings to indicate coordination and method of installation of a mechanical system with sprinkler, electrical, structural and other systems where their relationship is critical. Ensure all details of equipment, apparatus and connections are coordinated.

4. The Construction Manager shall provide interference drawings prepared by their Mechanical, Sprinkler and Electrical subtrades. Drawings are to be red-line markups scanned to PDF Format and shall indicate any perceived interference between mechanical, sprinkler, structural, and electrical work and the work of all other Divisions along with proposed solution to such interference.

5. Failure to coordinate with all other trades could result in reworking of installed equipment, piping or ducting at the discretion of the Consultant. Any reworking to accommodate the installation of other trades is to be performed at no extra cost.

6. All interference drawings shall be submitted and approved prior to the second Certificate of Payment being released.

1.2 COOPERATION AND COORDINATION

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. Provide forms, templates, anchors, sleeves, inserts and accessories required to be fixed to, or inserted in work, and set in place or instruct related trades as to their location. Pay cost of extra work caused by and make up time lost, as a result of failure to provide inadequate time, the necessary cooperative information of items to be fixed to, or built in.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

PART 1 GENERAL

1.1 GENERAL

1. This section details General Contractor's responsibilities in preparation, submission and maintenance of construction schedules with form and requirements for periodic revisions. The Sub-Contractors shall provide the General Contractor with their schedule of work and co-ordinate the work with General Contractor and the Work Progress of other trades on site.

1.2 REQUIREMENTS INCLUDE

1. Schedule, form, content.
    1. Stages/Phased Construction.
    2. Schedule Revisions.
    3. Weekly schedule updating.

1.3 SCHEDULES REQUIRED

1. Submit the following schedules:
    1. Construction Progress Schedule.
    2. Weekly Schedule and Manpower Loading.
    3. Submittal Schedule for Shop Drawings and Product Data and Shades.
    4. Product Delivery Schedule. Include required decision dates for finishes and colours.
    5. Sub-schedule showing submittals, review times, procurement schedules, and delivery dates.
    6. Sub-schedules to define critical portions of overall schedule.

1.4 FORMS OF SCHEDULES

1. Prepare schedules in form of horizontal bar chart (GANTT, or C.P.M. network). Provide separate horizontal bar column for each trade or operation, or separate activity for each operation that can be completed independently of other operations or trades. Provide as follows:
    1. Order: Chronological order of beginning of each item of work.
        1. Identification: Identify each column by distinct graphic delineation.

2. Horizontal Time Scale: Identify first work day of each week.

3. Scale and Spacing: To allow space for updating.

4. Minimum Sheet Size: 11" x 17" for electronic submission.

1.5 SUBMITTALS SCHEDULE

1. Include schedule for submitting shop drawings, product data, and samples. Co-ordinate with section 01300 requirements. Incorporate into Preliminary Progress Schedule and Weekly Schedule updates.

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

3. Include dates when SUBMITTALS and delivery will be required for the Owner-furnished products if applicable.

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

1.6 PRODUCT DELIVERY SCHEDULE

1. Include dates for delivery of products specified in Section 01020 - Allowances, if applicable.

2. Include dates for products furnished by Owner, if applicable.

3. Submit a schedule of required equipment order dates and delivery dates for products and/or assemblies which involve insignificant production time or fabrication time and/or will significantly affect the project schedule if not available when needed.

1.7 CONSTRUCTION PROGRESS SCHEDULE

1. Submit a preliminary construction schedule and phasing plan within ten working days of notification of bid acceptance, for approval.

2. Incorporate approved preliminary schedule in construction schedule specified in GC 3.5 of The General Conditions of The Stipulated Price Contract.

3. Submit a bar-chart progress schedule a minimum of seven (7) days before first progress application for payment. Prepare schedule in sufficient detail to indicate timing of major activities during phased progress of the Work and which will ensure completion of the Work on or before schedule.

4. On schedule indicate a time bar for each major construction activity to be performed at the site, properly sequenced and co-ordinate with other activities of work. Itemize activities in sufficient detail that no one bar exceeds two months in duration (separate long running trades such as Masonry into Logical Sub-

Sections). Allow sufficient space below planned time bar for another time bar to record actual progress.

5. Show dates for commencement and completion of all activities. Estimate duration period and float (contingency) time for each activity.

6. Show projected percentage of completion for each activity as of the date of submission of monthly progress payment applications and/or to the date of submission of schedule when requested.

7. Indicate actual progress of each activity to date of submission of schedule. Indicate current status of all activities to date of submissions of schedule by showing where behind, on or ahead of planned schedule.

8. Show changes occurring since previous submission of schedules:

    1. Major changes to scope

    2. Activities modified since previous submission

    3. Revised projections of progress and completion

    4. Other identifiable changes.

    5. Confirm commencement, duration and completion dates of all activities with subcontractors, subtrades and suppliers.

    6. Deliver to Architect, at the end of each calendar month with progress application a project status report derived from evaluation of Schedule.

    7. Include in this report updated schedule together with such supporting narrative and such graphical presentations necessary to clearly outline the progress of Work, areas of current and anticipated problems, effect of changes on schedules of major trade subcontractors and proposed corrective action.

    8. Be aware that the nature and day-to-day functioning of the Owner will have precedence over any phasing and arranged schedule, and stoppage of the work with good reason, and changes to the schedule may be made by the Owner on an as needed basis without prior notice and at no extra cost to the contract. The Contractor shall take this into account and shall co-ordinate and co-operate with the Owner and reschedule the work to accommodate the Owner's requirements.

    9. Lengthy shutdowns and disruptions of services will not be tolerated, and strict attention shall be paid to minimizing any disruption.

    10. Schedule required work in occupied areas in co-ordination with the Owner and such schedule be approved by the Owner prior to start of the

work. Provide two weeks minimum notice when work in existing area is required

1.8 STAGED/PHASE CONSTRUCTION

1. Prepare and submit sub-schedules for each separate stage of Work when pertinent to the project.

2. Provide sub-schedules to define critical portions of prime concern to master schedule.

3. Describe start and stop, float time and affected other work.

1.9 WEEKLY SCHEDULE UPDATE AND MANPOWER LOADING

1. Use the Construction Progress Schedule as a basis for reporting on a weekly basis the complete status of construction progress, scheduled activities and manpower loading on the project.

2. There will be an Owner/Architect/Consultant/General Contractor/Trade Contractor meeting every second week to review the project status. Provide a detailed 2-week work schedule (based upon the Construction Progress Schedule) outlining work activities and manpower requirements planned for that period.

3. Identify current and anticipated problems and delays with respect to the past work period the effects of said problems on the overall schedule and proposed corrective measures.

4. Submit to Architect two days prior to site meetings (every second week) the following:

    1. Updated Construction Progress Schedule.

    2. Outline of anticipated work activities for the forthcoming period.

    3. Outline of required and/or anticipated manpower levels (by trade) for the forthcoming period.

    4. Problems or delays experienced and/or anticipated.

    5. Proposed corrective measures to react to problems or delays.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

1. Division One - General Requirements is a part of this Section and shall apply as if repeated here.

1.2 APPOINTMENT AND PAYMENT OF INSPECTION COMPANIES

1. Inspection and Testing Companies for various trades will be appointed by the Consultant where specifically stated or required.

2. The cost of inspection and testing will be paid out of an allowance provided under Section 01020, except where tests or inspections reveal work not in accordance with the Contract, the Construction Manager shall bear the cost of such tests and additional tests as the Consultant requires to verify the acceptability of corrected work.

1.3 RESPONSIBILITIES

1. The Consultant will supply drawings and specifications as required for the use of the respective inspection and testing authorities and advise the Construction Manager of the Company appointed for the respective work.

2. The Construction Manager shall advise the Consultant and the respective Inspection and Testing authority not less than five (5) working days prior to the commencement of any work to be inspected or tested and ensure that proper facilities and co-operation is provided and that no work is carried out without the required inspection and testing.

3. Proper storage shall be provided for storing concrete specimens at the job site at the required temperature and free from vibration or injury.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

PART 1 GENERAL

1.1 ACCEPTABLE PRODUCTS

1. No alternate manufacturers or products or substitutions will be accepted during the tender (bid) period.

2. Should alternates or substitutions be proposed upon award of this Contract the requirements of this Section shall apply.

3. First item named or specified by catalogue number meets specifications in all respects regarding performance, quality of material and workmanship, and is acceptable to the Architect.

4. Items, other than first named, meeting specifications regarding quality of materials and workmanship only, are acceptable to the Architect, if they also meet performance, match the first named product in colour and texture, etc. and/or capacities specified and can be accommodated within the space allotted.

5. Where the contractor proposes the use of equivalent products other than that first named, on which design is based, the contractor shall be responsible for all details of installation including product size, arrangement, fit, colour, etc. and maintenance of all required clearances. Contractor shall prepare and submit revised layouts to indicate arrangement of all affected piping, ductwork, conduit, lighting, equipment, etc. Failure by Contractor to provide such drawings may be considered indication that additional costs associated with equivalent products such as revisions to surrounding architectural finishes, structural components, or the need for larger motor starters, larger power feeders, space revisions to associated product equipment, controls, etc. shall be included in Bid price.

1.2 APPROVAL REQUIRED

1. The Contract is based on the materials, equipment, and methods described in the Contract Documents.

2. The Architect will consider proposals for substitution of materials, equipment, and methods only upon award of Contract and when such proposals are accompanied by full and complete technical data and all other information required by the Architect to evaluate the proposed substitution.

6. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved for this work by the Architect, in writing.

1.3 "OR EQUAL"

1. Where the phrase "or equal", "approved equal", or "equal as approved by the Architect" occurs in the Contract Documents, do not assume that materials, equipment, or methods will be approved by the Architect.

2. The decision of the Architect shall be final.

1.4 AVAILABILITY OF SPECIFIED ITEMS

1. Verify prior to bidding that all specified items will be available in time for installation during orderly and timely progress of the work.

2. In the event specified items will not be so available, notify the Architect prior to receipt of bids.

3. Costs of delays because of non-availability of specified items, when such delays could have been avoided by the Contractor, shall not be borne by the Owner.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

1. Safety measures
2. Fire protection
3. Overloading precautions
4. Falsework
5. Scaffolding

1.2 CONSTRUCTION SAFETY MEASURES

1. Observe and enforce construction safety measures required by National Building Code (Part 8) and Ontario Building Code (latest edition as currently amended), Provincial Government, Workplace Safety & Insurance Board and municipal statues and authorities.
    1. In particular, the Ontario Construction Safety Act, the regulations of the Ontario Department of Labour and Ontario Hydro Safety Requirements shall be strictly enforced.
    2. In the event of conflict between any provisions of above authorities the most stringent provisions will apply.

1.3 MATERIAL SAFETY DATA SHEETS

1. Submit Material Safety Data Sheets (MSDS) for any product to be used, installed or applied inside of the building if said product may emit toxic fumes and/or noxious odours.
2. Submit Material Safety Data Sheets for any product which is known to or suspected of creating a health hazard or discomfort when used in confined spaces, including but not limited to the following:
    1. Adhesives
    2. Solvents
    3. Sealants (Caulking, etc.)
    4. Other products which may give off air borne particles after installation
        1. Any other product as direct by Architect/Consultants.
    5. The required Material Safety Data Sheets to be submitted prior to ordering

material or product for use as a part of the Work

3. The Owner may withhold payment for work of a subtrade or section until MSD Sheets for products supplied by that subtrade or section have been submitted, reviewed by Consultant and found to be acceptable.

4. Refer to Section 01700 - Project Close-Out for requirements regarding Certificates of Compliance.

1.4 MATERIALS SPECIFICALLY EXCLUDED

1. Asbestos and/or asbestos - containing products are not permitted. Submit Material Safety Data Sheets for any product suspected of containing asbestos if so requested by Consultant. Examples of some materials requiring close scrutiny and/or confirmation include:

2. Transite drainage pipe - whether buried or above grade - not permitted.

    1. Insulation and/or jacketting for pipes, ducts, motors, pumps, etc. - not permitted if any asbestos is present.

3. Solder for all piping is to be lead-free. "Lead Free" shall mean solder which contains less than 0.030% of lead when dissolved in fluoroboric and nitric acids and tested by inductively coupled argon plasma atomic emission spectroscopy. Steelbond 281 and Silverbrite are acceptable solder products.

4. The mechanical contractor shall provide an affidavit signed by the principal of the company, on company letterhead, that all of the solder used on the project was either one of the two acceptable products or that the solder used (identified by brand name) meets or exceeds the testing criteria.

5. The Owner shall undertake random testing of the soldered joints. Should testing provide that the solder used was not as specified, the Owner shall take legal action against the contractor as appropriate.

6. All paint and finish coatings are to be lead and mercury-free. Submit Material Safety Data Sheets confirming that these products are free of all lead and/or mercury compounds.

1.5 FIRE SAFETY REQUIREMENTS

1. Comply with requirements of the local municipal fire department with respect to continuous fire safety on the job site.

2. Comply with fire safety requirements of other construction related authorities (Workplace Safety & Insurance Board, Ministry of Labour, construction trade unions, etc.). If more than one authority issues similar requirements, the more stringent shall govern.

3. The appropriate clauses of the Ontario Building Code relating to fire protection shall be strictly followed.

4. Provide and maintain free access to temporary or permanent fire hydrants and other fire protection equipment during performance of work required by insurance companies having jurisdiction and governing codes, regulations and by-laws.

1.6 OVERLOADING

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

1.7 FALSEWORK

1. Design and construct falsework in accordance with latest issue of CSA S269.1-.

1.8 SCAFFOLDING

1. Design and construct scaffolding in accordance with latest issue of CSA-S269.2.

1.9 LIST OF MINIMUM SAFETY

1. Include all provisions for construction safety such as fences, hoarding along streets, storage provisions facilities, sanitation facilities, fire protection, electrical supply, temporary heat, ventilation, construction equipment with its supports and guards, stairs, platforms, ladders, scaffolds, guardrails, walkway lighting and morality lighting, work around asbestos lead, silica and fumes, all as required by the Construction Safety Act and Regulation, latest edition of the Province of Ontario, as well as all other applicable regulations of Jurisdictional Authorities.

1.10 OWNER SAFETY REQUIREMENTS

1. The Contractor will take all necessary steps to protect personnel (workers, visitors, general public, etc.) and property from any harm during the course of the contract.

2. All work procedures will be in accordance with Client legislated standards.

3. All equipment shall be in safe operating condition and appropriate to the task.

4. The Contractor shall ensure that only competent personnel are permitted work on site. The owner will throughout the term of the contract also remove from the site any persons not observing or complying with safety requirements.

5. The Contractor shall provide competent personnel to implement their safety programs and ensure that the owner's standards and those of the Ontario Health and Safety Act are being complied with.

6. Plant Services or the consultant will monitor every week to ensure that safety

requirements are met and that safety records are properly kept and maintained. Continued disregard for safety standards can cause the contract to be cancelled and the Contractor or subcontractors removed from site.

7. The Contractor will report to the owner, architect and jurisdictional authorities any accident or incident involving Contractor, owner or public personnel and/or property arising from the contractor's execution of the work.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

PART 1 GENERAL

1.1 FIRES

1. Open fires and burning of rubbish are not permitted on the site.

1.2 DISPOSAL OF WASTES

1. Do not bury rubbish and waste materials on site.

2. Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

3. All removal of waste products and debris resulting from the work must be audited and source-separated to comply with the most current version O.Reg 102 103 Industrial, Commercial and Institutional Source Separation Programs under the Environmental Protection Act and the 3 R's Regulation.

1.3 DRAINAGE

1. Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

2. Do not pump water containing suspended materials into waterways, sewer or drainage systems.

3. Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.4 SITE CLEARING AND PLANT PROTECTION

1. Refer to Division 2.

1.5 POLLUTION CONTROL

1. Provide and maintain temporary erosion and pollution control features including mud mats and siltation fences as per the Bruce County- Town of Mildmay and Ontario provincial standard details and requirements installed under this contract or previously installed.

2. Control emissions from equipment and plant to local authorities' emission requirements.

3. Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.

4. Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.6 NOISE CONTROL

1. Adhere to local noise bylaws.

2. Equip vehicles and equipment with efficient noise attenuation devices (mufflers) to minimize noise levels in vicinity of Site

3. Where necessary place noise attenuation devices (barriers) around stationery pumps and compressors.

1.7 WASTE MANAGEMENT CONTROL

1. Prepare Waste Audit and Waste Reduction Plans in accordance with O.Reg. 102/94 made under the environmental Protection Act for Waste Audits and Waste Reduction Work Plans. Ensure these plans are prepared prior to construction or demolition work proceeds on Site.

2. Prepare and implement a Source Separation Program in accordance with Ont. Reg. 103/94 made under the environmental Protection Act for Industrial Commercial source Separation Programs. Ensure program is implemented prior to construction or demolition work proceeds on Site.

3. Post plans on Site where most workers will see them and allow any worker to view plans who makes such a request.

4. The following set of definitions are intended to augment terms provided within this Article:

1.8 3 R: REDUCE (REDUCTION), REUSE, RECYCLE

1. REDUCE (REDUCTION) - Reduction involves actions to minimize quantity of waste at source and consequently, assumes highest priority in hierarchy of 3R activities.

2. REUSE - Direct reuse of products which otherwise would become waste, provides another means of diverting quantity of waste destined for landfill.

3. RECYCLE - Recycling involves collection of materials for use as feedstock in manufacturing of new products. Recycling can be most effectively accomplished if recyclable materials have been source separated at point of generation.

4. SOURCE SEPARATION - Purposeful segregation of materials from designated solid waste stream into specific material types at point of generation to facilitate recycling.

5. SOURCE SEPARATED MATERIALS - Specific types of materials that have been purposefully segregated from municipal waste into specific material types at point of generation.

6. CONSTRUCTION BUSINESS - Business enterprise employing more than 50 persons out

of 1 office involved in building, renovation and repair of immobile structures, including soil excavation and landscaping.

7. DEMOLITION BUSINESS - Business enterprise employing more than 50 persons out of 1 office involved in dismantling any immobile structure, facility or dwelling.

8. Apply waste management activities of reduction, reuse and recycling of waste materials during construction and/or renovation of this Contract.

9. Construction/Demolition Businesses shall be required to source separate in accordance with Ont. Reg. 103/94, for purposes of recycling, following materials:

    1. corrugated cardboard

    2. wood waste (i.e. non-treated dimensional lumber, manufactured wood) non-painted gypsum board

    3. ferrous metals

    4. Brick and Portland cement concrete

10. Submit agreement as requested to include source separation of above identified materials and other waste diversion activities during construction phase.

11. Requirements: During construction phase, Contractor shall be required to comply with following program requirements:

    1. Identify sorting, storage and disposal requirements anticipated during construction to maximize waste diversion.

    2. Establish reduction, reuse and on-site source separation activities during construction.

12. Identify haulers and recycling companies that have entered into agreement with or have expressed willingness to enter into such agreement with Contractor.

13. Identify person responsible for source separation program.

14. Establish effective education and information program for on-site employees, including training sessions, use of signs, and designated waste diversion program.

15. Establish cooperative agreements with Sub-Contractors/trades to abide by waste diversion program.

16. Contractor shall be willing to allow monthly on-site visits by Architect to review waste management/recycling program.

17. Immediately upon notification of award of Contract, and before starting work on Site, submit fully completed "Sub-Contractor Participation Form" appended to this

Section to the Architect.

18. Contractors shall provide evidence that they can and shall implement required waste diversion program. Provision of evidence includes, but is not limited to following:

    1. Written agreements with Sub-Contractors that they will participate in waste diversion program.

    2. Letters from reuse/recycling markets that they are in position to accept designed materials.

    3. Action plan prepared by Contractor for meeting objectives of waste diversion program; and

    4. Contract Sum shall include costs for implementing waste diversion program.

1.9 HAZARDOUS MATERIALS

1. See Section 00840 Hazardous Materials.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SUBCONTRACTOR PARTICIPATION FORM

For source separation program to be effective, it is important for Subcontractors/trades to work cooperatively with your company. To ensure this cooperative arrangement will be carried out, you may wish to ask Subcontractors/trades companies to sign this agreement.

I hereby agree to participate in the source separation program to the best of my abilities.

1. Company Name _____
   Address _____
   _____
   Signature _____

2. Company Name _____
   Address _____
   _____
   Signature _____

3. Company Name _____
   Address _____
   _____
   Signature _____

4. Company Name _____
   Address _____
   _____
   Signature _____

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

1. Systems demonstration
2. Document submission
3. Project commissioning
4. Inspection and takeover procedures

1.2 SYSTEM DEMONSTRATION

1. Prior to final inspection, demonstrate operation of each system to the Owner and Consultant.

1.3 DOCUMENTS

1. Collect reviewed submittals in Section 01010 and 01300 and assemble documents executed by Subcontractors, suppliers, and manufacturers. Submit as per requirements in Section 01010 - General Requirements.
    1. Provide bonds fully executed and notarized.
    2. Submit a final statement of accounting giving total adjusted Contract Sum, previous payments, and monies remaining due.
    3. Architect will issue a final change order reflecting approved adjustments to Contract Sum not previously made.

1.4 PROJECT COMMISSIONING

1. Expedite and complete deficiencies and defects identified by the Consultant.
2. Review record "as-built" drawings for completeness and then have “as-built” AutoCad 2010 or later drawings completed by a professional drafting service and provide “as-builts” on computer disks.
3. Review Cash and Contingency Allowances in relation to Contract Price, change orders, hold-backs and other Contract Price adjustments.
4. Submit required documentation such as statutory declarations, Workplace Safety & Insurance Board Certificates, certificates of approval or acceptance from regulating bodies.
5. Attend "end-of-work" testing and break-in or start-up demonstrations.

6. Review inspection and testing reports to verify conformance to the intent of the documents and that changes, repairs or replacements have been completed.
7. Meet with structural consultant and inspection and testing consultant to co-ordinate completion, testing approvals.

1.5 INSPECTION/TAKEOVER PROCEDURES

1. The requirements of OAA/OGCA Document No. 100 "Take-Over Procedures" also govern applicable take-over procedures for this Contract.

2. Prior to application for certificate of Substantial Performance, carefully inspect the Work and ensure it is complete, that major and minor construction deficiencies are complete and/or corrected and the building is clean and in condition for occupancy. Notify the Architect, in writing, of satisfactory completion of the Work and request an inspection.

3. During the Architect/Consultant inspections, lists of deficiencies and defects will be tabulated. Correct same.

4. When the Architect/Consultants consider deficiencies and defects have been corrected and it appears requirements of the Contract have been performed, make application for certificate of Substantial Performance. Refer to General Conditions Article GC 14 for specifics to application.

5. All utility meters to be read and transferred into the Owner's name.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

1. Environmental Protection – Section 01560

1.2 DUST AND CLEANING REQUIREMENTS

1. Standards: Maintain project in accordance with the latest edition of The Occupational Health and Safety Act.

2. Hazards and Dust Control:

   .1 Provide adequate ventilation during use of volatile or noxious substances.

   .2 Prevent spread of dust beyond the construction site by wetting, or by other means suitable for conditions, as it accumulates.

   .3 Provide Tack Mats at entrances to prevent dust and dirt from being traced through the project as required. Dispose of mats and replace on regular basis with new mat.

3. Floors:

   .1 To prevent soiling or damage to finish flooring where pedestrian traffic occurs after the flooring has been installed, install and maintain reinforced kraft paper temporary protection, secured in place and with joints sealed by reinforced pressure sensitive tape.

   .2 Install plywood panels of minimum ¼" thickness over completed finish flooring materials on which further construction work is performed or delivery of products is made, or both. Seal joints between panels with reinforced pressure sensitive tape.

1.3 MATERIALS

1. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

2. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 DURING CONSTRUCTION

1. Execute cleaning to ensure that building, grounds, and public properties are maintained free from accumulations of waste materials and rubbish. Keep site clear of snow, mud and pooling of water due to severe rain. Ensure that work is not stopped because of failure to provide access to site.

2. Wet down dry materials and rubbish to prevent blowing dust.

3. At reasonable intervals during progress of Work, clean site and public properties and dispose of waste materials, debris and rubbish.

4. Unless otherwise specified, salvaged material resulting from construction, and surplus materials and construction debris shall become property of Contractor, who shall dispose of it away from site.

5. Vacuum clean interior building areas when ready to receive finish paining and continue vacuum cleaning on an as-needed basis until building is ready for Substantial Performance or occupancy.

6. Obtain from each Subcontractor, instructions which designate proper methods and materials to be used in final cleaning and submit such instructions to the Consultant. Include Instructions in Manufacturer's Data Book specified in Section 01300.

7. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.

8. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

3.2 FINAL CLEANING

1. At completion of Work, remove waste materials, rubbish, tools, equipment, machinery, and surplus materials, and clean all surfaces exposed to view; leave project clean and ready for occupancy.

2. Employ experienced workers, or professional cleaners, for final cleaning.

3. In preparation for Substantial Performance or occupancy, conduct final inspection of interior and exterior surfaces exposed to view, and of concealed spaces.

4. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from all sight-exposed interior and exterior finished surfaces; polish resilient and ceramic surfaces so designated to shine finish. Vacuum carpet.

5. Clean and polish glass and mirrors.

6. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.

7. Broom-clean paved surfaces; rake clean other surfaces of grounds.

8. Clean filters, exposed ductwork, and structure.

9. Clean bulbs and lamps and replace those burned out.

10. Clean diffusers and grilles.

11. Clean sinks, faucets, and water closets and controls.

12. Remove snow and ice from access to building.

13. Maintain cleaning until project, or portion thereof, is occupied by Owner.

3.3 REMOVAL OF TEMPORARY FACILITIES

1. Completely remove temporary facilities from site, making good any damage when no longer required.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

1. The printed forms outlined below shall form the basis of communication between the Architect and the General Contractor. Copies of forms unrelated to the issuance of monies, shall be kept on the site; neatly filed and readily accessible to the parties concerned.

2. TRANSMITTAL RECORD

   1. A record of material issued by the Architect or General Contractor.

3. GENERAL REVIEW REPORT

   1. A progress report completed by the Architect or Consultant on a regular basis.

4. PROPOSED CHANGE

   1. A description of contemplated changes to the Contract.

5. CASH ALLOWANCE CHANGE ORDER

   1. Assignment of money for work executed under the Cash Allowance Section.

6. CHANGE ORDER

   1. Assignment of money for work executed beyond the financial limits of the Contract.

7. CHANGE DIRECTIVE

   1. A description of a change in the work when the Owner requires the Contractor to proceed with a change in the work prior to the Owner and the Contractor agreeing upon the adjustment in Contract Price and Contract Time.

8. CERTIFICATE FOR PAYMENT

   1. For release of contract money based on monthly progress draws.

9. SUPPLEMENTAL INSTRUCTIONS

   1. A description and/or clarification for the purpose of recording a clarification or interpretation of the contract documents or giving directions on problems resulting from field conditions.

END OF SECTION

PART 1 GENERAL

1.1 NEWFORMA SOFTWARE SYSTEM

1. This project will be administered through the Architect using the NEWFORMA software system.

2. The Contractor is required to use this internet-based software for ALL project communications, RFIs, quotations, project schedule, shop drawing log, change log, RFI log, etc., including all administrative forms as outlined in Section 01800 and construction schedules as outlined in Section 01310. All shop drawings, interference drawings and as-built drawings shall be submitted electronically through the Newforma Info Exchange in PDF format and shall be numbered in the order which they are submitted. Numbering shall be in the following format; 001, 002, 003, etc. Submittals will not be deemed as received unless delivered through Newforma Info Exchange.

3. Utilization of this system does not require the purchase or download of the Newforma software. The Architect will send an email notification which will automatically provide online access to the Newforma Info Exchange specific to this project.

1.2 NEWFORMA INSTRUCTIONS

1. You will receive an email instructing you how to get into the system (click on link). The system is self-explanatory as to the "use" for Submittals (Shop Drawings) and RFIs. Refer to attached screen shots.

2. When issuing Submittals and RFIs, the following people are to always be COPIED (not addressed to):

   Linda Butler **lbutler@plusvg.com**

3. Shop Drawings are to be issued as "Submittals". There is a place on the Submittal section to put in the Contractor's "expected response date" – please ensure that is filled in. Submittals are to be numbered in the sequence which they are submitted. Numbering to be as follows; 001, 002, 003, etc. (NOTE: as per the contract, the Architect has 10 working days to respond).

4. RFIs: There is a place on the RFI section to put in the Contractor's "expected response date" – please ensure that is filled in. RFI's are to be numbered in the sequence which they are submitted. Numbering to be as follows; 001, 002, 003, etc. (NOTE: as per the contract, the Architect has 5 working days to respond)

5. RFCs: (all Contractor quotations to be submitted as an RFC) RFC's are to be numbered in the sequence which they are submitted. Numbering to be as follows; 001, 002, 003, etc.

6. Submittals and RFI's requiring consultant review other than the Architect shall be sent via Newforma directly to the respective consultant. The +VG Project Manager as well as the persons noted above shall be copied on all submittals and RFI's.

7. All shop drawings, interference drawings and as-built drawings shall be submitted electronically through the Newforma Info Exchange in PDF format. Submittals will not be deemed as received unless delivered through Newforma Info Exchange.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary conditions as well as Divisions 01 and 1 Specification Sections apply to this section.

1.2 SUMMARY

1. This section requires the selective removal and subsequent disposal of the following:

    1. Carry out demolition in accordance with requirements of CSA S350-M. Demolish and remove materials from Site.

    2. Work includes but is not limited to demolition and/or removal of portions of existing building ,doors, windows, flooring, roofing, ceiling, plumbing fixtures, concrete, fixed furnishings, railings, mechanical equipment/components, and/or electrical work.

    3. Conduct all demolition and removal work as indicated on drawings and as required to accommodate new construction.

    4. Removal and protection of existing fixtures, materials, equipment and/or items indicated to remain, reuse return to Client and/or salvage.

    5. Contractor to remove existing millwork, sinks, appliances, ductwork, plumbing and electrical as noted on the drawings.

    6. Locate, identify, stub off, and disconnect utility services that are not indicated to remain.

    7. Materials and debris shall not be stacked in building but removed entirely from all circulation spaces at the end of each day.

    8. At end of each day's work leave work in safe and clean condition.

1.3 REMOVAL OF WORK SPECIFIED ELSEWHERE

1. Cutting non-structural concrete floors and masonry wall for piping, ducts and conduits is included with the work of the respective fire suppression, plumbing, HVAC and electrical specifications sections in Divisions 20 to 26.

1.4 RELATED WORK SPECIFIED ELSEWHERE

1. Remodelling construction work and patching are included within the respective sections and drawings, including removal of materials for reuse and incorporation into remodelling or new construction.

2. Relocation of pipes, conduits, ducts and other mechanical and electrical work is specified in their corresponding divisions.

1.5 SUBMITTALS

1. Submit the following in accordance with Conditions of the contract and Division 01 specifications sections.

    1. Schedule indicating proposed sequence of operations for selective demolition work to Owner's Representative for review prior to start of work. Include coordination for shutoff, capping and continuation of utility services as required, together with details for dust and noise control protection.

    2. Photographs of existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations.

    3. File submittals with Owner's Representative prior to start of work.

1.6 STANDARD REFERENCES

1. CSA S350 M80 (R2003) Code of Practice for Safety in Demolition of Structures.

1.7 JOB CONDITIONS

1. Some work may be required to be completed after hours and on weekends.

2. Partial demolition and removal:

    1. Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progressed. Transport salvaged items from site as they are removed.

    2. Storage or sale of removed items on site will not be permitted.

1.8 PROTECTION

1. Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work.

2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structure or element to be demolished to adjacent facilities or work to remain.

3. Protect from damage existing finish work that is to remain in place and become exposed during demolition operations.

4. Protect floors with suitable coverings when necessary.

5. Protect all existing adjacent work (wainscoting, plaster walls, bases and trim, etc) against damages which might occur from falling debris, scrapes or other causes due to work of this Section.

6. Construct temporary insulated dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks.

7. Ensure that all dust and debris is removed before finishing work commences.

8. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building. .

9. Remove protections at completion of work.

1.9 DAMAGES

1. Inform Owner's Representative immediately of any damage caused to adjacent facilities during demolition activities.

2. Promptly repair damages caused to adjacent facilities by demolition work once Owner's Representative gives the order proceed.

1.10 TRAFFIC

1. Conduct selective demolition operations and debris removals to ensure minimum interference with roads, streets, walks and other adjacent occupied or used facilities.

    1. Do not close or otherwise obstruct streets or walks without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

1.11 QUALITY ASSURANCE

1. Regulatory Requirements: Conform to the latest Occupational Health and Safety Act, as currently amended.

2. Most recent Occupational Health and Safety Act, as currently amended,

3. Conform to OBC, as applicable.

4. Conform to Fire Code, Regulation under Fire Marshals Act, especially Part 8.

5. Flame Cutting: Only if permitted by authorities having jurisdiction.

    1. Do not use torches for removal until work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame-cutting operations. Maintain portable fire suppression devices during flame-cutting operations.

6. Utility Services: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operation.

    1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities as acceptable to governing bodies.

    2. Maintain fire protection services during selective demolition operations.

    3. Provide bypass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Owner if shutdown service is necessary during changeover.

7. Environmental Controls: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with regulations pertaining to environmental protection.

8. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding and pollution.

9. Remove hazardous materials in accordance with applicable laws and regulations.

1.12 DISPOSAL OF WASTER MATERIALS

1. Selling or burning of materials on Site is not permitted.

2. Provide bin for garbage on sidewalk in a location acceptable to the Owner.

3. Conform to requirements of municipality's Works Department regarding disposal of waste materials.

4. Materials prohibited from municipality waste management facilities shall be removed from Site and disposed of at recycling companies specializing in recyclable materials

PART 2 PRODUCTS Not Used

PART 3 EXECUTION

3.1 PREPARATION

1. Provide interior and exterior shoring, bracing or support to prevent movement, settlement, or collapse of are to be demolished and adjacent facilities to remain.

2. Cease operations and notify Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.

3. Cover and protect furniture, equipment and fixtures to remain from soilage or damage when demolition work is performed in areas where such items have not been removed.

4. Provide and weatherproof closures for exterior opening resulting from demolition work.

3.2 DEMOLITION

1. Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on drawings in accordance with demolition schedule and governing regulations.

2. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.

3. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors or framing.

4. Provide services for effective air and water pollution controls as required.

5. For interior slabs on grade, use removal methods that will not crack or structurally disturb adjacent slabs or partitions.

6. If unanticipated mechanical, electrical or structural elements are encountered and conflict with intended function or design, investigate and measure both nature and extent of the conflict. Submit report to Owner's Representative in written accurate detail. Pending receipt of directive from Owner's Representative, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3.3 SALVAGED MATERIALS / EQUIPMENT

1. Salvaged items: Where indicated on drawing as "Salvage" or "Deliver to Owner", carefully remove indicated item (s), clean, store and turn over to Owner and obtain receipt.

3.4 DISPOSAL OF DEMOLISHED MATERIALS

1. Remove from building site debris, rubbish and other materials resulting from demolition operations. Transport and legally dispose off site.

2. If hazardous materials are encountered during demolition, comply with applicable regulations, laws and ordinances concerning removal, handling and protection against exposure or environmental pollution.

3. Burning of removed materials is not permitted on project site.

3.5 CLEANUP AND REPAIR

1. Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove partitions and leave interior areas clean.

2. Repair/replace areas, components and/or items that were intended to remain but got damaged during demolition work
to the full satisfaction of the Owner.

END OF SECTION

PART 1 GENERAL

1. GENERAL REQUIREMENTS

    1. Division One, General Requirements, is a part of this section and shall apply as if repeated here.

2. SHOP DRAWINGS

    1. Submit shop drawings in electronic PDF format.

    2. Submit shop drawings for review by the Consultant prior to fabrication.

    3. Design Criteria-Applicable Standards:

        1. All standards in accordance with latest issue.

        2. CSA Standard CAN3-S16.1-M, "Steel Structures for Buildings" Limit States Design.

        3. CSA Standard W59, "Welded Steel Construction" (Metal Arc Welding).

        4. CSA Standard W.55.2, "Resistance Welding Practice."

        5. CSA Standard W55.3, "Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings."

        6. CSA Standard W.47, "Certification of Companies for Fusion Welding of Steel Structures."

        7. CSA Standard S.136, "Cold Formed Steel Structural Members".

        8. Ontario Building Code.

    4. Certificates:

        1. Provide a certificate signed and sealed by the licensed/registered professional engineer responsible for the stair designs and the detailed steel connections (including guards) stating that the stairs and connections have been designed, detailed and fabricated in accordance with the applicable standards.

        2. Certification must bear the original seal and signature of the engineer and be dated. Photocopies are not acceptable.

    5. Clearly indicate construction details, sizes of steel sections, thickness or gauge of steel sheet, connections, joints, method of anchorage, number of anchors, supports, reinforcement and accessories. Confirm all

dimensions on site.

3. STANDARDS

1. Materials and workmanship shall conform to the requirements of the Latest Ontario Building Code, as currently amended.

2. Do welding work to CSA W59, unless specified otherwise. Welders to qualify under CSA W47, CSA 55.2 and CSA W55.3.

3. Design of steel fabrications, unit stresses and workmanship to conform to CSA CAN3-S16 1-M.

4. DESIGN CRITERIA

1. Design stair: landing construction; guards and railings and connections to conform to the Ontario Building Code.

2. Design detail and fabricate in general to CSA CAN3-S16 1-M.

5. QUALITY ASSURANCE

1. WELDING APPLICABLE STANDARDS:

1. CSA Standard W59, "Welded Steel Construction" (Metal Arc Welding).

2. CSA Standard W.55.2, "Resistance Welding Practice."

3. CSA Standard W55.3, "Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings."

4. CSA Standard W.47, "Certification of Companies for Fusion Welding of Steel Structures."

2. QUALITY ASSURANCE

1. Fabrication and erection of all components to be by companies holding current C.W.B. Certification as Division 1 or Division 2.1. All welding by welders holding current certification for the required welding position.

6. SCOPE

1. Provide all miscellaneous steel angles, plates, lintels, etc., indicated on the architectural drawings & not indicated on the structural drawings or where noted on the structural drawings by others. Size according to loads, set plumb and true and securely fix. Continuously weld and grind smooth exposed connections. Others may be welded or bolted.

2. Provide all additional miscellaneous steel items as required to complete the above work.

3. The General Contractor shall coordinate the work of this section with all other Trades for provision of miscellaneous metal work required but not provided by others.

PART 2 PRODUCTS

1. MATERIALS

1. Ferrous Metals:

1. Unless otherwise indicated, hot rolled mild steel in .15% to .25% carbon range.

2. Steel sections and plate: CSA G40.21-/M1987, minimum 260W grade.

3. Square steel tube: CSA G40.21-/M1987, Grade 350W.

4. Steel pipe: ASTM A53-76, Type E, Grade A.

5. Sheet Steel: hot dip galvanized, cold rolled, with stretcher level degree of flatness to ASTM A526; zinc coating designation Z275.

2. Aluminum: CSA HA Series - M1980 for aluminum and aluminum alloys, Alcan 50S Alloy.

3. Prime Paint: Oil alkyd type (shop coat) conforming to CGSB-1-GP-40M. Colour to be grey.

4. Expansion Joints: as specified.

5. Welding Materials: CSA W59-1984.

6. Bituminous Enamel: Alkali resistant asphaltic coating conforming to CGSB1-GP-108M.

7. Non-shrink Grout: Por-Rok by Hallemite Products Ltd., or SET 15 Minute Anchoring Cement by SET Products Ltd.

8. Galvanized Touch-Up Paint: Zinc rich, Galvafroid by W.R. Meddows of Canada Ltd. or approved equal.

9. Hot Dipped Galvanizing: conform to CSA G164-M1981.

10. Bolts and Anchor Bolts: to ASTM A307-82a.

11. Stainless Steel:

    1. To have brushed finish, Type 304 finish to be ornamental grade AISI No.4.

2. FABRICATION - GENERAL

    1. Fabricate components in the shop in largest size practicable to minimize field jointing.

    2. Fabricate components square, straight, true, free from warpage and other defects. Accurately cut, machine file and fit joints, corners, copes and mitres.

    3. Reinforce fabricated components to safely withstand expected loads.

    4. Make joints in built-up sections with hairline joints in least conspicuous locations and manner.

    5. Make allowance for thermal expansion and contraction when fabricating exterior work.

    6. Joints shall be welded unless otherwise indicated and unless details of construction do not permit welding. Exposed welds shall be continuous and shall be ground smooth.

    7. Close exposed open ends of tubular members with welded on steel plugs.

    8. Where work of other Sections is to be attached to work of this section, prepare work by drilling and tapping holes, as required to facilitate installation of such other work.

    9. Work of this Section, supplied for installation under other Sections, shall be prepared as required ready for installation by: drilling, countersinking and tapping holes, forming shapes and cutting to required sizes.

    10. Grind off mill stampings and fill recessed markings on steel components left exposed to view.

    11. Make workmanship of best grade of modern shop and field practice known to recognized manufacturers specializing in this work. Fit joints and intersecting members accurately. Make work in true plumb, true, square, straight, level and accurate to sizes and shapes detailed, free from distortion or defects detrimental to appearance or performance.

    12. Insulate metals where necessary to prevent corrosion due to contact between dissimilar metals and between metals and masonry, concrete or plaster. Use bituminous paint, butyl tape, building paper or other

approved means.

13. Supply all fastenings, anchors and accessories required for fabrication and erection of the work. Make exposed metal fastenings and accessories of same material, texture, colour and finish as base metal on which they occur unless otherwise shown or specified. Keep exposed fastenings to an absolute minimum and inconspicuous, spacing them evenly and setting them out neatly. Make fastenings of permanent type.

14. Draw mechanical joints to hairline tightness and seal countersunk screws and access holes for locking screws with metal filler where these occur on exposed surface.

5. FINISHES

1. Thoroughly clean steel of lose scale, rust, oil, dirt and other foreign matter. Suitable prepare steel surfaces by power tool cleaning to receive specified finishes.

2. Grind smooth sharp projections.

3. Remove oil and grease by solvent cleaning.

4. Apply coatings in the shop and before assembly. Where size permits, galvanize components after assembly.

5. Shop apply coat of primer to interior components after fabrication except where galvanized finish and stainless steel is required.

6. Hot dip galvanize exterior components and other components, where so indicated, after fabrication in accord with requirements of CSA Standard G164-M1981.

7. Apply coat of bituminous enamel to contact surfaces of metal components in contact with cementitious materials and dissimilar metals.

8. After erection and installation, thoroughly clean the work and apply field touch up of same formula as shop coat to all damaged or unpainted surfaces. Work all paint well into all joints, crevices and open spaces.

PART 3 EXECUTION

1. INSTALLATION

1. Install components plumb, square, straight and true to line. Drill, cut and fit as necessary to attach this work to adjoining work.

2. Provide temporary supports and bracing required to position components until they are permanently anchored in place.

3. Securely anchor components in place; unless otherwise indicated, anchor components as follows:

    1. To concrete and solid masonry with expansion shields and bolts.

    2. To hollow construction with toggle bolts.

    3. To thin metal with screws or bolts.

    4. To thick metal with bolts or by welding.

    5. Fill space between railing members and sleeves with non-shrink grout.

    6. To wood with bolts or lag screws.

4. Provide all components required for anchoring. Make anchoring in concealed manner wherever possible. Make exposed fastenings, where approved by Consultant neatly and of same material, colour, texture and finish as base metal on which they occur. Keep exposed fastenings evenly spaced.

5. Dissimilar metals and metals in contact with cementitious elements shall have contact surfaces coated with bituminous paint or be isolated by other means as approved by Consultant.

6. After installation, clean and refinish injured finishes, welds, bolt heads and nuts. Refinish with zinc rich paint or primer to match original finish.

7. H<u>ANDRAILS</u>

1. Unless shown otherwise on drawings or in this Section, handrails shall be as follows:

    1. <u>General:</u>

        1. Construct rails of standard steel pipe of sizes indicated on drawings.

        2. Where not indicated, pipe handrails to be 1 ½" (38 mm) O.D.

        3. Joints and intersecting members welded and ground smooth. Where rails return to walls or other vertical faces, cut off and grind smooth 1/4" (6 mm) from vertical face. See drawings for details.

2. Install brackets in best standard practice, space not more than 4'-0" (1200 mm) o.c. for wall handrails. Brackets shall be as shown on drawings. Mount handrailing to height shown on drawings.

3. Where handrails and top rail on guard are shown on drawings as not galvanized or stainless steel, such railings shall be shop primed for painting. Painting to be done under Section 09900.

4. Supply and install handrails and balustrades to safely support a horizontal load of 103 lb/lin. ft. (1.5 kN/m) applied at the top of the rail.

END OF SECTION

PART 1 GENERAL

1. GENERAL REQUIREMENTS

    1. Division One, General Requirements, is a part of this section and shall apply as if repeated here.

2. STORAGE

    1. Materials shall be protected from damage and kept dry during delivery and while stored at job site.

    2. Do not store materials in areas where glazing is not complete or concrete completely dry.

3. STANDARDS

    1. Materials and workmanship shall conform to the requirements of the Ontario Building Code as currently amended.

4. SCOPE

    1. Provide all miscellaneous rough carpentry required to complete the Work of this Contract.

PART 2 PRODUCTS

1. MATERIALS

    1. Sawn lumber shall be No. 2 spruce, pine or fir of best merchantable lumber, straight and sized, shaped to the correct dimensions from the nominal sizes noted on the drawings and specified herein. Lumber shall be well-seasoned stock, free from large loose resinous knots, shake, waned edges, splits, dry rot or other defects which would impair its strength or durability.

    1. Moisture content of all lumber for rough carpentry, at time of building-in, shall not exceed 17%.

    2. Wood Preservative: C.C.A. (chromium copper arseniate) by "Wolmanized".

    3. Rough Bucks, Battens, Blocking, Framing: Eastern Spruce, Jack Pine or Fir No. 2 or better.

    4. Exterior Rough Bucks Batten Blocking, Framing and Plywood and Interior Wood Attached to Masonry or Concrete: Jack Pine No. 2 or better "Wolmanized" pressure treated wood conforming to C.S.A. 081.1-M1983. Sizes as indicated on drawings and/or as required. All pressure treated lumber shall bear the trademark "Wolmanized" and bear a mark certifying

conformance with AWPB Standard LP-2 or LP-22.

5. Fire Retardant Lumber: to be CSA 080.20 DRICON FRT Lumber and plywood distributed by J. Brewer (Canada) Ltd; (519) 621-7701. Sizes as indicated on drawings and/or as required.

6. Grounds, Nailing Strips, Strapping, Furring: Eastern Spruce or Jack Pine Construction Grade allowing 10% to 15% standard grade.

7. Plywood Sheathing: Construction grade and paint grade good one side fir plywood sheathing, exterior type, conforming to C.S.A. 0121-M1978. Square edge or T&G as required.

8. Galvanized Nails and Spikes, Carriage Bolts, Screws and Washers: Hot dipped galvanized nails and spikes for exterior work and mill galvanized for interior work.

9. Nails, Spikes and Staples: To C.S.A. B111-1974, plain finish. Use spiral thread nails.

10. Adhesive: Waterproof wood adhesive.

PART 3 EXECUTION

1. WORKMANSHIP

1. Work shall be executed by skilled mechanics according to best practice, as specified herein and indicated on drawings.

2. Lay out work carefully and to accommodate work of other trades. Accurately cut and fit, erect in proper position, true to dimensions, align, level, square, plumb, adequately brace and secure permanently in place.

3. Bore holes for bolted work true to line and same size as bolts, drive into place for snug fit, use plate or washer to prevent nut from bearing directly on wood, and turn up nuts, bolts and lag screws tight at time of installation and again immediately before being concealed with other work or at completion of work.

4. Give painter sufficient notice so that untreated or unprimed carpentry items or materials shall be primed immediately upon delivery to site.

5. Co-operate with others engaged in work on the building to the end that proper unity of action will assure the orderly progress of the work. Do necessary boxing and protecting of sills, jambs, corners, and the like. Construct scaffold, ramps, and other temporary staging necessary.

2. WOOD PRESERVATIVE

   1. Treat fresh cut ends of pressure-treated Jack Pine with two coats of end preservative.

3. ROUGH HARDWARE

   1. Supply rough hardware such as nails, bolts, nuts, washer, screws, clips, strap iron, and hardware for temporary enclosures.

4. ROOF CURBS, BASES AND SUPPORTS

   1. Construct pressure treated wood roof curbs for ventilation ducts, fan bases, etc., as detailed or required by other trades. Construct suitable approved pads to receive duct supports. Note tops of all curbs for roof top units shall be a minimum 14" (350 mm) above finished roof surface.

5. ROUGH BUCKS, GROUNDS, BLOCKING, STRAPPING, FURRING

   1. Furring, blocking or strapping indicated is not to be regarded as exact or complete. Location and methods of securing these pieces to option of Contractor. Provide adequate nailing.

   2. Cut grounds and screeds in long lengths as practical with square ends. Erect to create true, plumb planes and fasten rigidly in place.

   3. Provide minimum 2" x 4" (38 mm x 89 mm) blocking as necessary for attachment of base, trim, cabinets, fixtures, hardware, miscellaneous specialties, equipment and the like unless indicated otherwise. Cut ends square and fasten rigidly to building structure.

   4. Rough bucks shall be minimum 2" (38 mm) thick wood of width indicated, set straight, true and plumb, braced and fastened securely in place.

   5. For general strapping, set treated wood strips vertically spaced 16" (400 mm) on centre, unless otherwise indicated. Shim so faces form a true plane. Provide intermediate horizontal strapping at all joints to wall finishes applied over grounds.

6. FRAMING

   1. Frame walls, partitions, roofs, platforms, etc., as indicated. Note: metal studs supplied and installed under Section 09110.

   2. Set wood joists 16" (400 mm) o.c. unless otherwise noted, using a single bottom plate and double top plates. Double studs at openings and triple at corners and partition intersections. Provide one row of horizontal bridging of same material as studs.

7. BLOCKING

   1. Provide minimum 2 x 4 (38 mm x 89 mm) blocking or size as required for secure attachment of base, trims, cabinets, fixtures, miscellaneous specialties, equipment etc. and the like unless specified otherwise. Cut ends square and fasten rigidly to building structure. Cut ends square and fasten rigidly to building structure. Coordinate blocking requirements with work of sections listed in 1.4 of this section.

8. FIRE RETARDANT WOOD

   1. Electric and Telephone Backboards and Panel Boards: Supply and install 19 mm thick backboards and panel boards, fire pressure treated, fir plywood. Consult electrical drawings for locations and requirements. Provide wood strapping as required. Fasten to wall using fasteners and spacing suitable to wall type to provide secure, sturdy installation which will carry equipment load without damaging.

9. WINDOW SILLS

   1. Supply and install first layer of plywood (pressure treated at window sills). Second layer, nosing and plastic laminate by Finish Carpentry. Refer to drawings for detail and locations.

END OF SECTION

PART 1 GENERAL

1. GENERAL REQUIREMENTS

    1. Division One - General Requirements, is a part of this Section, and shall apply as if repeated here.

2. REFERENCE STANDARDS

    1. Standard of finished carpentry, metal work and cabinet work in accordance with the "Architectural Millwork Standards" of the Architectural Woodwork Manufacturers Association of Canada (AWMAC).

3. QUALIFICATIONS

    1. The work of this trade shall be executed by a company having adequate equipment and skilled personnel.

4. SCOPE OF WORK

    1. Miscellaneous finish carpentry and installations as required for final fit and finish of all work where not provided by the General Contractor or other Trades.

    2. All trims, copings, cappings to ensure a finished installation of all work including transitions between existing and new work.

    3. The General Contractor shall have final determination of the scope of this section and coordinate the scope with the requirements of all other Trades.

5. SHOP DRAWINGS

    1. Submit Shop Drawings in electronic PDF format.

    2. Before Shop Drawings and fabrication are started, take critical measurements at the site to facilitate installation and fitting of work.

    3. Design Criteria - Applicable Standards:

        1. All standards in accordance with latest issue.

        2. Ontario Building Code

    4. Clearly indicate construction details, sizes and wood and steel sections, thickness or gauge of wood and steel sheet, connections, joints, method of anchorage, number or anchors, supports, reinforcement and accessories. Confirm all dimensions on site.

6. DELIVERY AND STORAGE

   1. Give Painter sufficient notice so that untreated or unpainted carpentry items or materials can be primed immediately upon delivery to site.

   2. No equipment shall be delivered to the site until a portion of the building in which it is to be installed is completely ready for equipment as approved by the Architect.

   3. Store finished work properly and keep under cover both in transit and at site. Finish woodwork shall not be delivered to site until concrete and masonry work has dried out.

   4. Cover all plastic laminate and melamine faces at shop with heavy Kraft Paper.

   5. Check access clearance at site before assembling.

7. SAMPLES

   1. Submit duplicate 12" x 12" (300 mm x 300 mm) samples of each type of panelling and each type of solid wood or plywood to receive stain or natural finish.

   2. Submit duplicate 12" (300 mm) long samples of each type of moulding.

   3. Submit samples of construction methods and all hardware.

8. WARRANTY

   1. The warranty period stipulated in the General Conditions of the Contract shall be extended five (5) years in writing against defects.

9. MOISTURE CONTENT

   1. Finish material to be dried to a uniform maximum moisture content of 12% for exterior work and 6% to 8% for interior work.

PART 2 PRODUCTS

1. MATERIALS

   1. Materials used for finish work shall be sound, free from defects that would mar finished appearance, well seasoned and air dried and of good quality for intended purposes. Wood laminates pressure bonded.

   2. Plywoods: shall be rift cut or quarter sawn Oak and/or plain sliced Maple architectural grade "AA" No. 1 Face Grade and shall comply to C.S.A. 0115-M1982, with plywood core, laminated with waterproof adhesive. Plywood shall be good both sides.

3. Hardwoods - Shall be solid selected Oak / Maple Architectural Grade 'AA'. Wood shall be selected for uniform colours and graining when at stained and varnished items. Finger jointed woods will not be accepted.

4. Framing Lumber - No. 2 or better spruce, pine or fir best mercantile lumber.

5. Penetrating Sealer - "Penetrim" by Tremco Mfg. Co. (Canada) Ltd., or "1402" by MacNaughton Brooks Ltd.

6. Painted Hardwood: American Poplar ("White Wood") "C" select grade.

7. Adhesive: As recommended by manufacturer for required application and to conform to C.S.A. 0121-M1978.

8. Nails, Spikes and Staples: To C.S.A. B111-1974, plain finish nails. Use spiral thread nails and barbed staples.

9. Pressure Treated Wood: Conforming to Section 06100, sizes as indicated and detailed. **NOTE:** Warped, twisted, loose or missing knots in wood will not accepted.

10. Exposed fasteners: All exposed fasteners to be stainless steel. At exposed screw locations use stainless steel screws and cup washers.

11. Refer to drawings and details for complete list of materials to be installed.

PART 3 EXECUTION

1. WORKMANSHIP

1. Work shall be executed by mechanics skilled in their respective trade, according to best practice, or specified herein and indicated on drawings.

1. Check job dimensions and conditions and notify the Architect in writing of unacceptable conditions. Do not proceed until remedial instructions are received. Commencement of work will imply acceptance of site conditions and re-working or modification of the work as deemed necessary by the Architect will be done at no extra cost to the Owner.

2. As far as practical, assemble work at the shop and deliver to the job ready for installation. Leave ample allowance for fitting and scribing on the job.

3. Fabricate work square and to the required lines.

4. Lay out work carefully as indicated and to accommodate work of other trades. Accurately cut and fit; erect in proper position true to dimensions. Align, level, square, plumb, adequately brace, and secure permanently in place.

5. Use treated lumber for studs, blocking nailers, furring and other wood permanently installed in building. Brush coat freshly cut ends with two coats of concentrated form of preservative.

6. Recess and conceal fasteners and anchor heads. Fill with matching wood plugs. Set nail heads and fasteners occurring within exposed interior carpentry work.

7. Provide wood members free from bruises, blemishes, mineral marks, knots, shake and other defects and select for uniform colour grain and texture. Machine and hand sand surfaces exposed in the finished work to an even, smooth surface free from defects detrimental to appearance.

8. Provide running members in the maximum lengths obtainable. Provide thickness of members in maximum dressed size of standard lumber. Where thickness of width indicated is not available in hardwoods, use glue laminations to obtain sizes required. Provide unexposed backs of veneers having the same physical characteristics as the face veneer.

9. Give painter sufficient notice so that untreated or unprimed carpentry items or materials can be primed immediately upon delivery to site. No exposed end grain of plywood shall be permitted; edging shall be solid 3/8" (10 mm) wide by thickness of plywood and of same species of wood. Finger jointed edging will not be accepted.

10. Co-operate with others engaged in work on the building to the end that proper unity of action will assure the orderly progress of the work. Do necessary boxing and protecting of sills, jambs, corners and the like. Construct scaffold, ramps, and other temporary staging necessary.

11. Chamfer edges of plastic laminate to avoid chipping.

2. <u>INSTALLATION</u>

1. Deliver Finish Carpentry to the site. Provide units of such sizes as will not present difficulty of entry to the place of installation. Where units are shipped in knock-down forms, provide clear instructions for assembly.

2. Install Finish Carpentry items plumb, square, true, rigid and secure with concealed fastening at exposed areas and with stainless steel screws and cup washers where secured inside of millwork units.

END OF SECTION

PART 1 GENERAL

1. GENERAL REQUIREMENTS

    1. Division One, General Requirements is part of this Section and shall apply as if repeated here.

2. SCOPE OF WORK

    1. Supply and install rigid insulation at all locations indicated on drawings.

3. SUBMITTALS

    1. Submit shop drawings and samples in accordance with CCDC Document 5B-2010 and Section 01300 - Submittals for items 2 below.

PART 2 PRODUCTS

1. INSULATION

    1. Roof Service Locations: Ship lapped / square edged – buttered, extruded polystyrene rigid insulation to be “Styrofoam Cladmate” with RSI 0.88 (R-5.0) minimum thermal resistance values per inch by Dow or equal – greater than 1 permeance - this insulation is to be breathable and only an air barrier on the exterior side of the wall substrate sheathing.

    2. Foam Insulation: Sprayed polyurethane foam to flame spread rating of less than 500, min. RSI 1.05 (R 6/1") at density of 32.8 kg/cu.m (2lb/cu. ft). Spray foam at voids and broken areas in the rigid insulation. Spray foam is for repairs only.

4. ADHESIVE

    1. Insulation board perimeter buttered edges: "Air-Bloc 21" by Bakor (air/vapour retarder, both)

PART 3 EXECUTION

1. WORKMANSHIP

    1. Work shall include rigid insulation in cavity walls, clear storey walls, roof parapets, roof curbs, below grade foundation perimeter and below concrete entrance slabs.

    2. Surfaces to receive rigid insulation shall be clean, free of grease and oil, and reasonably smooth with no mortar or concrete pin projections.

    3. Install insulation after building substrate materials are dry.

4. Prime surfaces before using asphaltic type adhesives.

5. Install all materials using adhesive or fasteners in strict accordance with manufacturer's installation instructions unless otherwise specified herein.

6. Ensure a uniform, continuous thermal barrier effect. Where insulation is to be provided under other Sections, co-ordinate the work such that the thermal barrier continuity is achieved.

7. Install insulation to maintain continuity of thermal protection to building elements and spaces.

8. Fit insulation closely around electrical boxes, plumbing and heating pipes and ducts, and other protrusions.

9. Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from damaged or broken edges. Use longest possible lengths to reduce number of joints. Keep insulation minimum 3" (75 mm) from heat emitting devices such as recessed light fixtures, and a minimum 2" (50 mm) from sidewalls of CAN4-S604 Type "A" chimneys and CAN1-B149.1 and CAN1-B149.2 Type "B" and "L" vents.

10. In multiple layer applications offset both vertical and horizontal joints.

11. Do not enclose insulation until it has been inspected.

END OF SECTION

1. GENERAL

1. GENERAL REQUIREMENTS

1. Division One, General Requirements is part of this Section and shall apply as if repeated here.

2. PRODUCTS

2.1 INSULATION

.1 Acoustic Sound Batt Insulation (Interior Wall Systems (Stud Cavity) & Sound Proofing Above Ceilings):

1. Roxul Acoustical Fire Batt (AFB) mineral wool insulation for fire rated assemblies and Roxul Safe 'n' Sound for non-fire-rated assemblies. Thickness is to fill wall cavity solid unless specified / shown otherwise on wall types.

2. Rockboard 60 with foil face (facing upward into plenum) at sound rated ceiling systems where ceiling spaces are used for plenums.

2.2 ACCESSORIES

.1 Staples: ½" (13 mm) minimum leg.

3. EXECUTION

3.1 INSULATION INSTALLATION

.1 Install insulation to maintain continuity of thermal protection to building elements and spaces. Insulation to be friction fit between studs, joists or furring members.

.2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

.3 Do not compress insulation to fit into spaces.

.4 Do not install insulation in any part of the building where protection against inclement weather has not yet been provided and where the insulation could thereby be wet or damaged.

.5 Provide and install supports as required to keep insulation in place at soffits with floor above and around ducts in attic space.

.6 Keep insulation a min. 3" (75 mm) from heat emitting devices such as recessed light fixtures.

3.2 LOOSE FIBRE INSULATION

.1 Pack loose mineral wool insulation in crevices around lintels, frames, beams, around ducts at holes and other places where shown or required to minimize air infiltration.

.2 Pack loose mineral wool into voids around mechanical and electrical pipes and ducts where they pass through non-fire rated wall, floors and ceilings.

3.3 FIRE RATED MINERAL WOOL INSULATION

.1 Supply and install mineral wool at fire separations and where indicated on drawings.

.2 Refer to Section 07270 Firestopping and Smoke Seals for mineral wool work by that Section.

3.4 SOUND INSULATION

.1 Fill all cavities full of mineral wool sound insulation where sound insulation is indicated on drawings.

.2 Sound insulation above acoustic tile ceilings supplied and installed by Section 09500 as per this Section.

3.5 BATT INSULATION

.1 Install mineral wool batt insulation at exterior or air/vapour barrier walls, ceiling spaces, between floor joists at perimeter wall locations and all other locations shown on drawings.

.2 Place batts in close contact with vapour barrier or air/vapour barrier facing the interior.

End of Section

PART 1 GENERAL

1. GENERAL REQUIREMENTS

    1. Division One, General Requirements, is a part of this Section and shall apply as if repeated here.

2. DELIVERY

    1. Packaging of insulation shall indicate manufacturer, type, density, and insulation value.

3. SAMPLES

    1. Submit samples in accordance with Section 01300.

    2. Install sample installation min. 1'-0" (300 mm) long for each material proposed for project.

    3. Submit material safety data sheets for materials of this Section.

PART 2 PRODUCTS

1. MATERIALS

    1. Sprayed-On Insulation: Foam insulation equal to Froth-Pak 2 Component Polyurethane Foam by DOW with a min. R value of 5.5 per inch.

PART 3 EXECUTION

1. WORKMANSHIP

    1. Insulation shall be applied by skilled workers, in accordance with best trade practices and manufacturer's printed instructions.

    2. Do not install insulation in any part of the building where roof protection against inclement weather has not yet been provided and where the insulation could thereby be wet or damaged.

    3. Examine joints before sealing to ensure that configuration, surfaces, and widths are suitable for spray-on insulation and service and that execution of sealing and performance of spray-on insulation will not be adversely affected. Defective work resulting from application to unsatisfactory joint conditions will be considered the responsibility of those performing the work of this Section.

    4. Proceed with spray-on insulation only when air, substrate and surfaces in contact with spray-on insulation are completely dry.

    5. Prepare joints by brushing, scrubbing, scraping or grinding inner surfaces top remove loose mortar, dust, oil, grease, oxidation, mill scale, and other materials which will affect adhesion and integrity of spray-on insulation and dry with clean cloths. Ensure that surfaces have not been coated with

releasing agents, coating or other treatments, or that they are entirely removed.

6. Finished joints to be free of air pockets, imbedded foreign materials and cut back after curing to be flush with surrounding materials and recessed to sufficient depth for caulking.

7. Where spray-on insulation is to be applied at edges of insulation or at air/vapour barrier ensure that spray-on insulation is located to form seal at warm side of insulation and/or to form continuation of air/vapour barrier.

8. Protect all finished surfaces with appropriate covering during installation.

9. Install Sprayed-On Insulation and Sprayed Applied Fire Resistive Insulation as per manufacturer's recommendations.

2 LOCATIONS

1. Sprayed-On Insulation: Seal all joints where air leakage can occur, including window, door frames and rough openings, around electrical and plumbing boxes and conduits that penetrate vapour barriers. All other locations as specified and indicated on drawings, with foam spray-applied insulation where required to prevent movement or infiltration of air. Do also voids under window sills.

3. CLEANING

1. Remove from surfaces of other work sealant smears, droppings and masking tape immediately after sealant has cured to a hard surface film.

2. Clean surfaces soiled by work of this Section. Do not use cleaning methods that will damage surrounding surfaces. Make good work cleaning has damaged under work of this Section.

END OF SECTION

PART 1 GENERAL

1. GENERAL REQUIREMENTS

    1. Division One, General Requirements, is a part of this Section and shall apply as if repeated here.

2. WORK INCLUDED

    1. Firestopping and smoke seal at all existing and new wall(s), floor(s) and roof assemblies. Mechanical and Electrical penetrations shall be by Mechanical and Electrical Contractors where their equipment and materials penetrated rated walls.

3. SAMPLES

    1. Submit samples in accordance with Section 01300 - Shop Drawings, Product Data, Samples and Mock-ups.

    2. Submit 1'-0" (300 mm) x 1'-0" (300 mm) sample of each actual firestop material proposed for project.

4. QUALITY ASSURANCE

    1. Applicator shall be licensed by the manufacturer of fireproofing materials.

    2. Submit manufacturer's certification that materials meet or exceed specified requirements.

    3. Product manufactured under ULC Follow-up Program. Each container or package shall bear ULC label or listing mark.

5. SHOP DRAWINGS

    1. Submit shop drawings and product data in accordance with Section 01300 - Shop Drawings, Product Data, Samples and Mock-ups.

    2. Submit shop drawings to show proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.

    3. Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation.

6. SEQUENCING AND SCHEDULING

1. Sequence work to permit installation of firestopping and smoke seal materials to be installed after adjacent work is complete and before closure of spaces.

7. MUNICIPAL AUTHORITY APPROVAL

1. Discuss firestopping and smoke seal requirements with municipal building inspector to obtain their approval prior to installation. Determine which products and/or procedures will be required to obtain final approval.

2. Submit in writing, prior to commencing installation, full detailed descriptions of materials and methods to be employed for firestopping work to achieve full final approval of authorities having jurisdiction.

PART 2 PRODUCTS

1. MATERIALS

1. Firestopping and smoke seal systems: A/D FIREBARRIER Firestop Systems by A/D Fire Protection Systems Inc., capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN4-S115-M85, and not to exceed opening sizes for which they are intended. Other manufacturers shall not be used unless approved in writing (5) days prior to tender closing. Approved Alternate Manufacturer: Tremco Ltd., Fire Stopping Systems and Hilti Firestopping Systems.

2. Mineral Wool Backing Insulation: ULC Labelled, preformed non-combustible material A/D FIREBARRIER Mineral Wool by A/D Fire Protection Systems Inc.

3. Firestopping Sealant: ULC labelled, single component silicone based, A/D Silicone FIREBARRIER Sealant by A/D Fire Protection Systems Inc.

4. Firestopping Seal: ULC labelled, single component water-based seal, A/D FIREBARRIER Seal by A/D Fire Protection Systems Inc.

5. Spray-On Firestopping Sealant: ULC labelled, high performance single component, water-based, elastomeric acrylic firestop sealant, “TREMstop Acrylic SP” (sprayable grade) by Tremco Ltd.

6. Fire resistance rating of installed firestopping assembly not less than the fire resistance rating of surrounding floor and wall assembly as indicated on the drawings.

7. Firestopping system at openings around penetrations for pipes, ductwork, conduit and other mechanical and electrical items requiring sound and vibration control; elastomeric sealant type with mineral wool; do not use a cementitious or rigid seal at such location.

8. Primers: to manufacturer's recommendation for specific material,

substrate, and end use.

9. Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

10. Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

11. Sealants for vertical joints: non-sagging.

12. Firestopping mortar is not acceptable.

PART 3 EXECUTION

1. EXAMINATION

    1. Examine existing conditions to receive this work prior to submitting shop drawings.

    2. Examine surfaces to receive work of this Section and report any defects which may affect the Work of this Section.

    3. Verify that openings are ready to receive the Work of this Section.

    4. Confirm compatibility of surfaces to receive firestopping and smoke seal materials.

    5. Beginning of installation means acceptance of existing surfaces and substrate.

2. PREPARATION

    1. Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are dry and frost free.

    2. Prepare surfaces in contact with firestopping materials and smoke seals to manufacturer's instructions.

    3. Maintain insulation around pipes and ducts penetrating fire separation.

    4. Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3. INSTALLATION

    1. Install firestopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.

2. Seal holes or voids made through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained. For vertical sections, sealant is required only on the top side of the mineral wool. It is required on both sides for horizontal sections except only one side on '0' hour rated walls.

3. Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

4. Tool or trowel exposed surfaces to a neat finish.

5. Remove excess compound promptly as work progresses and upon completion.

6. Install firestopping with smoke seal sealant on both sides of all fire rated walls except for '0' hour rated walls where sealants is required continuously only one side of mineral wool backing insulation.

4. INSPECTION

1. Notify architect when ready for inspection and prior to concealing or enclosing firestopping and smoke seal materials and service penetration assemblies.

2. Arrange for final inspection of the work of this Section by firestopping manufacturer and municipal building inspector prior to concealing or enclosing work. Make corrections required.

5. SCHEDULE

1. Fire and smoke seal at all areas where work is indicated on drawings (corridors, mechanical rooms, ceilings, janitor's room, washrooms, changerooms, servery, Library, gymnasium, etc. fire separations), and at locations as follows:

    1. Generally, all locations required by code.

    2. Penetrations through fire resistance rated (including 0 hour rated fire separations) masonry and concrete walls (except mechanical and electrical penetrations which will be firestopped by the mechanical and electrical contractors).

    3. Top of fire resistance rated masonry and gypsum rated partitions and walls (Includes corridors noted as 0 hr. fire rating)

       NOTE: Refer to Architectural drawings for locations of vertical fire separations.

    4. Intersection of fire resistance rated masonry.

5. Control and sway joints in fire resistant rated masonry.

6. Penetrations through all floor slabs and fire rated ceilings (except mechanical and electrical penetrations which will be firestopped by the mechanical and electrical contractors).

7. Openings and sleeves installed for future use through fire resistant rated separations.

6. CLEAN-UP

1. Remove excess materials and debris and clean adjacent surfaces immediately after application.

2. Remove temporary dams after initial set of firestopping and smoke seal materials.

7. CERTIFICATION

1. The manufacturer of the firestopping and smoke seal products shall inspect each application on site and certify in writing its fire rating.

2. Costs for manufacturer's site inspection of firestopping and smoke seals application and certification shall be included in this Contractor's Section 07270 base bid.

END OF SECTION

PART 1 GENERAL

1. GENERAL REQUIREMENTS

    1. Division One, General Requirements, is a part of this section and shall apply as if repeated here.

2. SYSTEM DESCRIPTION

    1. Supply all labour, materials, and equipment necessary for the complete work of this Section as indicated on the drawings, specified herein, or as required by job conditions and normally considered as work covered by this Section.

    2. The term "sealant" to be synonymous with the term "caulking" where used on the drawings and/or specifications.

3. SUBMISSIONS

    1. Submit complete colour samples for Architect's approval.

    2. Supply a sample container of each type of caulking or sealant.

    3. Sample joints of each type and colour of caulking shall be prepared at the site in a location directed by the Architect and be approved by the Architect before work commences. Approved joints will represent minimum acceptable for the work. Cure samples and under conditions anticipated at job site during construction.

4. ENVIRONMENTAL CONDITIONS

    1. Sealant and substrata materials to be minimum 5 C (41 deg. F.).

    2. If necessary, to apply sealants below 5 C., consult sealant manufacturer and follow their recommendations.

5. DELIVERY AND STORAGE

    1. Deliver and store materials in manufacturer's original wrappings and containers.

6. PROTECTION

    1. Mask adjacent surfaces as necessary to prevent contamination.

    2. Protect all sealant against puncture or damage until sealant has attained its final set.

    3. Be responsible for any damage to adjacent surfaces caused by the work of this Section. Provide extra protection as required when sandblasting.

4. Provide temporary covers over joints where joints have been cleaned out, but not yet caulked.

7. WARRANTY

1. Provide a written warranty, signed and issued in the name of the Owner stating that caulking work of this section is guaranteed against leakage, cracking, crumbling, melting, shrinkage, running, loss of adhesion, or staining adjacent surfaces, for a period of five years from the date of Substantial Certificate of Completion and that any defective caulking will be replaced.

2. At completion of the work, provide a written statement from the manufacturer or authorized manufacturer's representative that material used in the various applications is the recommended one and that the final application is as recommended by the manufacturer for the construction conditions detailed and for the performance required. These requirements are applicable to every material included in the work of this Section.

8. QUALIFICATIONS

1. Applicator for the work of this section shall:

1. Have adequate equipment and skilled personnel to expediently complete the work of this section in an efficient and very best workmanlike manner.

2. Be completely familiar with the published recommendations of the manufacturer of the caulking material being used.

2. Indication of lack of skill or defective work to be sufficient grounds for the Consultant to reject the installed caulking and to require its immediate removal and complete recaulking at no additional cost to the Owner during the guaranty period.

3. Co-operate with the Consultant and/or any inspection and testing agency he may appoint.

4. Materials to be utilized shall be inspected and tested as required.

5. Provide cut tests of 6 inches in length in order to ensure correct thickness, hardness, mixing and surface finish. Provide these cut test samples at times and from locations as directed by the Consultant and make good the areas from which the samples are taken.

6. All tests of the sealant installation shall be inspected by the sealant manufacturer's representative.

PART 2 PRODUCTS

1. MATERIALS

1. Primers: type recommended by sealant manufacturer.

1. Joint Fillers:

2. General: compatible with primers and sealants, outsized 30 to 50%.

3. Polyethylene: extruded closed cell foam, Shore A hardness 20, tensile strength 140 to 200 kPa.

3. Bond Breaker: pressure sensitive plastic tape, which will not bond to sealants.

4. Sealant Type A: Equal three-part polyurethane 'Tremco Dymeric 240' conforming to C.G.S.B. CAN2-19-24-M80. Colours to be tinted to specifically match wall colours. Maximum of five colours.

5. Sealant Type B: One-part silicone mildew resistant type equal to sanitary sealant 1702 by C.G.E. Silicones and conforming to CGSB 19-GP-22m or Dow Corning 786.

6. Sealant Type C: Equal to Sikaflex - 15 LM. Colours to be tinted to specifically match wall colours. Maximum of six colours.

7. Colour of Sealants: to be selected by the Architect. Colours of sealant to change where wall colours change (i.e., banding).

8. Joint Cleaner: xylol, methylethyleketon or non-corrosive type recommended by sealant manufacturer and compatible with joint forming materials.

9. Vent Tubing: 6 mm (1/4") inside diameter extruded polyvinyl chloride tubing.

10. Threshold Bedding: oil base caulking compound, to CGSB 19-GP-6.

11. Deliver materials to job site in sealed containers with manufacturer's original labels attached, and accompanied by certification of compliance with the specifications.

PART 3 EXECUTION

10. EXAMINATION

2. Examine all surfaces prior to application and notify the Architect of any conditions detrimental to satisfactory application.

3. Commencement of work shall imply acceptance of surfaces.

11. PREPARATION

2. Use a dry, clean, oil free compressed air stream to remove dust and other contaminants. Masonry surfaces shall be cleaned with wire brush and then blown clean. Any waterproofing treatments contaminating the joint must be completely removed.

3. Remove rust, mill scale and coatings from ferrous metals by wire brush, grinding or sandblasting.

4. Remove oil, grease and other coatings from non-ferrous metals with joint cleaner.

5. Prepare concrete, masonry, glazed and vitreous surfaces to sealant manufacturer's instructions.

6. Examine joint sizes and correct to achieve depth ratio ½ of joint width with minimum width and depth of 6 mm (1/4"), maximum width 25 mm (1").

7. Before caulking, fill spaces deeper than 13 mm (½") with bedding material, packed tightly in place and set below finished surfaces to suit specified sealant depth. Provide joints less than 13 mm (½") deep with an approved joint breaker.

8. Where necessary to prevent staining, mask adjacent surfaces with tape prior to priming and caulking.

9. Apply bond breaker tape where required to manufacturer's directions.

10. Prime sides of joints to sealant manufacturer's instructions immediately prior to caulking.

11. Remove all existing caulking and prepare for replacement.

12. Check form release agent used on concrete for compatibility with sealant and primer. If they are incompatible inform Consultant and change sealant to compatible type approved by Consultant or clean concrete to Architect's approval.

12. APPLICATION

2. Before application of any sealants, confirm that sealant material is compatible with the materials and finishes of the surfaces to which the material is applied or is in contact with.

3. Apply sealants, primers, joint fillers, bond breakers, to manufacturer's instructions. Apply sealant using a gun with proper size nozzle. Use sufficient pressure to fill voids and joints solid. Superficial pointing with skin bead is not acceptable.

4. Thoroughly mix caulking materials with a mechanical mixer capable of mixing at 80-100 rpm without mixing air into the material. Mix material in accordance with the manufacturer's directions and instructions.

5. Install caulking to the joints using manually operated or power operated guns. Use nozzles of the correct size and shape and provide sufficient pressure to completely fill the joints and make adhesive contact with the backs and sides of the joints. Caulk solidly around entire perimeter of openings.

6. Finish the surface of the caulking with a smooth, full bead, free from ridges, wrinkles, sags, air pockets and embedded impurities. Tool the finish bead with a water wet or dry tool as recommended by the manufacturer, to a slightly concave joint.

7. In masonry cavity construction, vent caulked joints from cavity to 3 mm (1/8") beyond external face of wall by inserting vent tubing at bottom of each joint and maximum of 1500 mm (5'-0") o.c. vertically. Position tube to drain to exterior.

8. Clean adjacent surfaces immediately and leave work neat and clean. Remove excess sealant and droppings using recommended cleaners as work progresses. Remove masking after tooling of joints. Finish work damaged due to this work shall be replaced at this contractor's expense to satisfaction of the Architect.

9. Set thresholds in a full bed of caulking compound at least 1/2" (12 mm) thick. Remove excess compound after threshold is set and neatly point joints.

10. All hidden joints or joints concealed by metal covers occurring in window and door frames, metal curtainwalls, other locations, to be clean, sealant applied and tooled, and inspected and approved prior to the installation of metal covers.

11. Use of sealants specified in the following locations:

    1. Type A:Use at all exterior locations and interior control joints and expansion joints. NOTE: this sealant **must not be** painted over.

    2. Type B: Joints between flooring (except carpet areas) and door frames; between countertops and walls; all high humidity locations at shower and changeroom locations.

    3. Type C: At all remaining interior locations.

13. <u>LOCATIONS</u>

    2. Do all caulking required (except where specified under other sections).

    3. Caulk exposed control joints and expansion joints occurring in masonry and concrete walls. (See item 3.6)

4. Caulk along underside of projecting flashings, except at roof eave detail.

5. Caulk joints between aluminum panels, window or door frames to adjacent building components around perimeter of every external window or door opening at interior and exterior sides aluminum units which work shall be performed by Automatic Aluminum Doors - Section 08710, Aluminum Window Section 08520, and Section 07461 Aluminum Architectural Panel System, Aluminum Curtain Wall - Section 08900.

6. Caulk around exterior louvres.

7. Set windowsills in a bed of caulking compound by Sections 08400 and 08900.

8. Interior hollow metal where it abuts interior finishes.

9. Caulk where shown on drawings and not specified in other sections.

10. Caulk joints at junction of different materials and junction of surfaces in different planes as required or directed (i.e. concrete to metal, concrete to masonry, masonry to metal, masonry to drywall, etc.).

11. Caulking elsewhere to provide a water and weatherproof condition.

12. Caulk areas on interior walls to stop air infiltration.

13. Caulking between resilient/sheet flooring and masonry or concrete walls; and between resilient/sheet flooring and hollow metal frames (Type 'B' sealant).

14. Caulk joints between masonry and gypsum wallboard or plaster.

15. Caulk control joints in drywall partitions.

16. Caulk around access panels, built-in specialties, grilles, pipes, ducts, conduit, outlet boxes, etc. penetrating floors, walls and ceilings.

17. Caulk joints around metal items projecting from ceramic tile work (Type "B" sealant).

18. Caulk around toilets, urinals, sinks, bathtubs, showers, etc. at junction with floor and wall surfaces (Type "B" sealant).

19. Caulk joints as required to provide soundproofing where soundproofing walls are indicated.

20. Caulk joints between wood window and wall surfaces and wood door frames and wall surfaces, etc.

21. Caulk perimeter of all countertops and window plastic laminate sills (including underside) with (Type "B" sealant).

22. Caulk around access panels and washroom accessories in ceramic tile faced walls.

14. CAULKING NOT TO BE DONE UNDER THIS SECTION

2. Caulking of Sidewalk Joints - Section 02600

3. Firestopping and smoke seals - Section 07270, Div. 15 and Div. 16

4. Caulking between aluminum work and aluminum work to surrounding surface - Section 07461, Section 08716, and Section 08520.

5. Caulking and sealants for glazing - Section 08800

6. Caulking of Acoustic Drywall Partitions - Section 09250

7. Caulking of Ceramic and Quarry Tile - Section 09300

8. Caulking of sheet flooring - Section 09624

15. CAULKING OF MASONRY CONTROL JOINTS

2. Caulk all Masonry Control Joints where shown on drawings. Refer to exterior elevations and interior elevations.

NOTE: For Base Price at each control joint shown on exterior wall elevation allow for control joint to also be located in back up masonry concrete block wall as per AD detail, backer rod and Caulking by this Section. Compressible joint filler by Masonry Section 04200.

NOTE: Linear quantity based on one side/face of exposed concrete block masonry wall.

NOTE: Verification of linear quantities of control joints to be made later. Locations of all additional required Concrete Block Joints to be finalized later after submission of proposed control joint locations on shop drawings to be submitted by Masonry Contractor as required by Specifications Section 04200.

END OF SECTION

1. GENERAL

1. GENERAL REQUIREMENTS

1. Division One, General Requirements is part of this Section and shall apply as if repeated here.

2. SHOP DRAWINGS

1. Submit shop drawings in electronic PDF format in accordance with GC 3.10 of CCDC Document 2, 2008 and Section 01300 – Submittals.

2. Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings, finishes and fire ratings.

3. Fire Ratings indicated on Door Finish Schedule are minimums. If door design cannot be satisfied at specified rating (i.e. 20 min), supply door or frame with acceptable higher rating (i.e. 45 min.).

3. QUALIFICATIONS OF MANUFACTURER

1. Products used in the Work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

2. Only steel hollow metal doors and frames manufactured by members of the Canadian Steel Door and Frame Manufacturer's Association (CSDFMA) are eligible for use on this project.

3. Qualified Manufacturers:

    1. S. W. Fleming
    2. Baron
    3. Daybar
    4. Artek
    5. Trillium
    6. Vision Hollow Metal

4. PROTECTION

1. Use all means necessary to protect materials of this Section before, during and after installation and to protect installed work & materials of all other trades.

5. REPLACEMENTS

1. In the event of damage, immediately make all repairs & replacements necessary to the approval of the Architect and at no additional cost to

the Owner.

6. WORK INCLUDED

1. Supply all hollow metal doors, frames and screens as shown on drawings and on door schedule.

1. Door cutouts, complete with reinforcing, stops, and closures required for glazing.

2. Cut outs and reinforcing for finishing hardware including preparations for mortice type hardware.

3. Cutouts for security system. Coordinate with Div.16.

2. Supply all necessary fastening and anchoring devices for above items.

7. STANDARDS

1. Materials and workmanship to be in accordance with Canadian Steel Door and Frame Manufacturer's Association Specifications Standards for steel doors and frames.

8. REGULATORY REQUIREMENTS

1. Supply fire labelled steel doors and frames in accordance with NFPA-80, current edition, except where specified otherwise.

2. PRODUCTS

1. MATERIALS

Steel: cold rolled steel, double annealed patent levelled, fully pickled and free from scale and internal defect. Surfaces shall be free from perceptible waves, buckles and other imperfections.

1. Zinc Coating: wipe coated galvanizing in conformance with ASTM 527, Coating Class A01.

2. Primer for Touch-Up: conforming to CGSB 1GP-181M.

3. Labels: Provide ULC or Warnock-Hersey Labels for doors and frames as per Door Schedule.

4. Reinforcing Channel: to CAN/CSA - G40.21-M7, grade 300W, 3.25 mm.

2. FABRICATION

1. Generally

1. Fit and assemble work in shop where possible. Execute according to details and approved shop drawings. Where shop fabrication is not possible, make trial assembly in shop.

2. Weld all components of doors and frames. File or grind exposed welds smooth and flush. Exposed welds shall be continuous. Knock-down frame not to be used on this project.

3. Workmanship shall be best grade modern shop and field practice known to recognized manufacturers specializing in this work. Joints and intersecting members accurately fitted made in true planes with adequate fastening.

4. Insulate where necessary to prevent electrolysis between metal to metal or metal to masonry or concrete.

5. Fabricate and erect work square, plumb, straight, true and accurately fitted. Provide adequate reinforcing and anchorage.

6. Clean, scrape and remove rust, mill scale, grease or extraneous material from frames and doors following fabrication. Flood coat with air-drying paste filler and again sand to eliminate all unevenness or irregularities. Apply in shop a full smooth coat of zinc chromate primer to all surfaces. Deliver work to site with primer undamaged and otherwise satisfactory for following work specified in Section 09900.

2. Doors

1. Provide hollow metal doors of type and size indicated on Door Schedule, and as detailed on Drawings.

2. Construct flush type continuously welded exterior doors conforming to ASTM A527 16 gauge (1.613 mm) hollow metal construction, steel stiffened with vertical steel ribs, all voids filled with semi-rigid fibrous insulation minimum density 24 kg/m^3 polystyrene polyurethane and complete with top and bottom caps. Finish shall be "wipe coat" galvanized steel.

3. Doors shall be mortised, reinforced, drilled and tapped to receive templated hardware including mortise type hardware. Reinforce for surface mounted hardware.

4. Prepare doors to receive glass or grilles as required. Provide

removable stops secured with countersunk tamperproof head screws at 6" (150 mm) o.c. Prepare exterior doors to receive 1" (25 mm) thick insulated sealed glass units.

5. Weld door and panel components together to provide integrated units, square, true and free from distortion or waves. All 18 gauge doors to have welded seams minimum 30% overall and 2" (50 mm) length welds. Weld above and below all hinge locations. All 16 gauge doors to be continuously welded. Grind and fill smooth welded seam.

6. Door head and bottom shall have channel shaped member, closing off top and bottom of door flush with face skins. NOTE: close off top and bottom of exterior doors even with outer edge of door.

3. Fire Rated Doors

1. Provide doors, frames and hardware with Underwriters Laboratories of Canada (ULC) labels, clearly visible, where required to be fire rated or installed in fire rated assembly.

4. Door and Screen Frames

1. Provide steel hollow metal door and window frames for openings indicated on Door Schedule and as detailed elsewhere on drawings.

2. Form interior hollow frames to profile indicated of 16 U.S. gauge (1.613 mm) hot rolled "wipe coat" zinc coated steel. Construct exterior frames of 16 U.S. gauge (1.613 mm) hot rolled, zinc coated steel.

3. Cut mitres and weld corners continuously along inside frame profile. Fill corners of steel frames with metallic paste filler and sand smooth and uniform. Do not weld corner of removable stop.

4. Provide 10 gauge (3.51 mm) channel stiffeners in mullions each side of door openings occurring in screens, or as required to provide a rigid installation.

5. Prepare removable stops secured with counter-sunk tamperproof screws at 6" (150 mm) o.c.

6. Provide three (3) neoprene single stud bumpers for each interior door frame and (2) bumpers at head for pairs of doors.

7. Prepare frames for mortise type hardware at all doors except panic

hardware locations at exterior doors, stair doors, corridor cross doors, gym doors and library doors. Blank, reinforce for butts with 1/4" (6.35 mm) steel plate, drill and tap as required. Reinforce both sides of every door closer, provide for concealed door closers where required.

8. Cover reinforcement plates or attachments and cut-outs with 22 gauge (0.853 mm) steel sheet boxes to protect against mortar. Provide channel or angle spreaders readily removable.

9. Provide adjustable "Tee" or wire masonry anchors with head of No. 6 gauge (4.94 mm) steel and body of 10 gauge (3.510 mm) corrugated steel where frames are built into masonry, except at thermal broken frames. Provide manufacturer recommended anchor at all other locations.

10. Supply three anchors for jambs between 4'0" (1219 mm) and 7'0" (2134 mm) and four anchors for jambs exceeding 7'0" (2134 mm) high. Adjustable type shall be as recommended by manufacturer. Provide adjustable jamb anchors for fixing at floor.

11. Provide head reinforcement in frames wider than 4'-0" (1200 mm) and where indicated or recommended by manufacturer.

12. Prepare frames for electric hardware and security systems. Reinforce and drill and tap frames as required. Coordinate with Div.16.

13. Prepare frames for continuous door length type hinges where indicated on door schedule.

14. Provide 12 gauge (2.66 mm) reinforcing in frames for continuous door length type hinges where indicated on door schedule.

15. Provide removable mullions where indicated on door frame schedule.

1. Metal Panels and Closures

1. Provide 16 U.S. gauge (1.6 mm) hot rolled zinc coated steel closures (at corners and/or between frames) and panels as indicated and detailed on drawings.

3. EXECUTION

1. INSTALLATION

1. Frame Installation:

1. Allowable limit of distortion shall be 1/16" (1.5 mm) out of plumb each jamb, measured on face of frame, resulting in maximum twist of frame of 1/8" (3 mm) measured diagonally from upper to lower corner.

2. At masonry walls: install frames using the corrugated or wire masonry anchors. At preformed openings and exterior thermally broken doors use machine screws and expansion anchors as provided for this application. After installation, fill countersunk screw heads flush with frame and sand smooth ready for painting. Fill exterior frames with spray-on insulation by Section 07215. Co-operated with masonry trade who will fill interior frames with mortar.

3. Brace frames solidly in position while being built in. Install temporary spreader of wood at mid-height of frame until adjacent wall work is completed. Provide vertical support at centre of head for openings of 4'-0" (1200 mm) wide or wider.

4. Remove temporary jamb spreader bars and vertical supports only after frames are securely anchored in place.

2. Door Installation:

1. Install hollow metal doors plumb, true and level and at correct elevation.

2. Co-ordinate installation of hardware.

3. Adjust operable parts to ensure proper operation.

4. Install hollow metal panels and closures with concealed fastenings.

5. Install acoustical assembled doors and frames as per manufacturer's recommendation.

3. Install fire rated doors and frames in accordance with National Fire Codes, Volume 4, produced by National Fire Protection Association (NFPA 80).

4. Attach fire rating labels to doors and frames required to be fire rated. Ratings shown on door schedule are minimum. Attach temperature rise rated labels to doors required to be 90 MFR or greater.

5. Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

6. Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08700 - Finish Hardware.

7. Adjust operable parts for correct function.

2. TOUCH-UP

1. Remove rust, clean and touch-up any damaged galvanizing with "Zincrich" or "Galvicon" paint.

2. Remove rust, clean and touch-up any damaged paint with approved primer.

End of Section

1. GENERAL

1. GENERAL REQUIREMENTS

    1. Division One, General Requirements, is part of this section and shall apply as if repeated here.

2. QUALIFICATIONS

    1. Manufacturers approved for the work of this Section are:

        1. Kawneer Company, Canada Limited.
        2. Alumicor

    2. No other manufacturer or supplier, except those noted above, shall be used unless approved in writing by the Architect seven (7) days prior to tender closing.

    3. **It is the responsibility of the approved manufacturers to *meet or exceed and submit OBC SB-10 Energy Efficiency Compatibility Results.***

        Note: The above mentioned submittal is to incorporate the specified sealed glazing unit and each opening component as a whole before the shop drawings are accepted or before any shop drawings are reviewed.

3. SHOP DRAWINGS

    1. Submit shop drawings in electronic PDF form in accordance with GC 3.11 of CCDC Document 2-2008 and Section 01300 – Submittals.

    2. Submit shop drawings for the fabrication and installation of associated components of the work. Indicate anchors, joint system, expansion provisions, hardware, and other components not included in manufacturer's standard data. Include glazing details (where required).

    3. Before shop drawings and fabrication are started, take critical measurements at the site to facilitate installation and fitting of work.

    4. Shop drawings that are submitted are to be in the units of the tendered drawings with critical on center mullion dimensions (dimension string from datum level to top of opening noting center of mullions) noted along with all other regular shop drawing dimensions, no exceptions. Both units (metric and imperial) are allowed. Openings are to be identified with the corresponding tags on the tendered drawings.
        (Coordinate with typical A8 drawing notes)

4. SUBMITTALS

1. Submit samples of sections and finishes for Architect's approval before fabrication.

2. Furnish templates, diagrams, and other data to fabricators and installers of related work, as needed for coordination installation.

3. Coordinate with Division 16, Section 08700 Finish Hardware and security subcontractor for any electrical provisions required.

5. DESIGN

1. Design for wind and snow loads as set out by the Ontario Building Code, 2012 as currently amended for the building location. Copies of any and all structural calculations made in connection with the supplementary design and/or detailing of the work of this section shall be promptly furnished to the Architect if requested.

2. Submit with shop drawings certification that window and entrance design and construction will meet the specified requirements. Certification shall be in the form of test reports on similar units performed by an independent testing laboratory, and shall meet approval of Architect before fabrication commences.

6. WARRANTY

1. The Work and materials of this Section shall be under warranty in accordance with GC 12.3 of CCDC Document 2 - 2008 but for a period of five years and ten (10) years for hermetically sealed units from the date of Architect's Certificate of Substantial Completion.

2. PRODUCTS

1. MATERIALS

1. Aluminum: Extruded Members: 6063-T54 alloy and temper.

2. Fasteners, Screws & Bolts: 300 Stainless Steel or 400 series stainless steel cadmium plated and of sufficient size and quantity to perform their intended function.

3. Glazing Tape: Tremco 440 tape with built-in shim and as recommended by window manufacturer.

4. Weathering and Glazing Gaskets: Extruded black closed cell or dense elastomer of durometer appropriate to the functions.

5. Spacer Shims: oil resistant rubber or plastic acceptable to glass manufacturer, channel shaped and approximately 4" long (100 mm).
6. Silicone Sealant: Dow Corning #795 or as per manufacturers recommendations exceeding CAN2-19.13-M82 Class 40 requirements.

7. Isolating Coating: Black alkali resistant bitumastic enamel.

8. Spray-On Insulation: Supply and install by this section as per Section 07215.

9. Miscellaneous: Supply all covers, copings, special flashings, filler pieces, termination pieces, caps closures and expansion joint covers as required and as indicated on drawings.

10. Glass for Aluminum Doors: as per 08800 Glass and Glazing Section.

11. Glass for Exterior Aluminum Entrance Framing: as per 08800 Glass and Glazing Section.

12. Glass for Interior Aluminum Screens: as per 08800 Glass and Glazing Section.

2. FABRICATION

1. General

1. Construct aluminum assemblies of extruded sections to size and profile shown on drawings.

2. Build units square, true, accurate to size, free from distortions, waves, twists, buckles or other defects detrimental to performance or appearance.

3. Units too large for handling or shipping shall be prefabricated in shop, disassembled and marked for shipping and field assembly.

4. Use concealed fastenings. No exposed screws shall show in the finished work unless approved by the Architect. Such screws shall be countersunk and finish match surfaces in which they occur.

5. Joints shall be accurately cut and fitted to result in a tightly closed joint.

3. DOORS, ENTRANCE SCREENS, INTERIOR SCREENS

1. Frames

1. **"Kawneer Trifab 451UT, Center, Interior Glazed"** thermally broken framing at exterior entrance screens where the door system is stand alone.

2. For product listed above, coordinate with manufacturer and drawings for side light base heights (dimension to match doors) with associated aluminum sill flashing, metal liner, insulation and aluminum panels where indicated on drawings.

2. Conform to CAN3-A440-M90 performance standards Air Leakage to meet the Fixed rating, and Type A3, Water Leakage Type B5 and Wind Resistance Type C7.

3. Doors

   1. Exterior entrance doors to be insulated **"Kawneer 560 InsulClad"** with insulated double glazing. Black anodized finish. (Coordinate with door schedules on Drawings)

   2. Interior screen doors to be coordinated with screen schedules and associated door type schedules.

   2. Coordinate with door schedules for heads and stiles sizing and base height. Adjacent screens / curtain wall bases to match door base height typical.

   3. Provide mid-rail at all doors that require panic devices, coordinate with door schedules for sizing.

   4. The core shall be foamed-in-place urethane foam at density of 5.0 lb./cu.ft. (64 kg.m³). Provide insulated aluminum panel where indicated on drawings.

   5. Stiles shall have a wall thickness of .125". (3.2 mm). Glazing mouldings shall be .050" thick (12.7 mm).

   6. Use snap-in type square glazing stops with neoprene bulb type glazing. Do not use exposed screws to secure stops. Use lock-in, tamperproof type stops.

   7. Equip door leaf with an adjustable mechanism in top rail near the lock stile, to provide for minor clearance adjustments after installation.

4. Door Hardware

   1. Equip all aluminum doors with continuous weather stripping with adjustable weather stripping at the base; and aluminum thresholds, 6mm (1/4") maximum vertical height, over 6mm up to ½" (12.7mm) height to be sloped / bevel in a 1 in 2, 50%. Closer cover to match door finish colour.

   2. Equip all aluminum doors with full height (continuous) Roton concealed leaf geared heavy-duty stainless steel hinge.

   3. All other hardware including concealed closers, exposed closers, locksets, exit device, push/pulls, overhead stops, handicap

automatic door openers to be supplied under Section 08700 – Finishing Hardware and installed under Section 06200 – Finish Carpentry.

4. Locking and security to be coordinated with School Board hardware consultant.

5. All entrance hardware operators to be compatible with accessibility devices and security operation.

5. Finish

1. Prepare and fabricate components as required before finishing.

2. Finish to be clear anodized.

3. Metals other than aluminum shall match colour finishes.

6. Closures, Flashings and Miscellaneous Covers

1. Provide .125" (3 mm) thick aluminum closures and caps where required.

3. EXECUTION

1. INSTALLATION

1. Secure work adequately and accurately to the structure in required position and in manner not restricting thermal movement. Work shall be plumb, square and level, free of twist, warp or other superimposed loads. Provide shims as required.

2. All metal to metal joints shall be sealed to provide a weathertight assembly in accordance with manufacturer's instructions.

3. Use concealed fixings where possible, where not possible use flat head screws in countersunk holes. Exposed bolt or nut heads not permitted. Match exposed fastenings with surfaces on which they occur.

4. Isolate all aluminum coming in contact with unlike materials with heavy shop coating of black alkali resistant bitumastic enamel to prevent electrolytic or chemical reaction.

5. Fill voids between aluminum extrusions and wall surfaces at exterior doors and entrance framing with foam spray applied insulation where required to prevent movement or infiltration of air. Supply and install spray-on insulation as per Section 07215 – Spray-On Insulation.

6. Supply and install all caps and closures where required to create a complete installation and as indicated on the drawings.

2. CAULKING

   1. Caulking between aluminum and aluminum; aluminum and glass to conform to this section. Caulking to perimeter drywall masonry and concrete all by this section as per Section 07900 - Sealants.

   2. Caulking by this Section shall be installed as per Section 07900.

3. GLAZING

   1. Glaze windows in accordance with CAN3-A440-M90.

   2. Set glazing tape against permanent stops, allow 1/8" for cap bead, set horizontal strips first using full width pieces of tape, then set vertical pieces. Butt tape at corners, do not lap tape or run continuous at corners.

   3. Set glass on setting blocks, number as recommended by glass manufacturer. Set glass with draw lines horizontal.

   4. Apply heal bead on interior, using sealant. Place spacer shims, set glazing tape against glass and install stops.

   5. Apply cap bead to fill void on exterior. Tool sealant with a slight bevel, sloped away from the glass to create a water shed.

   6. Mark each light with a large white cross to indicate the presence of glass.

   7. Replace under this section defective, damaged or broken glass due to faulty setting, handling or storage.

   8. Neoprene bulb type glazing in accordance with manufacturer's instructions.

4. ADJUST AND CLEAN

   1. Adjust all hinges, closers and weather stripping for optimum condition. Lubricate operating equipment.

   2. Clean surfaces promptly after installation, exercising care to avoid damage of the protective coating (if any).

   3. Advise the contractor of protective treatment and other precautions required through the remainder of the construction period, to ensure that doors will be without damage or deterioration (other than normal weathering) at the time of acceptance.

   4. Aluminum shall be isolated from concrete, mortar, plaster and dissimilar metal with bituminous paint. Windows shall be protected from other building materials during and after insulation until acceptance by the

General Contractor. Thereafter, it shall be the responsibility of the General Contractor to maintain protection and provide final cleaning.

END OF SECTION

PART 1 GENERAL

1. GENERAL REQUIREMENTS

    1. Division One, General Requirements, is part of this Section and shall apply as if repeated here.

    QUALIFICATIONS

    2. Manufacturers approved for the work of this Section are:

        1. Kawneer Company Limited, Canada
        2. Alumicor

    3. Only those manufacturers listed above shall be used.

    4. It is the responsibility of the approved manufacturers to meet or exceed and submit OBC SB-10 Energy Efficiency Compatibility Results.

        Note: The above-mentioned submittal is to incorporate the specified sealed glazing unit and each opening component as a whole before the shop drawings are accepted or before any shop drawings are reviewed.

2. SHOP DRAWINGS

    1. Submit shop drawings in electronic PDF format in accordance with GC 3.10 of CCDC Document 2- 2008.

    2. Submit shop drawings for the fabrication and installation of associated components of the work. Indicate anchors, joint system, expansion provisions, hardware, and other components not included in manufacturer's standard data. Include glazing details (where required).

    3. Before shop drawings and fabrication are started, take critical measurements at the site to facilitate installation and fitting of work.

    4. Note that shop drawings for translucent glazing units to be part of this section.

    5. Submit with shop drawings certification that window design and construction will meet the specified requirements. Certification shall be in the form of test reports on similar units performed by an independent testing laboratory and shall meet approval of Architect before fabrication commences.

    6. Shop drawings that are submitted are to be in the units of the tendered drawings with critical on centre mullion dimensions (dimension string from datum level to top of opening noting centre of mullions) noted along with all other regular shop drawing dimensions, no exceptions. Both units (metric and imperial) are allowed. Openings are to be identified with the corresponding tags on the tendered drawings.
    (Coordinate with typical A8 drawing notes)

3. SUBMITTALS

   1. Submit samples of window, glazing, fasteners, caulking and finishes / colours for Architect's approval before fabrication.

   2. Furnish templates, diagrams, and other data to fabricators and installers of related work, as needed for coordination installation.

   3. Coordinate with Division 16, Section 08700 Finish Hardware and security subcontractor for any electrical provisions required.

4. WARRANTY

   1. The work and materials of this Section shall be under Warranty in accordance with GC 12.3 of CCDC Document 2 - 2008 but for a period of five (5) years from the date of Architect's Certificate of Substantial Completion. Hermetically sealed glazing units shall be guaranteed for a period of ten (10) years.

   2. Warranty shall include: Warranty against excessive colour changes or surface deterioration of aluminum finishes; complete weather tightness of the curtain wall and aluminum panel system against unreasonable intensity and frequency, or both, of sound by the curtain wall and aluminum panel system installation or its anchorage system or loosening or deforming of any members of the installation.

5. PROTECTION

   1. Mark each light with a large cross to indicate presence of glass (colour that stands out to the visible eye). Use material that will leave no residue after removal.

   2. Replace under the work of this section defective, damaged, or broken glass due to fault setting, handling or storage.

6. OPERATION AND MAINTENANCE DATA

   1. Upon completion of installation, supply standard parts service kit and service manual. Arrange with, and demonstrate to building maintenance staff window operation, sash removal, cleaning, re-glazing, and general maintenance procedures.

7. DESIGN

   1. Conform to latest issue of CAN/CSA-A440 performance standards Air Leakage-Type A3, Water Leakage Type B7, Wind Resistance-Type C5 and a Condensation Resistance Factor - I factor 67.

   2. Design for wind and snow loads as set out by the Ontario Building Code, 2012, as currently amended, for the building location. Copies of any and

all structural calculations made in connection with the supplementary design and/or detailing of the work of this section shall be promptly furnished to the Architect if requested.

3. Supply all connections, brackets, angles and fasteners to tie curtain wall to main structure, floors, columns and beams.

4. Supply all covers, copings, special flashings, filler pieces, termination pieces, caps closures, expansion joint covers and metal bellows, as required and as indicated on drawings including interior side where indicated on drawing.

8. STANDARDS

1. **Kawneer 516 series** Thermally Broken Window System -4" (101.6mm) deep aluminium frames, fixed window system.

2. **Kawneer 526 series** Project -In window compatible with Kawneer 516 fixed aluminium frames. Including; 4 bar hinges, cast white bronze cam locks, weep covers, glass fibre mesh insect screen, stainless steel hardware.

PART 2 PRODUCTS

1. MATERIALS

1. Aluminum: Extruded aluminum alloy members 6063 T5 alloy, minimum 1.6 mm (0.62") thick. Sheet which is not to be exposed shall be Utility Grade.

2. Aluminum Flashing: Supply 0.125" (3.2 mm) thick aluminum to profiles as indicated on drawings.

3. Aluminum Sills: Model #451T-037 aluminum sills shall be complete with Kawneer typical sill anchors, joint covers, match Kawneer 526-008, chairs, anchoring devices and jamb drip deflectors. Extruded sills to have profile with minimum 1/8" (3 mm) thickness and depth of sill as required. Sills shall be in longest possible lengths, joints only at mullions.

   NOTE: Aluminum sills to be provided at bottom of all windows and curtain wall locations as detailed.

4. Vision Glass: as per 08800 Glass and Glazing Section.

5. Glazing Tape: Tremco 440 tape with built in shim as recommended by manufacturer, colour selected by Architect.

6. Spacer Shim: oil resistant rubber of plastic acceptable to glass manufacturer, channel shaped and each approximately 4" (100 mm) long.

7. Thermal Break: virgin polyvinyl chloride.

8. Isolating Coating: Black alkali resistant bitumastic enamel.

9. Sealant Bond Breaker: Open cell foam backer rod sized to suit.

10. Silicone Sealant: Dow Corning #795 or as per manufacturer's recommendations exceeding CAN2-19.13-M87 Class 40 requirements. Min 2 colours as selected by Architect.

11. Sealant at Perimeter Masonry Openings: 3-part Tremco Dymeric 240 sealant in accordance with Caulking - Section 07900 (Type A sealant). Minimum 2 colours as selected by Architect.

12. Fasteners, Screws and Bolts: Stainless steel 300 Series or stainless steel 400 Series cadmium plated of sufficient size and quality to perform their intended function.

13. All other materials shall conform to NAAMM Standard SW-1-68T.

9. FABRICATION

1. General

1. Construct aluminum assemblies of extruded section to size and profile shown on drawings.

2. Build units, square, true, accurate to size, free from distortions, waves, twists, buckles or other defects detrimental to performance or appearance.

3. Units too large for handling or shipping shall be prefabricated in factory, disassembled and marked for shipping and field assembly.

4. Use concealed fastenings. No exposed screws shall show in the finished work where finished product is exposed to view, unless approved by the Architect. Such screws shall be countersunk and finished to match surfaces in which they occur.

5. Fabricate windows as follows:

1. Cope and butt all joints in main frame, neatly in weather tight manner and secure by means of screws anchored into integral screw ports.

2. Deburr and make smooth all sharp milled edges and corners of frames.

3. Provide sill members with minimum 7 degree slope. Aluminum sills shall be complete with required anchors, joint covers, and drip deflectors. Extruded sill to profile

shown in longest possible lengths. Provide upturn drip - deflectors at ends of sill.

4. Provide sill weep system which will facilitate drainage of water accumulating in sill area while preventing passage of air, dirt and insects to interior.

5. Fabricate and anchor frames using specific screw fasteners without violating the thermal break. Exposed fasteners or pop rivets are not acceptable.

6. Fabricate entire window in a manner that will allow easy replacement of any defective, damaged or worn components, hardware or weather stripping.

7. Fabricate windows so that the aluminum head and sill members are continuous for the entire length of the frame and extend over and beneath the jamb members.

2. Finish

1. All to be clear anodized finish (Kawneer #17 finish).

PART 3 EXECUTION

1. INSTALLATION

1. Install work in accordance with manufacturer's recommendations and with standards specified herein.

2. Work shall include all fixings, clips stiffeners, trim pieces, sills condensation gutter, etc., as required for a complete installation.

3. Install windows plumb, level and true relative to building structure. Do not exceed 1/8" (3 mm) in 10'-0" (3050 mm) variation from plumb and level.

4. Provide all required expansion joints.

5. Isolation: isolate all aluminum coming in contact with other metals, masonry or concrete with heavy shop coating of black alkali resistant bitumastic paint.

6. All fixings shall be concealed.

7. Wood shall not be used for shimming or blocking.

8. Fill voids in aluminum extrusions and between masonry surfaces at all perimeters with foam spray applied insulation as specified in Section 07215 to prevent movement or infiltration of air.

2. CAULKING

   1. Work shall include caulking at all joints between aluminum frame members. All perimeter window caulking to surrounding finishes to conform to Section 07900 and be installed by this Section 08520.

   2. Caulk in accordance with materials and procedures as Section 07900.

3. GLAZING

   1. Set glazing tape against permanent stops, allow 4 mm for heal bead, set horizontal strips first using fill width pieces of tape, then set vertical pieces. Butt tape at corners, do not run tape or run continuous at corners.

   2. Set glass on setting blocks, number as recommended by glass manufacturer. Set glass with draw lines horizontal.

   3. Apply heal bead on interior using sealant. Place spacer shims set glazing tape against glass and install stops.

   4. Apply cap bead to fill void on exterior tool sealant with a slight bevel, sloped away from the glass to create a water shed.

   5. Mark each light with a large white cross to indicate presence of glass. Use flour and water paste for markings.

   6. Replace under the work of this section defective, damaged, or broken glass due to faulty setting, handling or storage.

   7. Neoprene bulb type glazing in accordance with manufacturer's instructions.

4. ADJUST AND CLEAN

   1. Clean surfaces promptly after installation, exercising care to avoid damage of the protective coating (if any).

   2. Advise the Contractor of protective treatment and other precautions required through the remainder of the construction period, to ensure that windows will be without damage or deterioration (other than normal weathering) at the time of acceptance.

   3. Aluminum shall be isolated from concrete, mortar, plaster and dissimilar metal with bituminous paint. Windows shall be protected from other building materials during and after installation until acceptance by the Contractor. Thereafter, it shall be the responsibility of the Contractor to maintain protection and provide final cleaning.

END OF SECTION

PART 1 GENERAL

1. GENERAL REQUIREMENTS

    1. Division One, General Requirements, is a part of this section and shall apply as if repeated here.

2. WARRANTY

    1. The Work under this Section shall be warrantied in accordance with GC 12.3 of CCDC-2 as currently amended but for a period of 10 years on insulated units and 5 years on all other work from the date of Consultant's Certificate of Substantial Completion.

3. PROTECTION

    1. Mark each light with a large cross to indicate presence of glass (colour that stands out to the visible eye). Use material that will leave no residue after removal.

    2. Replace under the work of this section, defective, damaged or broken glass due to faulty setting, handling or storage.

4. SUBMITTALS

    1. Submit shop drawings in accordance with CCDC-2 as currently amended and Section 01300 - Submittals.

5. STANDARDS

    1. Design in conformance with CAN/CGSB-12.20-M, structural design of glass for buildings.

PART 2 PRODUCTS

1. MATERIALS (all exposed glass edges shall be polished and chamfered typical)

    1. Tempered Glass: 1/4" (6 mm) minimum clear glass tempered conforming to CAN/CGSB - 12.1 M90 equal to Ford Glass.

    2. Glazing Tape: Tremco 440 tape and as indicated in other glass sections, also to be confirmed by manufacturer's written recommendations.

    3. Sealant: CWS by Dow Corning.

    4. Heal Bead Sealant: One-part polysulphide or acrylic sealant conforming to CGSB 19-GP-5 and as indicated in other glass sections.

    5. Spacer Shims: neoprene, Shore "A" durometer hardness 80, 3" (75 mm) long x 0.08" (2.4 mm) thick and 3/8" (9 mm) high.

6. Setting Blocks: neoprene, Shore "A" durometer hardness, 4" (100 mm) long x ¼" (6 mm) high x width to suit glass thickness.

7. Primer: Sealers and cleaners to glass manufacturer's standard

8. Vision Glass(GL): Sealed insulated glass units, ten (10) year guarantee, ½" (12.7)90% argon and 10% air space, hermetically sealed, insulating units conforming to CAN/CGSB - 12.8 - M90 and with thermally broken stainless-steel glazing spacer. Warm edge spacer is only allowed in curved glazing units.

   NOTE: colour selection of glass to be confirmed by Consultant prior to manufacturing.

   1. Outer Light Glass Types:

      1. 6mm (1/4") Tempered Solargray with Solarban 70XL (Surface 2) by P.P.G. Canada or approved equal at all vision locations. Colour to be confirmed with Architect prior to fabrication.

   2. Inner Light Glass Type:

      1. 6mm (1/4") Clear Tempered by P.P.G. Canada or equal.

9. Vision Glass for Exterior Entrance Doors, Basement Windows (LSG): Sealed insulated glass units, ten (10) year guarantee, ½" (12.7 mm) air space filled with 90% Argon and 10% air, hermetically sealed with stainless steel thermally broken glazing spacer (warm edge spacer to be used only at radius / curved glazing units) insulating units conforming to CAN/CGSB - 12.8 - M90.

   1. Outer Light Glass Types:

      1. 6mm Heat Strengthened Clear / .090 PVB interlayer / 4mm Heat Strengthened Solargray by TRULITE or equal (9.525mm (3/8") air space)

   2. Inner Light Glass Type

      1. 6mm Solarban 70XL (3) Clear Tempered by TRULITE or equal.

10. NOTE: Applicable details for glazing, to manufacturer for the assembly in which the glazing is installed, to be submitted in shop drawings stamped by a professional engineer before any manufacturing. Glazing tape to be as per manufacturer's written recommendations.

PART 3 EXECUTION

1. WORKMANSHIP

    1. Installation of glass shall be by workmen skilled in this trade and done in strict accordance with material manufacturer's directions to produce a first-class installation.

    2. Accurately cut glass to fit opening and provide for glass expansion.

    3. Carefully remove glazing stops and replace after glazing. Exercise care to prevent damage to stops.
    4. Collect all glass cuttings in boxes and remove when cleaning up debris.

    5. Cut glass and mirrors from dimensions taken in field.

    6. Remove protective coatings and clean contact surfaces with solvents and wipe dry.

    7. Apply primer-sealer to contact surfaces.

2. DOORS, SIDELIGHTS AND SCREENS

    1. Interior Lights

        1. Glaze with glass as indicated, using mastic glazing compound.

        2. Set glass with equal bearing full width of pane. Use setting blocks as per manufacturer's instructions.

        3. Apply thin layer of mastic compound to rebate, set glass, then press until even bed is secured, sprig and run face compound, replace removable stops.

        4. Insert spacer shims to centre glass in space. Place shims at 2'-0" (600 mm) o.c. and keep 1/4" (6mm) below the sight line.

        5. Installation shall be rattle free.

    2. Exterior Lights

        1. Set glazing tape against permanent stops, allow 1/8" (3.2 mm) for cap bead, set horizontal strips first using full width pieces of tape, then set vertical pieces. Butt tapes at corners, do not lap tape or run continuously.

        2. Set glass on setting blocks, quantity as recommended by glass manufacturer. Set glass with draw lines horizontal.

        3. Apply heal bead on interior using sealant. Place spacer shims, at

2'-0" (600mm) o.c. and keep ¼" (6mm) below the sight line. Set glazing tape against glass and install stops.

4. Apply cap bead to fill void on exterior. Tool sealant with a slight bevel, sloped away from glass to form a water shed.

3. ALUMINUM WINDOWS, ENTRANCE FRAMING AND DOORS

1. Specified under this Section.

4. FINISHING

1. Immediately remove sealant and compound droppings from finished surfaces. Remove labels after work is completed and inspected by Consultant.

END OF SECTION

PART 1 GENERAL

1. GENERAL REQUIREMENTS

    1. Division One - General Requirements are part of this section and shall apply as if repeated here.

2. QUALIFICATIONS

    1. Conform to CSA A82.30-M1980 including appendices.

PART 2 PRODUCTS

1. MATERIALS

    1. Non-load-bearing channel stud framing less than 4800 mm long: to ASTM C645-83 size as noted on drawings, roll formed from 25-gauge (0.53 mm) thickness electro galvanized steel sheet; for screw attachment of gypsum board. Knock-out service holes at 1'-6" (460 mm) centres.

    1. Floor and ceiling tracks: to ASTM C645-83; in widths to suit stud sizes, 1 1/4" (32 mm) flange height. Use hot dipped galvanized units at exterior wall and exterior canopy locations.

    2. Metal channel stiffener: size to suit studs, 2 mm thick cold rolled steel, coated with rust inhibitive coating. Use hot dipped galvanized units at exterior wall and exterior canopy locations.

    3. Bridging channels and diagonal tension straps (load bearing stud systems): material and gauge to match studs, let into or surface fastened to studs for diagonal/lateral bracing and reinforcement.

    4. Screws: CGC Branch Screws (or approved equal) of type recommended in the selector guide on Page 5 of Canadian Gypsum Brochure 09250 - 1E. Use hot dipped galvanized or epoxy coated fasteners at exterior walls and canopies.

    5. Furring Channels: 7/8" (22 mm) x 2 3/4" (70 mm), 25 Ga. (18 mils), cold rolled galvanized after fabrication, types manufactured by Bailey Metal Products Limited, D-1001, Donn Products, Universal Sections or Canadian Gypsum Co. to meet CSA A82.30-M1980. Use hot dipped galvanized units at exterior walls and canopies.

    6. Resilient Channels: 1/2" (13mm) x 2 1/4" (57mm), Bailey RC Plus, manufactured by Bailey Metal Products Limited, Model No. D-1007, to meet ASTM A653/A653-11. Use G40 galvanizing to ASTM C754-11.

    7. Carrying Channels: 1 1/2" (38 mm) x 6 lbs./10 ft. (892 g/m) cold rolled steel after fabrication to meet CSA A82.30-M1980. Use hot dipped galvanized

units at exterior walls and canopies.

8. Anchors: to meet CSA A82.30-M1980 standard.

9. Acoustical Sealant: Acoustical sealant to CGSB 19-GP-21M by Tremco or approved equal.

10. Insulating Strip: Rubberized, moisture resistant 1/8" (3mm) thick foamstrip, ½" (12mm) wide with self-sticking adhesive on one face, lengths as required.

11. Blocking: Bailey Backer Bar, interior partition use

PART 3 EXECUTION

1. GENERAL

1. Installation shall be by mechanics skilled in this trade and done in accordance with best standard practice and material manufacturer's printed directions.

2. Do not cover piping, conduit, duct and the like until inspected and approved by the Architect.

3. Furring indicated shall not be regarded as exact or complete.

4. Method of framing and furring left to Contractor's option but shall result in a rigid, secure, plumb framing and forming, erected to maintain overall sizes as indicated and of adequate strength to support without distortion of the facing indicated. Wall furring and suspended and furred ceilings must be installed to meet CSA A82.31-M1980 except where specified otherwise.

5. Do not make fastenings to ducts, pipes, conduit, door frames, backers or inserts of other trades not specifically intended for fastening metal furring.

6. The completed installation of framing and furring must allow drywall to be installed free of waves, depressions, other defects that would mar the finished appearance.

2. PARTITIONS

1. Install partition tracks at top and bottom of studs, align accurately, and make allowance for deflection under beams and structural slabs to avoid transmission of structural loads to studs. Use 2" (50 mm) leg ceiling track.

2. Secure tracks to concrete and steel with power actuated fasteners at a min. 24" (600 mm) o.c.

3. Install dampproof course (vapour barrier) under stud shoe tracks of partitions on slabs-on-grade.

4. Place studs vertically at 16" (400 mm) centres and not more than 2" (50 mm) from abutting walls, openings and each side of corners. Secure studs to tracks at floor and ceiling using screws or crimp method. Place interior heavy-duty studs vertically at 12" (300 mm) centres where indicated on drawings.

5. When necessary, splice studs with 8" (200 mm) nested lap and one positive attachment per stud flange. Place studs in direct contact with door frame jambs, abutting partitions, partition corners and existing construction elements. Where studs are installed directly against uninsulated surfaces install insulating strips between studs and wall surfaces.

6. Anchor studs for shelf-walls and those adjacent to door and window frames, partition intersections and corners to ceiling and floor runner flanges with an approved crimping tool. Securely anchor studs to jamb and head anchor clips of door or borrowed-light frames, place horizontally a cut-to-length section of runner, with a web-flange bent at each end, and secure with one positive attachment per flange. Position a cut-to-length stud (extending to ceiling runner) at vertical panel joints over door frame header.

7. Install heavy gauge single jamb studs at all openings.

8. Erect metal studding to tolerance of 1:1200.

9. Stiffen partitions exceeding 8' (2400 mm) in height and/or 10' (3000 mm) in length with 3/4" (19 mm) channel bracing extending horizontally across the length of the partition. Provide one horizontal stiffener for partitions under 12' (3600 mm) high; at least two horizontal stiffeners for partitions 12 or more feet high (3600 or more mm), at maximum 6' (1800 mm) centres. Install metal strapping securing stud to masonry or concrete walls at every other stud where horizontal stiffeners occur. Provide other partition reinforcing necessary to support wall hung components, cupboards, closets and the like. Use 2 studs at jambs of openings and corners.

10. Where horizontal runs of service lines are to be installed within the partition, erect studs with web openings aligned.

11. Provide reinforcing and necessary stiffeners to support hollow metal screens. Reinforcing to be capable of supporting screens rigidly and solid without deflection.

12. Work includes the installation of hollow metal frames.

13. All fire rated partitions must be installed from floor to underside of floor slab at ceiling above.

14. Provide horizontal 25 ga. metal anchor strips with wood blocking behind it for blocking behind wood base millwork tackboard and chalkboard, etc. All wood blocking for trim, base, millwork, miscellaneous specialties, to be installed by Section 06100 after erection of metal studs and ceiling suspension system.

3. RESILIENT CHANNELLING ON PARTITIONS AND WALLS

1. Work includes as below:

2. Installation on Substrate: new and existing (on wood stud framing, metal stud framing, concrete block masonry, brick masonry, poured in place concrete, bulkheads, and all other substrates not noted, that is exposed and seen by line of sight)

1. Walls are to be flat and an even / level & plumb plane, install resilient channelling, blocking, shims as required to achieve this. A wavy wall will not be accepted – wall types do not have to state this in order for it to be installed.

2. Install resilient channelling (13mm – ½" min.) at 400mm o/c maximum horizontally on substrate framing as to manufacturer's installation instructions (it is important which direction the fastened side is orientated). Ensure substrate framing is adequate to support loading of wall finish and resilient channelling loadings as per manufacturer's installation instructions / recommendations.

3. Resilient channelling should not be required on new framed wall systems (unless noted otherwise on wall types) as these should be an even / level and plumb plane when installed – if not the framing is to be rectified.

4. Also consult manufacturer's installation instructions for other requirements that are to be met.

5. Erect resilient channelling to tolerance of 1:1200.

4. BULKHEADS

1. Work includes fire separations in ceiling space, drywall surfaces above windows and bulkheads to suspended ceilings.

2. Install steel studs and furring of sizes shown at 16" (400 mm) o.c. or as shown.

3. Furring indicated shall not be regarded as exact or complete. Provide

adequate bracing at bulkheads to structure to ensure a rigid installation and to meet CSA A82.31-M1980.

4. Locate bulkhead furring no more than 2" (50 mm) from corners abutting partitions or other construction.

5. CONSTRUCTION OF SOUND ATTENUATED PARTITIONS

1. Install insulating strips under studs and tracks around perimeter of sound control partitions. Install acoustical sealant at joints at each side of studs and tracks, against insulating strips between studs and tracks and floor, wall or underside of floor or roof deck above.

END OF SECTION

PART 1 - GENERAL

1. GENERAL REQUIREMENTS

    1. Division One, General Requirements, is a part of this section and shall apply as if repeated here.

2. DESCRIPTION

    1. Work of this Section includes:

        .1 Gypsum wallboard to partitions, ceilings, bulkheads furring and wall facings at all areas.

        .2 Products finished by, but not supplied under this section is 06260 Solid Mineral Profile Panelling.

3. QUALIFICATIONS

    1. Contractor for this work to have a minimum of five years' experience in installation of wallboard.

    2. Install work to CSA A82.31-M1980, C.G.C., Drywall Construction Handbook and the Manual of Gypsum Wallboard Construction by Gypsum Drywall Contractor's International except where specified otherwise.

4. DELIVERY, STORAGE

    1. Store materials in a dry weather proof enclosure. Store wallboard flat, in piles without overhanging boards.

    2. Do not install damaged or deteriorated material but remove from site.

    3. Materials as delivered shall bear the manufacturer's name branch name of material and where applicable, CAN/CSA classification.

5. JOB CONDITIONS

    1. Air and surface temperature: Minimum 54 F (12 C) and maximum 77 F (25 C) for 24 hours before, during and until entire installation is complete.

    2. Ensure proper ventilation, during and following joint treatment, to eliminate excessive moisture.

    3. Examine surfaces in which wallboard is to be attached and check environmental conditions and do not commence work until surfaces and conditions are satisfactory.

4. Commencement of work will denote acceptance of conditions.

6. PROTECTION

1. Protect work of other sections against damage resulting from work of this section. Repair and make good to approval, damage to other sections caused by this work.

PART 2 - PRODUCTS

1. MATERIALS

1. Gypsum Wallboard:

.1 Manufacturer: Specification is generally based on Canadian Gypsum Co. Ltd. material but equivalent materials by other manufacturers are acceptable.

.2 Backing Board and Gypsum Coreboard: CSA A82.27-M1977.

.3 Gypsum Wallboard: CSA A82.27-M1977. Use Type 'X' (special fire retardant) board such as CGC Firecode 'C' when fire rating is required, 16 mm, (5/8") thick. Use board with round or tapered edges.

2. Accessories:

.1 Casing beads, corner beads, fill type: 24 ga. (0.5 mm) base thickness commercial grade sheet steel with G90 zinc finish to ASTM A525-80A; perforated flanges; one piece length per location.

NOTE: Use Beadex U Trim (thickness as required) where "J" mould is indicated on drawings as manufactured by BeadeX Manufacturing Company Inc.

.2 Screws: C.G.S. Brand Screws Type S. 1" (25 mm) and 1 ½" (38 mm) as required to C.S.A. A82.31-M1980. For exterior Sheathing and tile backer board use 1 1/4" Bugle head fine thread rust resistant drillpoint drywall screw (type S-12).

.3 Joint Treatment Material: CGC MC "All-Purpose" and CGC MC "Joint Topping" compounds - to ASTM 0474 and 0475. Use materials recommended by board manufacturer for the proposed

use. Material shall be pre-mixed, ready to use, in sealed cans.

.4 Reinforcing Tape: Perf-a-Tape by CGC or equal.

.5 Adhesive: CGC "Durabond" 90 pre-mixed, ready to use in sealed cans.

.6 Acoustic Materials:

1. Acoustical Caulking: Acoustical sealant by Tremco or approved equal to CGSB 19-GP-21M.

2. Sound Attenuation Batts: Section 07213 Mineral Fibre Insulation

.7 Control Joint: equal to C.G.C. control joint No. 093.

.8 Thermal Break: Permanent adhesive faced rubberized cork, 1/8" (3 mm) thick by width required.

.9 Stud adhesive: to C.G.S.B. 71 GP-25M.

PART 3 - EXECUTION

1. EXAMINATION

1. Examine surfaces and other conditions on which work of this Section depends and do not proceed until conditions are suitable.

2. Commencement of work will denote acceptance of conditions.

2. GYPSUM BOARD INSTALLATION

1. General:

.1 Do not install gypsum board until work of other Trades which will be covered by the board has been installed and approved.

.2 Use board of maximum practical length to reduce number of end joints. Install control joints in long runs of board.

.3 Fit ends and edges closely, but do not force together.

.4 Attach board to framing using screws, not nails.

2. Installation on Stud Framing:

.1 Install board vertically or horizontally whichever results in fewer end joints, use longest possible lengths. Cut and fit boards around openings, beams, joists, ducts, light fixtures and similar items. Install board up to underside of slab or metal deck above to provide sound insulated walls and fire separations.

.2 Minimize gypsum board joints over openings. Use one piece application to span over opening width where board lengths allow. There is to be no board joint directly over / above edge condition of opening.

.3 Position edges over supports for vertical or horizontal application.

.4 For single layer vertical application space screws 12" (300 mm) o.c. for field of panel and 6" (150 mm) o.c. staggered, along vertical abutting edges. For horizontal application space screws 12" (300 mm) o.c. in field and 8" (200 mm) and along abutting end joints. For double layer application, stagger joints in second layer of boards, a minimum of one-stud spacing in both directions and fasten with screws as before.

3. Install board continuously above ceiling at exterior walls to support vapour barrier where it occurs.

3. FIRE RATING

1. Conform with following for fire rated partitions, ceilings and bulkheads:

.1 Fire resistant ratings called for on drawings and schedules.

.2 Appropriate codes and regulations.

.3 Use "Firecode C" or approved equivalent gypsum board.

4. FINISHING

1. Mix joint compound (powder) in accordance with manufacturer's printed instructions.

2. Prefill "V" grooves of rounded edges with Durabond 90 compound. Finish flush with tapered surface ready for reinforcing tape application. Allow pre-fill material to dry thoroughly before application of embedding compound and tape.

3. Apply "All-Purpose" compound in thin uniform layer; embed reinforcing tape accurately centred on joint, securely pressed in, leaving sufficient

compound under tape to provide proper bond. Immediately apply skim coat over tape application. Allow to dry thoroughly before application of filler coat.

4. Apply filler coat of "Topping" compound such that taper depression is flush with board surfaces. Allow to dry thoroughly before application of finish coat.

5. Apply finish coat of "Topping" compound extending slightly beyond the filler coat and feathered out onto the board surface.

6. Sand between coats and following the finish coat, where necessary, and leave surface smooth and ready for painting.

7. Finish screw depressions with filler material and finish coat as specified in 4. and 5. above.

8. Joint and depression finish shall in no case protrude beyond the plane of the board surface.

9. Finish corner beads and metal trim flush with board surface using filler and finishing coats feathered out approximately 2" (50 mm) and 4" (100 mm) respectively onto the board surface to ensure that metal visible only at arris.

10. Fill and tape joints and internal corners and fill screw depressions in board face and smooth out along corner beads and metal trim with joint compound.

11. Provide specified metal trim and control joints at exposed edges, at junctions of drywall with dissimilar material, at control joints and at junction with columns. Fasten with screws at 12" (300 mm) o.c. along entire length.

12. Cut out a 'V' at all butt joints and install Durabond 90 then complete with filler and topping coats.

13. Avoid sanding adjacent paper surface of boards.

5. CLEANING

1. Clean thoroughly and remove all excess materials from other surfaces.

2. Remove all excess materials as job proceeds and at completion.

6. 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 6" (160 mm) o.c. for full length.

2. Install "J" molds around perimeter of suspended ceilings.

3. Install "J" molds where gypsum board butts against surfaces having no trim concealing junction and where indicated.

4. Install aluminum reveals at all locations as indicated on drawings. Install tape and joint material tight to edges of tape type "reveals". Aluminum reveal to be extruded Alloy 6063-T5 with chemical conversion coating. Primed painted – factory sprayed and baked-on coating to serve as base for field painting. Final paint as per specification Section 09900 and to be selected by Architect prior to manufacturing.

   .1 25mm “F” Reveal Molding DRMF-625-100 by Fry Reglet or approved equal, where indicated on drawings.

   .2 19mm “F” Acoustical Reveal – FARM-875-75 by Fry Reglet or approved equal.

   .3 6mm channel screed Model PCS-75-25/25 by Fry reglet or approved equal, between wall wood panels (all horizontal and vertical applications) and where indicated on drawings.

7. ACCESS PANELS

1. Ceiling access panels to be 18" x 18" (460 mm x 460 mm) drywall to match adjacent ceiling finishes except at fire rated ceilings, and as noted on drawings.

2. Provide "J" molds at exposed drywall edges of panel and at ceiling opening.

3. Reinforce panel with 3/4" (19 mm) fire retardant plywood backer as required.

4. Install access panels at wall locations provided by Divisions 15 and 16.

5. Rigidly secure frames to furring or framing systems.

8. CERTIFICATION

1. Provide at completion of work a written certification that all drywall work

where applicable conforms to the required ULC fire rated assemblies.

9. ACOUSTICAL MATERIALS

1. Install a continuous double row of caulking beads around perimeter of partitions which are indicated as containing sound attenuation batts.

2. Install sound attenuation batts in partitions where shown, with air space consistently on one side. Continue batts behind electrical boxes and conduits and all other services and items installed in partitions.

3. Provide caulking around all ducts, pipes, conduits and other items passing through partitions

4. Caulk all openings in wall and through base and ceiling plates for plumbing.

5. Electrical Outlets: cut holes neatly to reduce leaks. Caulk it tight around outlets before plate is installed. Do same for wall mounted fixture outlets before fixtures installed.

6. Bring early to General Contractor's attention that no electrical outlets are to be back to back in sound control walls. Consult Electrical Engineer.

7. Caulk edge of drywall to studs at perimeter of wall with 2 beads of caulking.

8. Installation of acoustical walls shall be from floor to bottom of floor above (not ceiling height) and sealed at all perimeters (including voids in metal deck).

10. FIRE STOPPING

1. Provide gypsum wallboard and furring as required to box in around steel joists at top of masonry and gypsum wallboard partitions including cross walls parallel to steel joists as per drawings.

2. All firestop sealants and backup mineral wool by Section 07270 - Firestopping and Smoke Seals.

END OF SECTION

PART 1 GENERAL

1. GENERAL REQUIREMENTS

    1. Division One is a part of this Section and shall apply as if repeated here.

2. DESCRIPTION OF SYSTEMS

    1. Lay-in Tile System: Exposed suspended tee-bar system accommodating 2'-0" x 4'-0" (610 mm x 1220 mm), acoustical panels in areas as indicated drawings and reflected ceiling plans as acoustical tile ceiling.

    2. All tile and suspension systems shall comply to U.L.C. Design as indicated on drawings.

3. SAMPLES

    1. Submit for approval, two samples (to match existing as closely as possible) of tile to be used in the project.

4. WORK INCLUDED

    1. This contractor shall supply and install all acoustic tile and required accessories as indicated on the working drawings, room finish schedule, including the following:

        1. All non-combustible ceiling boards.

        2. All exposed "T" grid suspension systems.

5. MAINTENANCE MATERIALS

    1. Deliver acoustical units in packages for maintenance use amounting to 3% of gross ceiling area for each lay-in panel type. Store where directed. Clearly identify packages.

    2. Maintenance materials shall be of same production run as installed materials.

6. ENVIRONMENTAL CONDITIONS

    1. Commence installation only after building has been enclosed and dust generating activities have been completed.

    2. Permit wet work to dry completely before commencement of installation.

    3. Ensure that a uniform minimum temperature of 15 deg. C. and humidity of 20-40% before, during, and after installation is maintained.

7. LETTER OF CERTIFICATION

    1. The Contractor, together with manufacturer, shall submit a written confirmation, signed by manufacturer's registered professional engineer, stating that the suspended ceiling system will provide adequate support for electrical fixtures, as required by current bulletin of the ESA of Ontario Hydro. NOTE: all electrical fixtures to have independent supports in fire rated ceilings.

8. WARRANTY

    1. Provide 10-year warranty on ceiling tiles for humidity and sag resistance.

PART 2 PRODUCTS

1. Lay-in Tile System:

    1. Hangers: Min. No. 12 (2.5 mm) SWG galvanized mild steel hanger wire - 24" (600 mm) o.c. or galvanized steel wire of size capable of safety supporting anticipated ceiling system and loading.

2. Tees: Donn Suspension Systems by C.G.C. (Typical Lay In)

    3. Tees: Armstrong Prelude XL 15/16” suspension Systems for square lay in tile system

        1. Main Tees: .021" (.53 mm) thick cold rolled steel, double web, with rectangular bulb section at least l 1/2" (38 mm) high. Fabricate with punched cross tee holes at not greater than 16" (400 mm) o.c. and hanger wire holes at 2" (50 mm) o.c. Exposed flange shall be 15/16" (23.8 mm) wide and not less than .009" (.23 mm) thick cold rolled steel.

        2. Cross Tees: Double web design with rectangular bulb; web extending to form a positive interlock with main tees in same exposed flange width.

        3. See lay-in panel types for width of Tees to be used with each tile type.

    4. Accessories:

        1. Miscellaneous approved clips, splicers, screws, nails and other standard types to suit applicable conditions. Provide special accessories as required. Accessories shall be galvanized after forming.

        2. Standard edge moulding as manufactured by system manufacturer to suit applicable details. Moulding shall be formed of zinc coated steel.

3. Provide Armstrong Impact Clip System Item No. 414 system. Provide accessible type clips where access is required (coordinate with mechanical and electrical for locations)

5. Finish:

1. Tees, edge mouldings, and exposed accessories shall be finished with baked, non-yellowing, low sheen colour to match colour of lay-in panels. Colour to be White.

6. Lay-in Panels:

1. Install tile types where acoustic tile is indicated on room finish schedule. Mineral tile types are as listed below:

1. AT1: Fine Fissure 1729, Square Lay-in 15/16 grid- 24" x 48" x 5/8" (610mm x 1220mm x 16mm) with square lay-in edge detail as manufactured by Armstrong or equal by C.G.C. or Celotex. CO.

7. Tie Wire: 1.2 mm galvanized annealed steel wire.

8. Inserts and attachments to Structure for Hanger Connections: to suit conditions and loadings, galvanized after fabrication.

PART 3 EXECUTION

1. WORKMANSHIP

1. Installation shall be by skilled mechanics and in strict accordance with system manufacturer's printed directions to produce a first class, flush finished surface in true plane and free from drooping, warped, uneven joints, damaged tile or panels. Butt joints tightly.

2. Consult with mechanical and electrical trades to co-ordinate and arrange work to accommodate recessed fixtures, diffusers, grilles, and other similar items, where indicated on mechanical and electrical drawings. Recessed items shall replace or be centred in acoustical units.

3. Frame around recessed fixtures, diffusers, grilles and openings and where normally required in good standard practice.

4. Provide all furring required and construct drywall bulkhead, incorporated as part of best standard practice to Architect's approval.

5. Provide and install protection panels and/or five-sided box enclosures at recessed lighting fixtures, speaker boxes, diffusers, duct openings, firestop flaps, etc. as specified in the applicable ULC assembly specification. Approval of enclosures and protection will be by Architect and/or Municipal Authorities.

2. ERECTION

1. Lay-in Tile System

1. Install ceiling suspension system to ASTM C636-76 and manufacturer's instructions, except where specified otherwise.

2. Supply hangers and inserts to support the grid in time to be installed in structural system if required.

3. Hangers for acoustic systems shall be spaced to comply to U.L.C. Design, approximately 4 ft. (1200 mm) centres both ways and where normally required in good standard practice.

4. Secure hangers firmly.

5. Erect carrying channels for suspended systems of required elevation and level to tolerance of 1/8" (3.2 mm) over 12 ft. (3650 mm). Frame around recessed fixtures, diffusers, grilles and openings and where normally required in good standard practice. Furr around ducts, beams, bulkheads or the like, as shown or required by U.L.C. Standard.

6. Ensure that the suspension system supports the completed assembly, including all superimposed loads, such as lighting fixtures, diffusers and grilles, with a maximum deflection of 1/360 of the span. Provide supplemental hangers within 6" (150 mm) of each corner and at maximum 2'-0" (610 mm) around perimeter of light fixtures.

7. Attach exposed tees at centres required in good standard practice.

8. Install expansion joints in all main beams as required by U.L.C.

9. Provide angle wall mouldings at junctions of ceilings and vertical surfaces.

10. Provide spring clips to ensure tight installation, in rooms having an area less than 20 sq. ft. (1800 mm2).

11. Provide lay-in tile and grid to meet fire rating at all fire rated ceilings.

12. Erect ceiling system at required elevation and level to tolerance of 1/8" (3 mm) in 12'-0" (3660 mm).

13. Cut reveal edges to match factory detail at all reveal edge lay-in ceiling that needs cutting to fit grid size.

3. FIXTURE SUSPENSION

    1. Make provisions for carrying flush mounted and recessed fixtures on suspended ceilings, using 4 hangers per fixture. Consult and coordinate with Electrical and Mechanical Trades.

    2. The suspended ceiling system must comply with the current bulletin from the Electrical Inspection Department of Ontario Hydro regarding "Lighting Fixtures in Suspended Ceilings".

    3. It is the responsibility of this contractor to supply the Architect with a letter stating that the suspension system is capable of holding the electrical fixtures as shown on the electrical drawings and as required by the above bulletin of the Electrical Inspection Department of Ontario Hydro.

4. MITRED JOINTS

    1. "T" bar ceiling grid to be mitred at the outside corners.

5. ACOUSTICAL UNITS

    1. Install acoustical units parallel to building lines to produce uniform borders and with edge units not less than 50% of unit width.

    2. Accurately scribe and cut acoustical units to fit recessed items and adjacent work. Butt joints tight; terminate edges with moulding.

6. SPECIAL CLEANING

    1. Keep acoustical panel installation and all components clean.

    2. Remove and replace damaged or improperly installed units.

7. MECHANICAL EQUIPMENT ACCESS

    1. Install "T" bar system to allow it to be removed easily at areas where mechanical units occur to allow units to be easily removed. NOTE: Stop main "T" on each side of equipment access.

8. IMPACT CLIPS

    1. Install Impact Clip System at all acoustic tile ceiling areas.

9. CERTIFICATION

    1. Provide at completion of work a written certification that all ceiling conforms to the requirements of the ULC design criteria for fire rated assemblies and that the suspended ceiling will provide adequate support electrical fixtures as per current bulletin of the ESA of Ontario Hydro.

END OF SECTION

PART 1 GENERAL

1. GENERAL REQUIREMENTS

   1. Division One, General Requirements, is a part of this Section and shall apply as if repeated here.

2. SUBMITTALS

   1. Samples

      1. Prepare samples of various finishes for Architect's approval either on site or by submitting samples as directed, at least thirty days before materials are required. Submit samples in triplicate on 8" x 12" (200 mm x 300 mm) material. Identify each sample as to job, finish, formula, colour name, number, sheen name and gloss units, date and name of Subcontractor.

3. PRODUCT HANDLING

   1. Delivery and Storage

      1. Deliver materials to site in their original containers with label intact and store in spaces directed by Architect. Keep stored materials covered at all times and take all necessary precaution against fire.

      2. Provide C02 fire extinguisher of minimum 20 lbs. (9 kg.) capacity in storage area.

4. ENVIRONMENTAL CONDITIONS

   1. Do not paint or finish in unclean or improperly ventilated areas. Do not paint in temperatures lower than 50 degrees F. (10 degrees C.) or varnish in temperatures lower than 65 degrees F. (18 degrees C.) for 24 hours before, during and 48 hours after application.

   2. Do not undertake exterior painting at temperatures under 50 degrees F. (10 degrees C.) for 24 hours before, during and 48 hours after application or immediately following rain, frost or dew. Safe levels shall be determined by use of an electronic metre.

   3. Test for moisture content in each location immediately before commencing application of paint. Do not apply paint on surfaces where moisture content exceeds 14%. Promptly notify Consultant if such conditions are encountered.

   4. Provide approved equipment for testing moisture content of surfaces to receive paint finishes and have available on Site at all times during Work of this Section.

5. Do not apply paint finish in areas where dust is being generated.

5. PROTECTION

1. Provide metal pans or adequate tarpaulin to protect floors in areas assigned for the storage and mixing of paints.

2. Use sufficient drop cloths and protective coverings for the full protection of floors, furnishings and work not being painted.

3. Leave above areas clean and free from evidence of occupancy upon completion of painting.

4. Protect paint materials from fire and freezing.

5. Keep waste rags in metal drums containing water and remove from building at end of each working shift.

6. FINISH CARPENTRY & ARCHITECTURAL MILLWORK

1. All cabinet millworks must be finished in the shop by Section 06400. All other finish carpentry materials (including miscellaneous brackets for benches) to be finished by Section 09900.

7. SCOPE OF WORK

1. With exceptions noted above or specifically called for in other Sections of the Specification, all paintwork is included in the scope of this Section.

2. NOTE: In locations where Drawings do not call for paint or similar finish on walls and/or ceilings, the intent of this Specification is that all exposed unpainted metal surfaces shall be painted.

3. Paint exposed drywall and the like in locations where finish is not otherwise specified or noted. Do not paint such surfaces in mechanical shafts, unless specifically noted.

4. In locations where Drawings do not call for paint or similar finish on walls and/or ceilings, the intent of this Specification is that items such as new work, including miscellaneous metal work, shall be painted.

5. Paint pipes, conduit, ducts and related thermal insulation and all prime painted mechanical and electrical equipment and supports located in mechanical and electrical storage and maintenance rooms in allocations where Drawings call for paint or similar finish on walls and/or ceilings.

6. Do not paint pipe, conduit, ducts, insulation and the like where concealed above ceilings (except louvred type ceilings) or in-service shafts.

7. Make good paint finish on shop coated work where damaged.

8. Paint visible portions of steel shelf angles, lintels and structural steel.

9. Paint all edges and all faces of doors where primed for paint supplied.

10. Stain all top, bottom and side edges of all plastic laminate doors.

11. Interior of ducts and diffusers visible from exterior on room side.

12. Paint all roof top equipment, stairs, pipes, conduit, vents, ducts, pipe insulation, etc. exposed on roofs (including primed and prefinished items).

13. Allow for three (3) different paint colours to be used in the building - including field, accent walls and bulkheads

5. QUALITY ASSURANCE AND REFERENCES

1. Paint work shall meet or exceed standards set out in C.G.S.B. Specification No.'s 85-GP-1M to 85-GP-33A and C.P.C.A. Canadian Painting Contractors Association - Painting Manual.

2. Employ fully trained workers who are regularly employed in this field.

3. Manufacturer's sales representative shall perform inspections on the Owner's behalf in order to ensure compliance with product specifications.

6. RETOUCHING

1. Do all retouching, etc. to ensure that the building may be handed over to the Owner in perfect condition, free of spatter, fingerprints, rust, watermarks, scratches, blemishes or other disfiguration.

11. TEST AREA

1. A room or area in the building will be designated by the Architect as a test area to establish standard of workmanship, texture, gloss and coverage.

2. Prior to any painting being started, request a meeting on Site between Architect, Contractor, Subcontractor and Material Manufacturer's Representative to review conditions, surfaces, anticipated problems and to clarify quality of workmanship acceptable to Architect.Apply finishes to each type of surface within room with correct material, coats, colour, texture and degree of gloss in sample area and have same approved prior to providing Work of this Section.

3. Retain test area until after completion of Work. Test area to be minimum standard for the Work.

4. Failure to comply with the above will be cause for Architect to request all Work previously painted to be repainted.

PART 2 PRODUCTS

1. MATERIALS

1. "Top Line" products only are acceptable. Use only products of manufacturers whose best quality lines meet or exceed CGSB Specifications for the particular type of material required. Approved manufacture and product unless specifically indicated otherwise in specification:

1. Paints, stains and varnish:
   a) General Paint
   b) Benjamin Moore
   c) Sherwin Williams
   d) Zinsser
   e) Glidden/Devoe Coatings

2. Latex Water Based Epoxy
   - Sherwin Williams B70W00211 - Waterbased catalyzed epoxy extra white/
     Tint base A/B60V00025 - Waterbased Catalyzed epoxy Semi-Gloss Hardner Part B
   - Glidden - 4420 - True Glaze Waterborn epoxy / 4426 True Glaze semi-gloss converter

3. Latex Supper Adherent Primer,
   - General Paint 51-050 Premium Latex Plastic Primer
   - Benjamin Moore #23-00 Freshstart Acrylic Primer Sealer
   - Zinsser 1-2-3 Acrylic Primer Sealer
   - Sherwin-Williams - B51WQ8850 - Adhesion Prm White
   - Glidden Latex super undercoat 94280

4. Interior Latex Block Filler, C.G.S.B. Standard #-GP-188M
   - General Paint 70-224 Premium Latex Block Filler
   - Benjamin Moore #595-01 Latex Block Filler
   - Glidden #362650 Concrete Block Filler
   - Sherwin-Williams B42W00046 Heavy Duty Block Filler

5. Stain Suppressant Sealer/Primer Hi-Hide, C.G.S.B. #1-GP-119M (where required)
   - General Paint 60-200 X-Terminator 2 Latex Sealer
   - Zinsser BIN Primer, hi-hide (spot prime only)
   - Zinsser Bullseye Odourless
   - Sherwin-Williams - B49WQ8820 Multipur LTX Pr Wh
   - Glidden/Jammer 200

6. Thinners, cleaners: Type and brand recommended by the paint manufacturer.

7. Materials to be new and first line of manufacturer.

8. Deliver materials to site in original unbroken containers bearing brand and manufacturer's name.

PART 3 EXECUTION

1. CONDITION OF SURFACES

1. Check all surfaces with electric moisture metre and do not proceed if reading is higher than 12-15 without written permission from Architect.

2. Proceed with work only when surfaces and conditions are satisfactory for production of a first-class job.

3. Clean and remove dust, grease, rust and extraneous matter from all surfaces (except that rust occurring on items specified to be primed under other sections shall be removed and worked reprimed under these sections).

3. The commencing of work in a specific area shall be construed as acceptance of the surfaces, and thereafter the contractor shall be fully responsible for satisfactory work as required herein.

5. All surfaces shall be prepared in accordance with Chapter 2 for Interior Work of the Master Painters and Decorators Association Painting Manual latest edition.

6. Prepare surfaces in accordance with paint covering manufacturer's instructions.

2. PREPARATION

1. Concrete and Masonry

1. Test surfaces for alkalinity with pink litmus paper or other recognized method.

2. Where extreme alkalinity occurs, wash surface with 4% solution tetrapotassium pyrophosphate (5 oz. per gallon (31 ml./l.) of water) where latex base paint is to be used and with zinc sulphate solution (3 lbs. per gallon (300 g./l.) of water where other paint bases are to be used.)

3. Etch normal concrete surfaces to receive alkyd paint with muriatic acid solution (1 part commercial) 31.45% to 3 parts

water. Neutralize and allow to dry before painting.

4. Prepare masonry concrete surfaces to CGSB 85-GP-31M.

2. Metal

1. All metal surfaces to receive coatings shall be cleaned to SSPC-SP1 (solvent washing) prior to painting as specified herein.

2. Touch-up shop primed metal after first removing loose primer, rust, oil, grease and other contaminants.

3. All metal surfaces exposed and/or exhibiting rust shall be cleaned to SSPC-SP2 or SSPC-SP3 standards and primed with an approved rust inhibitive primer prior to recoating as specified.

4. Feather edges to make touch-up inconspicuous when applying new primer.

5. Conform to CGSB 1-GP40d.M to CGSB 85-GP-14M.

3. Galvanized Surfaces

1. For Primer Application Type C Corrosive ensure that all surfaces to be painted are clean, dry, and free of all contaminants.

2. Cleaning of existing surfaces to be conducted according to SSPC-SP-4 Flame Cleaning procedure. Pass high temperature, high velocity, oxyacetylene flames over entire surface and then wire brushing. Primer is to be applied before surface is cool.

3. Phosphatize galvanized metal surfaces using CGSB 31-GP-105M pretreatment or prime with galvanized metal primer.

4. Hardware

1. Remove finishing hardware, electric cover plates and accessories, mask any that are not removable. Replace these when paint is dry and clean them. Do not clean hardware with solvent that will remove permanent lacquer finish.

5. Gypsum Wallboard

1. For small holes, scratches or other surface marks fill with patching compound and sand smooth.

2. For larger holes or damaged areas do not proceed until trade for original work has filled or repaired surfaces to acceptable levels.

3. Prepare wallboard surfaces to CGSB-85-GP-33M.

6. Copper

1. Prepare copper piping and accessories to CGSB 85-GP-20M.

7. General

1. Mask specification plates occurring on equipment, switch boxes, and similar items requiring painting.

2. Protect, remove and replace hardware, accessories, lighting fixtures and similar items as required.

3. Conform with Architect's colour schedules and exactly match approved samples.

3. APPLICATION

1. Finishes and number of coats specified in the schedule are intended to cover surfaces perfectly. If they do not, apply further coats until perfect coverage and colour are achieved as required.

2. Any areas exhibiting incomplete or unsatisfactory coverage shall have the entire plane painted. Patching will not be acceptable.

3. Walls needing repainting, entire wall (plane) shall be painted to the satisfaction of the Architect. See drawings for extent of work.

4. Spray painting will not be permitted (except at metal deck and joist areas) unless specifically approved in writing by the Architect in each instance. Architect may withdraw approval at any time and prohibit spray painting for reasons such as carelessness, poor masking or protection measures drifting paint fog, disturbance to other Trades or failure to obtain a dense, even, opaque finish. Spray painting shall be full double coat, i.e., at least two passes for each coat. Do not use spray or roller on wood or metal surfaces, brush only unless approved in writing by Architect. Spray painting and backroll may be permitted on concrete blocks.

5. Arrange to have traffic barred from completed areas wherever possible.

6. Apply materials in strict accordance with manufacturer's directions and specifications and be familiar with these directions and specifications.

7. Apply primer-sealer coats by brush or roller method. All primers and undercoats to be tinted to no more than 25% of intensity of the finish colour.

8. Permit paint to dry before applying succeeding coats, touch up suction spots and sand between coats with No. 00 sandpaper.

9. Where two coats of the same paint are to be applied, the first coat shall be the same colour as the finish coat and be inspected by the Architect before application of final coat, to allow the Architect to make reasonable modification of colour if necessary. Furnish Architect with a schedule showing expected completion of the respective coats of paint for the various areas and surfaces. Keep this schedule current as the job progresses.

10. Exterior paints and deep/intense interior and exterior colours shall be from the nearest factory premixed colour selection and shall be alterable to match required colours.

11. Flat and semi-gloss finishes on gypsum wall board, block and other surfaces of large areas shall be applied by roller and to all other surfaces applied by brush.

12. Paint shall be uniform in sheen, colour and texture, free from brush or roller marks, sags, runs or other defects.

13. Finish edges of doors (top, bottom, sides and cutouts) with paint or stain treatment as required to match face of door. Stain top and bottom edges a different colour and seal with one coat of shellac and one coat gloss varnish or two coats paint. Refinish tops and edges of wood doors after fitting.

14. Even up stained woodwork in colour as required by nature of wood and as directed by Architect. Apply same finish on trim, fitments, cupboards and other protecting ledges as on surrounding work, disregard sight lines.

15. Carefully hand smooth and sandpaper wood between coats (including priming). Apply one coat sealer before applying first coat paint filler to knots or sap blemishes on wood surfaces to receive paint or stain finish.

16. Remove rust, oil, grease and loose shop paint from metal work by brushing or with wire brushes and make good shop coat before proceeding with final finish. Feather out edges to make touch up patches inconspicuous.

17. After first coat, fill nail holes, splits, and scratches, using putty coloured to match finish.

18. Clean castings with wire brush before application of first paint coat.

19. Do not etch galvanized metal. Prepare prime and paint elsewhere in this section. This includes metal door frames and the like with wiped zinc coating.

20. Remove form oil or parting compounds from concrete surfaces. Use Xylol or approved compound.

21. Paint interior of pipe spaces, ducts, etc. visible through grilles or through metal ceilings in black matt finish.

22. Conform with Architect's colour schedule and exactly match approved samples.

23. Mechanical and Electrical Materials

    1. Refer to Mechanical and Electrical Sections of the Specifications and note the instructions regarding painting and finishing of materials and equipment supplied and installed by those trades.

    2. Remove grilles, covers, access panels for mechanical and electrical systems from location and paint separately, if these items are not factory finished.
    3. Paint work to match adjacent walls and ceilings unless directed otherwise. Note: This includes trim on fixtures exposed, speaker covers, emergency lights, grilles, diffusers, louvres, vents, fire extinguisher cabinets, electrical panels, etc.

    4. Paint interior surfaces that are visible through grilles and louvres with one coat of flat black metal paint to limit of sight line.

    5. Where walls and ceilings are not scheduled to be painted, the work described above shall be painted a colour selected by Architect.

    6. Unless factory painted, all exposed piping, conduits, ductwork hangers, insulation and mechanical equipment shall be painted.

24. Rooms without finished ceilings will have decks, joists, beams, ducts, etc., painted.

25. Paint graphics as shown on drawings. All graphics to be semi-gloss minimum two coat application.

4. ADJUST AND CLEAN

1. Cracks occurring in walls or ceilings requiring patching during "warranty period" shall be repainted in such a way that the patch is not visible at a distance of 5'-0" (1500 mm).

2. If patch painting not acceptable repaint entire wall or ceiling surface.

3. At completion clean entire area of surplus materials and equipment.

5. FIELD QUALITY CONTROL

1. Locate testing area in building to establish standard of workmanship, texture, gloss and coverage where designated.

2. Apply samples of all finishes on each type of surface to be coated with correct material, number of coats, colour, texture and degree of gloss required.

3. Retain test area until completion of work. Use approved work in test areas as standard for corresponding work throughout building. Correct and refinish work which does not compare with approved finishes.

6. FINISH SCHEDULE

1. General

1. Finish the listed exposed surfaces, wherever they occur unless such surfaces are specifically noted to be left unfinished.

2. Exposed means visible in the completed work and includes the interior of closets, cabinets and drawers.

3. The Architect shall have the option of having wood painted or with transparent finish and of which finish shall be used.

4. In instances where materials specified are not suitable for a particular job application or are contrary to manufacturer's recommendations for use on a particular surface, such condition shall immediately be brought to the attention of the Architect for clarification and instructions.

5. Finishes shall match approved samples, but Architect reserves the right to make reasonable changes to finish specifications to obtain desired results without additional cost or obligation of Owner.

6. Where surfaces have been disturbed the entire plane shall be painted.

2. Exterior Schedule

1. Metal (Ferrous): One coat rust inhibitive primer (metal surfaces already primed need not receive a field prime coat except for touch up). Two coats exterior Aura paint by Benjamin Moore.

Note: All roof top equipment, pipes, conduit, vents, ducts, grilles, pipe insulation, etc. to be painted.

2. Galvanized Steel: One coat galvanized primer. Use a Polyamide converted epoxy primer by Devoe Coatings, "4170-1000 with 4170-999 - catalyst". Two coats of galvanized Finish Coat. Use a single package tough, durable alkyd modified urethane coating with water, chemical and solvent resistance by Devoe Coatings "Devoe" Glid Shield Urethane Gloss Enamel No. 4328-0100 Series (installation within 72 hours of installing primer).

   Note: All exterior areas are to be painted including stairs, masonry lintels, etc.

3. Painted Wood Surfaces: One coat wood primer. Two coats exterior Aura paint by Benjamin Moore.

4. Stained Pressure Treated Wood or Cedar: Two coats solid hide Aborite stain and one Clear Topcoat both by Benjamin Moore.

3. Interior Schedule

1. Metal (Ferrous): One coat latex super adherent primer (metal surfaces already primed need not receive a field prime coat except for touch up). Apply two coats latex water-based epoxy 2 coats.

2. Hot Ferrous Metal - (Valve bodies, strainers, etc., on high temperature lines.) - One coat primer, latex super adherent heat resistant - Two coats latex water-based epoxy.

3. Galvanized Steel: One coat galvanized primer. Use a Polyamide converted epoxy by Devoe Coatings "4170-1000 with 4170-9999-catalyst". Two coats of galvanized Finish Coat. Use a single package tough, durable alkyd modified urethane coating with water, chemical and solvent resistance by Devoe Coatings "Devoe Glid Shield Urethane Gloss Enamel No. 4328-0100 Series (install within 72 hours of installing primer).

4. Woodwork Painted: One coat super adherent primer. Two coats latex Ultra "94800" by Glidden.

5. Natural or Stained Close Grain Wood: One coat non-bleeding alkyd stain. One coat sanding sealer.
   Approved Finish Clear Coats are as follows:

   .1 General Paint 25-011 Urethane Semi-Gloss. Apply two coats: spread rate, 350 square feet per 3.78 litre container. Each coat wet film thickness: 4.0 mils. Each coat dry thickness: 1.5 mils.

OR

.2 Benjamin Moore & Co. Ltd. #435 Low Lustre Alkyd Urethane. Apply two coats: spread rate, 575 square feet per 3.79 litre container. Each coat wet thickness: 2.8 mils. Each coat dry thickness: 1.1 mils.

OR

.3 Glidden #90333 Urethane Varnish. Apply two coats: spread rate, 638 square feet per 3.78 litre container. Each coat wet thickness: 2.5 mils. Each coat dry thickness: 1.0 mils.

6. Natural Cedar Slat Ceilings: natural finish.

7. Natural or Stained Open Grain Wood: One coat stain filler. One coat sanding sealer.
Approved Finish Clear Coats are as follows:

.1 General Paint 25-011 Urethane Semi-Gloss. Apply two coats: spread rate, 350 square feet per 3.78 litre container. Each coat wet film thickness: 4.0 mils. Each coat dry thickness: 1.5 mils.

OR

.2 Benjamin Moore & Co. Ltd. #435 Low Lustre Alkyd Urethane. Apply two coats: spread rate, 575 square feet per 3.79 litre container. Each coat wet thickness: 2.8 mils. Each coat dry thickness: 1.1 mils.

OR

.3 Glidden #90333 Urethane Varnish. Apply two coats: spread rate, 638 square feet per 3.78 litre container. Each coat wet thickness: 2.5 mils. Each coat dry thickness: 1.0 mils.

8. Concrete Block: One coat latex block filler, applied at the minimum rate of 80 sq. ft per gallon (1.63 m2 per litre), or as required by block texture to completely fill block. **Pinholes will not be accepted.** Apply more block filler if necessary to completely fill the block before applying finish coats. Note that lightweight block requires more block filler to fill than standard weight block does and adjust application rate as required. Two coats interior Latex Semi-Gloss “Ultra 94800" by Glidden.

9, Exposed Insulated Pipes and Ductwork: One coat size. One coat super adherent primer undercoat. Two coats Ultra “94800" by Glidden eggshell.

10. Gypsum Wallboard: One coat of Latex super adherent primer. Two coats semi-gloss Ultra “94800" by Glidden. Velvet or eggshell at walls and Low gloss at ceilings.

11. Surfaces Behind Grilles and Duct Work Where Visible Within 12' (300 mm) of Grille:

    1. Two coats vinyl latex matt black.

12. Painted Light Trims, Emergency Lights, Louvres, Diffusers, Vents, Concealed Sprinkler Covers, Fire Extinguisher Cabinets, and Electrical Panels, Etc.

    1. One coat super adherent primer. Two coats Ultra “94800" by Glidden to match surrounding wall and ceiling colours or as specified by Architect.

13. Exposed Sealed Concrete Floors to be Painted

    1. One coat Sikafloor 2001 Primer

    2. One coat Sikafloor polyurethane UV in colour as selected by Architect from complete colour range.

    3. Install floor primer and finish coat as per manufacturer's printed installation instructions.

14. General Notes

    1. See drawings for locations of areas where more than one colour occurs on one wall and one ceiling plane.

    2. Each ceiling bulkhead section or level may be a different colour.

    3. At stairwells and metal railings, allow for flat bars, pickets and stringers at stairs to be each painted a different colour. Maximum three colours to be chosen by Architect. Clarification detail will be issued with colour schedule after tender.

    4. Door frames may be one colour and door another colour.

7. MAINTENANCE MATERIAL

1. Provided one sealed can of four litre capacity, of each product in each colour used in the Work for Owner's use in maintenance work.

2. Container to be new fully labelled with manufacturer's name, type of paint, and colour.

3. Provide Owner 3 copies of paint formula for each colour and type of paint for Owner's maintenance manual.

END OF SECTION

PART 1. GENERAL

1.1 GENERAL REQUIREMENTS

.1 Division One - General Requirements is a part of this section and shall apply as if repeated here.

1.2 DESCRIPTION

.1 Work included: Provide manually operated rolling shade systems at all exterior windows where indicated on Architectural drawings. Provide all components as needed for a complete and proper installation.

1.3 QUALITY ASSURANCE

.1 Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.4 SUBMITTALS

.1 Product Data: Within 60 calendar days after the General Contractor has received the Owner's Notice to Proceed, submit:

.1 Materials list of items proposed to be provided under this Section.
.2 Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
.3 Shop Drawings in sufficient detail to show fabrication, installation, anchorage and interface of the work of this Section with the work of adjacent trades.
.4 Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.

.2 Construct one complete light proof window shade with attachments and accessories for approval by the Architect.

1.5 WARRANTY

.1 Three (3) year written warranty against mechanical and fabric failure (including fabric fading) under normal conditions.

1.6 ACCEPTANCE

.1 All manual and motorized shades remain the property of the supplier until accepted in place by the Architect.

PART 2. PRODUCTS

.1 **Manually Operated Rolling Shade System:** SunProject, Moduline 105 Lite Lift. Commercial chain-driven, manually operated roller-screen shading system complete with aluminum fascia and stainless steel drive chain. Sunshade fabric to be 1% open weave flame retardant Thermoveil Shadecloth in classrooms and library and 3% open weave flame retardant Thermoveil Shadecloth in Principal and Main office locations. Seams, if required, shall be equally spaced vertically to form material in equal widths. Drawings are based on Sun Project Canada Inc., (905-660-3117). Approved equal product/manufacturer is Solarfective Products Ltd., MechoShade or Silent Gliss.

1. Manually Operated Shade Locations: New exterior windows where noted on Architectural Drawings.

2. Sunshade Fabric: 1% in teaching spaces and library and 3% administrative areas open weave flame retardant. Architect to choose colour when shop drawings are submitted. Seams, if required, shall be equally spaced vertically to form material in equal widths.

.1 Hardware and Accessories Required for a Total Integrated System

.1 Shade Roller: Extruded aluminum tube, 6063-ST6 alloy, 2.55 in. OD with internal keyway to receive tubular motor. The tube is extruded with two fabric-mounting channels designed so that the shade cloth does not disengage from the tube itself.

.2 Mounting Spline: Extruded vinyl with asymmetrical locking channels and embossed fabric guide for use with 2.55 in. OD tube. Spline has sufficient capacity to hold shade and additional weight without disengaging from the tube.

.3 End Brackets: Consist of 1/8" in. thick sheet steel. Wall, jamb or ceiling mounted as required and permanently installed.

.4 Centre Support Brackets: supplied to meet span or weight requirements. Ceiling or wall mounted.

.5 Weights: Mill-finished aluminum, flat bars, single lengths for each shade panel.

.6 Fascia: Extruded aluminum 6063T5 with clear anodized finish. Used for surface mounted applications. Snap on with concealed fastenings that hide the bracket assembly and appears to be a continuous unit when mounted side to side.

.8 Finishes: All exposed aluminum parts have a clear anodized finish.

Steel parts are either cadmium plated, satin finished or have been bonderized prior to painting with a baked enamel finish.

.9 Exterior hembar shall be rectangular 6 mm x 37 mm, with internal grooves to accommodate a fabric guide carrier at each end.

.10 Fabric shall be hot laser cut and reinforced at the edges with a high frequency thermoweld seal. Fabric is reinforced with heat sealed spring tempered stainless steel batten stiffeners positioned approximately every 900 mm insuring that fabric not escape or be pulled out of the side channel.

PART 3. EXECUTION

3.1 SURFACE CONDITIONS

.1 Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

.1 Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interfaced with the work of this Section.

.2 Install the work of this section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of government agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position for long life under hard use.

.3 Install the work plumb, level, and in proper operating condition.

.4 Install units within the following tolerances:
1. Maximum variation of gap at window opening perimeter: ¼ inch per 8 feet (+/- 1/8 inch) of shade height.
2. Maximum offset from level: 1/16 inch per 5 feet of shade width.

.5 Upon completion of the installation, put each operating component through at least five complete cycles, adjusting as required to achieve optimum operation and complete blackout at all edges (at blackout locations).

.6 Touchup scratches and blemishes to be completely invisible to the unaided eye from a distance of five feet (1500 mm), or replace item.

3.3 CLEANING

.1 Touch up damaged finishes and repair minor damage in order to eliminate evidence of repair. Remove and replace work that cannot be satisfactorily repaired.

.2 Clean exposed surfaces, including metal and shade fabric, using non-abrasive materials and methods recommended by the Shadecloth Manufacturer. Remove and replace work which cannot be satisfactorily cleaned.

END OF SECTION

Division 20 Common Requirements for Mechanical

20 00 01 Mechanical Specification Index

Common Contract Requirements for Mechanical

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Testing, Adjusting, and Balancing

20 06 11 Testing, Adjusting, and Balancing (TAB) of Mechanical Systems

Division 22 Plumbing

Facility Sanitary Sewerage

22 13 16 Sanitary Waste and Vent Piping – Cast Iron and Copper
22 13 17 Sanitary Waste and Vent Piping – Plastic

Division 23 Heating, Ventilating, and Air Conditioning (HVAC)

HVAC Insulation

23 07 13 Duct Insulation
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23 21 11 Hydronic Accessories
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23 25 13 Water Treatment for Closed-Loop Hydronic Systems

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23 31 13 Metal Ducts

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23 33 13	Duct Accessories
23 33 13.13	Volume-Control Dampers
23 33 16	Fire Dampers
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23 37 13	Diffusers, Registers, and Grilles

Convection Heating and Cooling Units

23 82 23	Hydronic Unit Ventilators
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Division 25 Integrated Automation

Building Automation System

25 40 11	Building Automation System

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

.1 This section covers items common to all sections of Mechanical Division.

.2 Conform to Division 1 General Conditions.

.3 Furnish labour, materials, and equipment necessary for completion of work as described in contract documents.

.4 Unless specifically indicated, all materials and equipment provided under this contract shall be new and shall be manufactured in the project year.

1.2 INTENT

.1 Mention herein or indication on Drawings of articles, materials, operations or methods requires: supply of each item mentioned or indicated, of quality, or subject to qualifications noted; installation according to conditions stated: and, performance of each operation prescribed with furnishing of necessary labour, equipment, and incidentals for mechanical work.

.2 Where used, words “Section” and “Division” shall also include other Subcontractors engaged on site to perform work to make building and site complete in all respects.

.3 Where used, word “supply” shall mean furnishing to site in location required or directed complete with accessory parts.

.4 Where used, word “install” shall mean secured in place and connected up for operation as noted or directed.

.5 Where used, word “provide” shall mean supply and install as each is described above.

1.3 TENDERS

.1 Submit tender based on specified described equipment or Alternates listed.

1.4 REGULATIONS, PERMITS AND FEES

.1 All materials and quality of work shall meet all current and latest Provincial, Municipal and Fire Marshall requirements, regulations, codes and by-laws in force in the area of the project.

.2 Each contractor shall give all necessary notices, obtain all necessary permits, and pay all fees in order that the work shown or specified may be carried out. Each contractor shall furnish any certificates necessary as evidence that the work installed conforms with the laws and regulations of all authorities having jurisdiction.

.3 In the event that changes or alterations are required on completed work by authorized inspectors, these changes shall be made at the contractor's expense.

.4 Special equipment which does not have a standard CSA label shall be inspected by the local electrical authority having jurisdction and the Approval Certificate shall be submitted to the Consultant as soon as possible. All costs and fees for inspections shall be borne by this contractor.

.5 Submit a copy of all final certificates in the maintenance manuals.

1.5 DRAWINGS

.1 Mechanical Drawings do not show structural and related details. Take information involving accurate measurement of building from building drawings, or at building. Make, without additional charge, any necessary changes or additions to runs of piping, conduits and ducts to accommodate structural conditions. Location of pipes, ducts, conduits and other equipment may be altered by Consultant without extra charge provided change is made before installation and does not necessitate major additional material.

.2 As work progresses and before installing piping, ductwork, heating units, registers, diffusers, fixtures and any other fittings and equipment which may interfere with interior treatment and use of building, provide detail drawings or obtain directions for exact location of such equipment and fittments.

.3 Mechanical Drawings indicate general location and route of pipes, ducts and conduits which are to be installed. Where required work is not shown or only shown diagramatically, install same at maximum height in space to conserve head room and interfere as little as possible with free use of space through which they can pass. Follow building lines, conceal piping, conduits and ducts in furred spaces, ceilings and walls unless specifically shown otherwise. Install work close to structure so furring will be small as practical.

.4 Install piping and ductwork to clear structural members and any fireproofing. Locate mechanical work to permit installation of specified insulation. Do not remove or damage structural fireproofing. Leave space to permit fireproofing and insulation to be inspected and repaired.

.5 Before commencing work, check and verify all sizes, locations, grade and invert elevations, levels and dimensions to ensure proper and correct installation. Verify existing/municipal services.

.6 Locate all mechanical and electrical equipment in such a manner as to facilitate easy and safe access to and maintenance and replacement of any part.

.7 In every place where there is indicated space reserved for future or other equipment, leave such space clear, and install piping and other work so that necessary installation and connections can be made for any such apparatus. Obtain instructions whenever necessary for this purpose.

.8 Relocate equipment and/or material installed but not co-ordinated with work of other Sections and/or installed incorrectly as directed, without extra charge.

.9 Where drawings are done in metric and product not available in metric, the corresponding imperial trade size shall be utilized.

1.6 INTERFERENCE AND CO-ORDINATION DRAWINGS

.1 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the constructed spaces provided.

.2 Prepare drawings to indicate co-ordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are co-ordinated.

.3 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance are indicated on drawings.

.4 Upon consultant's request submit copies of interference drawings to consultant.

.5 Due to the nature of the building and the complexity of the building systems provide the following:

.1 Interference drawings, showing coordination of architectural, structural, mechanical and electrical systems for the consultant's review prior to fabrication.

.2 Detailed layout drawings, clearly showing fasteners and hangers.

.6 Provide CAD drawings (minimum release AutoCAD 2007) in addition to hard copies.

1.7 QUALITY ASSURANCE

.1 Perform work in accordance with applicable provisions of local Plumbing Code, Gas Ordinances, and adoptions thereof for all mechanical systems. Provide materials and labor necessary to comply with rules, regulations, and ordinances.

.2 In case of differences between building codes, provincial laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify Consultant in writing of such differences.

1.8 ALTERNATES

.1 Throughout Mechanical Division are lists of "Alternate Equipment" manufacturers acceptable to Consultant if their product meets characteristics of specified described equipment.

.2 Contractors may elect to use "Alternate Equipment" from lists of Alternates where listed. Include for any additional costs including all costs for revisions to electrical scope to suit Alternate used.

.3 It is the responsibility of this Division to ensure "Alternate Equipment" fits space allocated and gives performance specified. If and "Alternate Equipment" nor "equal" specified product unit is proposed and does not fit space allotted in Consultant's opinion, supply of specified described equipment will be required without any request for additional monies. Should electrical and structural characteristics for "alternate" or "equal" equipment differ from equipment specified, it shall be the responsibility of this contractor or equipment manufacturer to pay all costs associated with the revisions to the electrical or structural scope.

.4 If pipe or item, of size or weight indicated, is unobtainable, supply next larger size or heavier weight without additional charge.

1.9 EXAMINATION

.1 Site Inspection

.1 Examine premises to understand conditions, which may affect performance of work of this Division before submitting proposals for this work.

.2 No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

.2 Drawings:

.1 Mechanical Drawings show general arrangement of piping, ductwork, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.

.2 Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Plumbing, Mechanical, and Fire Protection Drawings.

.3 Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories, which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

.3 Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

1.10 SEQUENCING SCHEDULING AND COORDINATION

.1 It is understood that while Drawings are to be followed as closely as circumstances permit, this Division will be held responsible for installation of systems according to the true intent and meaning of Contract Documents. Anything not clear or in conflict will be explained by making application to Consultant. Should conditions arise where certain changes would be advisable, secure Consultant's approval of these changes before proceeding with work.

.2 Coordinate work of various trades in installing interrelated work. Before installation of mechanical items, make proper provision to avoid interferences in a manner approved by Consultant. Each Contractor shall refer to all sections of the specification for their responsibilities with other trades. Changes required in work specified in Mechanical Division caused by neglect to do so shall be made at no cost to Owner.

.3 Arrange pipes, ducts, and equipment to permit ready access to valves, unions, traps, starters, motors, control components, and to clear openings of doors and access panels.

.4 Furnish and install inserts and supports required by Mechanical Division unless otherwise noted. Furnish sleeves, inserts, supports, and equipment that are an integral part of other Divisions of the Work to Sections involved in sufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location or installation of items above shall be borne by Mechanical Division.

.5 Be responsible for required excavation, backfilling, cutting, and patching incident to work of this Division and make required repairs afterwards to satisfaction of Consultant. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.

.1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

.2 Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

.3 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

.6 Adjust locations of pipes, ducts, equipment, fixtures, etc, to accommodate work from interferences anticipated and encountered. Determine exact route and location of each pipe and duct prior to fabrication.

.1 Make offsets, transitions, and changes in direction of pipes, ducts, and electrical raceways as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.

.2 Furnish and install traps, air vents, sanitary vents, pull boxes, etc, as required to effect these offsets, transitions, and changes in direction.

.7 Slots and openings through floors, walls, ceilings, and roofs shall be provided by this contractor but performed by a trade specializing in this type of work. This Division shall see that they are properly located and do any cutting and patching caused by its neglect to do so.

1.11 CONTRACT BREAKDOWN

.1 Provide breakdown of contract exclusive of HST to acceptance of consultants prior to first draw submission.

.2 Provide labour and material cost for each item.

.3 Breakdown shall indicate total contract amount.

.4 Contract breakdown shall be as follows as a minimum.

Mobilization and shop drawings (max. $2000.00)
Demolition
Above grade rough-in plumbing and drainage
Refrigerant piping and insulation
Heating piping
Piping Insulation
Ductwork
Duct Insulation
Unit Ventilators
Grilles & Diffusers
Condensing units
Fire Stopping
Fans & Equipment
Building Automation Systems
Testing Adjusting and Balancing
Mechanical contractor closeout requirements (min. of 3% but not less than $5,000.00)

.5 Progress claims, when submitted are to be itemized against each item of the contract breakdown, this shall be done in table form showing contract amount, work complete to date, previous draw, amount this draw and balance.

1.12 SHOP DRAWINGS AND PRODUCT DATA

.1 Furnish complete catalog data for manufactured items of equipment to be used in the Work to Consultant for review within 30 days after award of Contract.

.2 Provide a complete list of shop drawings to be submitted prior to first submission.

.3 Before submitting to the Consultant, review all shop drawings to verify that the products illustrated therein conform to the Contract Documents. By this review, the Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers, and similar data and that it has checked and coordinated each shop drawing with the requirements of the work and of the Contract Documents. The Contractor's review of each shop drawings shall be indicated by stamp, date and signature of a qualified and responsible person possessing by the appropriate authorization.

.4 If material or equipment is not as specified or submittal is not complete, it will be rejected by Consultant.

.5 Additional shop drawings required by the contractor for maintenance manuals, site copies etc., shall be photocopies of the "reviewed" shop drawings. All costs to provide additional copies of shop drawings shall be borne by the contractor.

.6 Submit all shop drawings for the project as a package. Partial submittals will not be accepted.

.7 Catalog data or shop drawings for equipment, which are noted as being reviewed by Consultant or his Engineer shall not supersede Contract Documents.

.8 Review comments of Consultant shall not relieve this Division from responsibility for deviations from Contract Documents unless Consultant's attention has been called to such deviations in writing at time of submission, nor shall they relieve this Division from responsibility for errors in items submitted.

.9 Check work described by catalog data with Contract Documents for deviations and errors.

.10 Shop drawings and product data shall show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances. e.g. access door swing spaces.

.11 Shop drawings and product data shall be accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Acoustical sound power data, where applicable.

.3 Points of operation on performance curves.

.4 Manufacturer to certify as to current model production.

.5 Certification of compliance to applicable codes.

.12 State sizes, capacities, brand names, motor HP, accessories, materials, gauges, dimensions, and other pertinent information. List on catalog covers page numbers of submitted items. Underline applicable data.

.13 Shop drawings can be submitted by an electronic submission as per the following directions.

.1 Electronic Submissions:

.1 Electronically submitted shop drawings shall be prepared as follows:

.1 Use latest software to generate PDF files of submission sheets.

.2 Scanned legible PDF sheets are acceptable. Image files are not acceptable.

.3 PDF format shall be of sufficient resolution to clearly show the finest detail.

.4 PDF page size shall be standardized for printing to letter size (8.5"x11"), portrait with no additional formatting required by the consultant. Submissions requiring larger detail sheets shall not exceed 11"x17".

.5 Submissions shall contain multiple files according to section names as they appear in Specification.

.6 File names shall include consultant project number and description of shop drawing section submitted.

.7 Each submission shall contain an index sheet listing the products submitted, indexed in the same order as they appear in the Specification. Include associated PDF file name for each section.

.8 On the shop drawing use an "electronic mark" to indicate what is being provided.

.9 **Each file shall bear an electronic representation of the "company stamp" of the contractor. If not stamped the file submission will not be reviewed.**

.2 Email submissions shall include subject line to clearly identify the consultants project number and the description of the shop drawings submitted.

.3 Electronic attachments via email shall not exceed 10MB. For submissions larger than 10MB, multiple email messages shall be used. Denote related email messages by indicating "1 of 2" and "2 of 2" in email subject line for the case of two messages.

.4 Electronic attachments via web links (URL) shall directly reference PDF files. Provide necessary access credentials within link or as username/password clearly identified within body of email message.

.5 On site provide one copy of the "reviewed" shop drawings in a binder as noted above.

.6 Contractor to print **3** copies of "reviewed" shop drawings and compile into maintenance manuals.

1.13 OPERATION AND MAINTENANCE MANUAL

.1 Provide operation and maintenance data for incorporation into manual as in submittals' requirements.

.2 Operation and maintenance manual to be approved by, and final copies deposited with, Consultant before final inspection.

.3 Operation data to include:

.1 Control schematics for each system including environmental controls.

.2 Description of each system and its controls.

.3 Description of operation of each system at various loads together with reset schedules and seasonal variances.

.4 Operation instruction for each system and each component.

.5 Description of actions to be taken in event of equipment failure.

.6 Valves schedule and flow diagram.

.7 Colour coding chart.

.8 Spare parts equipment list.

.9 Manufacturers standard or extended warranty information.

.4 Maintenance data shall include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.5 Performance data to include:

.1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified elsewhere.

.4 Testing, adjusting and balancing reports as specified in Testing, Adjusting and Balancing Section.

.6 Miscellaneous data to include:

.1 Letter of contractor's warranty and guarantee.

.2 Index sheet.

.3 Tabbed format for each section.

.4 Manufacturers approved shop drawings.

.5 Spare parts list and source.

.6 List of Manufacturers and suppliers address for each piece of equipment.

.7 Approvals:

.1 Submit 1 copy of draft Operation and Maintenance Manual to Consultant for approval. Submission of individual data will not be accepted unless so directed by Consultant.

.2 Make changes as required and re-submit as directed by Consultant.

.3 Provide three (3) copies of final operation maintenance manuals, as well as a PDF file of the entire approved manual on a USB stick. Only one USB stick is to be provided containing both the approved manual and As-built drawings.

.8 Additional data:

.1 Prepare and insert into operation and maintenance manual when need for same becomes apparent during demonstrations and instructions specified above.

1.14 AS-BUILT DRAWINGS

.1 Site records:

.1 Contractor shall provide 2 sets of reproducible mechanical drawings. Provide sets of white prints as required for each phase of the work. Mark thereon all changes as work progresses and as changes occur. This shall include changes to existing mechanical systems, control systems and low voltage control wiring.

.2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection at all times.

.2 As-built drawings:

.1 Prior to start of Testing, Adjusting and Balancing (TAB), finalize production of as-built drawings.

.2 Identify each drawing in lower right hand corner in letters at least 3 mm (1/8") high as follows: - "AS-BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (date).

.3 TAB to be performed using as-built drawings.

.4 Submit hard copy to Consultant for approval. When returned, make corrections as directed.

.5 Once approved, submit completed reproducible paper as-built drawings as well as a scanned pdf file copy on USB stick with Operating and Maintenance Manuals.

1.15 WARRANTIES AND SERVICE

.1 In addition to guarantee specified in General Conditions, guarantee heating, cooling, and plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.

.2 The contractor shall provide all regular equipment service including any parts (as recommended by the manufacturer) for the warranty period.

.1 HVAC unit

.2 All equipment filter changes (4 times per year).

.3 Miscellaneous fans and heaters.

.3 Warranty period shall start from date of substantial completion and shall be 2 years. Warranty shall include parts and labour.

1.16 SUBSTANTIAL PERFORMANCE

.1 Complete the following to the satisfaction of the consultant prior to request for submission of substantial performance.

.1 As-Built Drawings.

.2 Maintenance Manuals

.3 System Start up

.4 TAB Reports

.5 HVAC System Commissioning

.6 Instructions to Owners

.7 Final Certificates (required prior to consultant’s release of conformance letter).

.1 TSSA Certificate of Authorization for split refrigeration systems ***exceed 3 tons

1.17 OCCUPANCY REQUIREMENTS

.1 The contractor shall provide the following documentation to the consultant prior to receiving occupancy. Failure to provide the proper documentation will result in the occupancy not being granted. List of required documentation:

.1 Final Certificates (required prior to consultant's release of conformance letter).

.1 TSSA Certificate of Authorization for split refrigeration systems ***exceed 3 tons

1.18 REVISION TO CONTRACT

.1 Provide the following:

.1 Itemized list of material with associated costs.

.2 Labour rate and itemized list of labour for each item.

.3 Copy of manufacturers/suppliers invoice if requested.

1.19 DELIVERY STORAGE & HANDLING

.1 Follow Manufacturer's directions in delivery, storage, and protection, of equipment and materials.

.2 Deliver equipment and material to site and tightly cover and protect against dirt, water, and chemical or mechanical injury but have readily accessible for inspection. Store items subject to moisture damage (such as controls) in dry, heated space.

1.20 PHASING OF WORK

.1 This work for this project shall be constructed in phases. Refer to the architectural drawings for phasing information and details. Misinterpretation of the drawings with respect to the extent of the phasing of the work shall not relieve the contractor of the work required to complete the entire contract.

.2 Provide all necessary services or temporary services to suit phasing of construction with respect to all mechanical services and fire protection.

.3 Life safety systems in the building are to remain fully operational in occupied areas for building staff and occupants during renovations.

.4 Provide all necessary tests and certificates at completion of each phase to suit requirements of local authorities and consultants for occupancy of completed areas.

1.21 TSSA INSPECTION

.1 Prior to final completion of the project, this contractor shall make application, arrange, and pay for a TSSA inspection of all piping systems and equipment installations, including, but not limited to fuel piping, heating plant, and associated equipment installed under the contract.

.2 Provide a copy of the TSSA report in the maintenance manuals for each system.

1.22 CONFINED SPACES

.1 Certain areas of the building may be defined as a "Confined Space". Any personnel working in these areas must have confined space training, appropriate equipment and undertake all work in conformance with appropriate codes and standards.

.2 Refer to building documentation for any spaces deemed "Confined Space".

1.23 ENERGY EFFICIENCY

.1 The mechanical systems of this building must achieve the energy efficiency levels by conforming to ANSI/ASHRAE/IESNA 90.1 "Energy Standard for Buildings Except Low-Rise Residential Buildings" and Chapter 2 of Division 3 of SB-10 prescriptive method from the Ontario Building Code.

.2 All equipment, products, and installations must conform to the Codes and Standards.

END OF SECTION

Part 1 General

1.1 TESTS

.1 Give 48 hours written notice of date for tests.

.2 Insulate or conceal work only after testing and approval by Consultant.

.3 Conduct tests in presence of Consultant.

.4 Bear costs including retesting and making good.

.5 Piping:

.1 General: maintain test pressure without loss for 4 h unless otherwise specified.

.2 Hydraulically test hydronic piping systems at 1-1/2 times system operating pressure or minimum 860 kPa, whichever is greater.

.3 Test natural gas systems to CSA-B149.1-00, TSSA requirements and requirements of authorities having jurisdiction.

.4 Test drainage, waste and vent piping to Ontario Building Code and authorities having jurisdiction.

.5 Test domestic hot, cold and recirculation water piping at 1-1/2 times system operating pressure or minimum 860 kPa (124.8 psi), whichever is greater.

.6 Test fire systems in accordance with authorities having jurisdiction and as specified elsewhere.

.6 Equipment: test as specified in relevant sections.

.7 Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures or test medium.

1.2 SYSTEM START UP

.1 Provide adjusting testing and start up of all equipment prior to testing and balancing (TAB) specified elsewhere.

.2 Provide consultant with written notice verifying all equipment operation and installation is complete.

.3 Start up shall be in presence of the following: owner or representative, consultant, contractor, building automation systems (BAS) contractor, and manufacturer's representative. Each person shall witness and sign off each piece of equipment.

.4 Simulate system start up and shut down and verify operation of each piece of equipment.

.5 Arrange with all parties and provide 72 hours notice for start up procedure.

.6 Arrange with building automation systems contractor to sequence all components and ensure system operation.

1.3 COMMISSIONING

.1 Co-ordinate and direct each step of the commissioning process, and recommend acceptance or non-acceptance to the Owner/Owner's Representative.

.2 Prepare, in writing, documentation of any deficiencies discovered during the commissioning process. Submit to consultant and Owner/Owner's Representative.

.3 The Commissioning Process is detailed in *ASHRAE Guideline 1-1996 HVAC Commissioning Process.* The commissioning plan may be modified to reflect the actual construction schedule and design.

.4 Provide a pre-functional test of all HVAC mechanical system and sub-system elements, including control devices, shall be checked for the following:

.1 Verify that each element has been properly installed, properly identified, and that all connections (including electrical) have been made correctly.

.2 Verify that each element has been checked for proper lubrication, drive rotation, belt tension, control sequence, flow direction, or other conditions which may cause damage or reduce system performance.

.3 Verify that tests, meter readings, and specific mechanical/electrical performance characteristics agree with those required by equipment or system manufacturer.

.4 Controls calibration to be completed in accordance with the specification.

.5 The TAB shall be done in accordance with the specifications.

.5 A functional performance testing shall be done during two separate periods – one during the cooling season and one during the heating season. The first (cooling) testing period shall occur as soon after completion of installation as practical. The heating testing period shall occur as soon as weather conditions make it practical to test warm-up, zone heating and economizer functions. These tests ensure that all equipment and systems operate in accordance with design intent. The tests are dynamic tests, and test the systems through all possible modes of operation.

.6 Reports:

.1 The contractor shall be responsible for recording, documenting, and maintaining detailed inspection and testing data on the test documentation reports. The data record shall be comprehensive and concise.

.2 All data must be recorded as soon as possible during the course of the inspection and testing.

.3 All documentation shall have the date, time, and names of persons participating in the inspection and testing.

.4 All test instruments shall be documented for valid calibration.

.5 The recording work sheets, inspection check lists, and Performance Testing plans must all be approved by the Engineer and the owner's representative prior to the start of the testing.

.6 Include all commissioning documentation in the maintenance manuals.

.7 Mechanical System Execution:

.1 Operate equipment and systems shall be tested in the presence of the owner's representative and the consultant to demonstrate compliance with specified requirements. To minimize the time of Commissioning Team members, testing shall be done in four seasonal single blocks of time insofar as possible.

.2 Notify the consultant, in writing, fourteen (14) days prior to tests scheduled under requirements of this Section.

.3 Testing shall be conducted under specified design operating conditions as recommended or approved by the consultant.

.4 All elements of systems shall be tested to demonstrate that total systems satisfy all requirements of these Specifications. Testing shall be accomplished on hierarchical basis. Test each piece of equipment for proper operation, followed by each sub-system, followed by entire system, followed by any inter-ties of other major systems.

.5 All special testing materials and equipment shall be provided by the appropriate contractor.

.6 Provide three copies of all test reports and records to the consultant.

.8 The verification testing procedures shall address all operating characteristics of all mechanical equipment and systems, including:

Equipment Checklist	System Checklist
Condensing Units	Unit Ventilators
Unit Ventilators	
Controllers/Valves/Dampers	
Relays/Sensors/Transducers	

1.4 DEMONSTRATION AND OPERATING AND MAINTENANCE INSTRUCTION

.1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.2 Mechanical contractor to schedule and coordinate the demonstration all on the same day, starting at a pre-approved time and continuing consequently until complete.

.3 Where specified elsewhere in Mechanical Division, qualified manufacturers' representatives who are knowledgeable about the project to provide demonstrations and instructions.

.4 Use operation and maintenance manual, record drawings, audio visual aids, etc. as part of instruction materials.

.5 Instruction duration time requirements as specified in appropriate sections.

.6 Where deemed necessary, Consultants may record these demonstrations on video tape for future reference.

1.5 TRIAL USAGE

.1 Consultant or owner may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to following equipment and systems:

.1 HVAC

.2 Exhaust air

.3 Domestic water

.4 Plumbing, and drainage.

1.6 DEFICIENCIES

.1 During the course of construction, the consultants will monitor construction and provide written reports of work progress, discussions, and instruction to correct work.

.2 Instruction to correct work shall be done within the work period before the next review.

.3 The contractor shall not conceal any work until inspected.

.4 The contractor shall expedite 100% complete rough-in work and have inspected prior to concealing services and equipment especially above ceiling.

.5 Upon completion of the project the consultant will do a final review. Upon receiving the final inspection report, the contractor must correct and sign back the inspection report indicating the deficiencies are completed. A re-inspection will only be done once consultant receives this in writing.

1.7 EQUIPMENT INSTALLATIONS

.1 Unions or flanges: provide for ease of maintenance and disassembly.

.2 Space for servicing, disassembly and removal of equipment and components: provide as recommended by manufacturer or as indicated.

.3 Equipment drains: pipe to floor drains.

.4 Install equipment, rectangular cleanouts and similar items parallel to or perpendicular to building lines.

1.8 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to equipment unless specified or indicated otherwise. Coordinate with block coursing (if applicable).

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install mechanical equipment at following heights unless indicated otherwise.

.1	Hydronic heating elements	200 mm (8") to bottom of cabinet (unless noted otherwise)
.2	Thermostats: Barrier Free (operable)	1200 mm (3 '– 11")
	Non Barrier Free	1500 mm (5 '– 0")

Also follow direction of architectural drawings and where discrepancies occur clarify prior to rough-in.

1.9 ANCHOR BOLTS AND TEMPLATES

.1 Supply anchor bolts and templates for installation by other divisions.

1.10 PROTECTION OF OPENINGS

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.11 ELECTRICAL

.1 Electrical work to conform to Electrical Division including the following:

.1 Supplier and installer responsibility and related mechanical responsibility is indicated in Equipment Schedule on mechanical and/or electrical drawings

.2 Control wiring and conduit is specified in Electrical Division except for conduit, wiring and connections below 50 V which are related to control systems specified in Mechanical Division. Refer to Electrical Division for quality of materials and workmanship.

.3 Electrically operated equipment shall be C.S.A. approved label. Special Inspection Label of Provincial Authority having jurisdiction will be accepted in lieu of C.S.A. approval. Each motor shall have an approved starter. Starter will be supplied and installed by Electrical Division unless otherwise indicated.

1.12 MOTORS

.1 Provide high efficiency motors for mechanical equipment as specified.

.2 If delivery of specified motor will delay delivery or installation of any equipment, install motor approved by Consultant for temporary use. Final acceptance of equipment will not occur until specified motor is installed.

.3 Motors under 373 W, (1/2 hp): speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, voltage as indicated.

.4 Motors 373 W, (1/2 hp) and larger: EEMAC Class B, Totally Enclosed Fan Cooled (TEFC) induction, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 40°C (72°F), 3 phase, voltage as indicated.

1.13 PIPING AND EQUIPMENT SUPPORTS

.1 Equipment supports supplied by equipment manufacturer: specified elsewhere in Mechanical Division.

.2 Piping and equipment supports not supplied by equipment manufacturer: fabricate from structural grade steel meeting requirements of - Structural Steel Section. Submit structural calculations with shop drawings.

.3 Mount base mounted equipment on chamfered edge housekeeping pads, minimum of 100 mm (4") high and 150 mm (6") larger than equipment dimensions all around. Concrete specified elsewhere.

.4 Where housekeeping pads incorporate existing pads provide 10 mm dowels into existing pads. New pad height shall match existing.

1.14 SLEEVES

.1 Pipe sleeves: at points where pipes pass through masonry, concrete or fire rated assemblies and as indicated. Grout sleeves in place.

.2 Schedule 40 steel pipe.

.3 Sleeves with annular fin continuously welded at midpoint:

.1 Through foundation walls.

.2 Where sleeve extends above finished floor.

.3 Through fire rated walls and floors.

.4 Sizes: minimum 6 mm (1/4") clearance all around, between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25 mm (1") above other floors.

.6 Fill voids around pipes:

.1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.

.2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.

.3 Ensure no contact between copper tube or pipe and ferrous sleeve.

.4 Fill future-use sleeves with lime plaster or other easily removable filler.

.5 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M+Amdt-Mar-78.

.7 Provide minimum 20 gauge duct sleeves where ducts pass through masonry concrete or fire rated assemblies. Maintain minimum 25 mm clearance all around or to the requirements of the authority having jurisdiction. Seal at wall as indicated.

1.15 FIRE STOPPING

.1 This contractor shall work with all other contractors on the project in providing one common method of fire stopping all penetrations made in fire rated assemblies.

.2 Approved fire stopping and smoke seal material in all fire separations and fire ratings within annular space between pipes, ducts, insulation and adjacent fire separation and/or fire rating.

.3 Do not use cementious or rigid seals around penetrations for pipe, ductwork, or other mechanical items.

.4 Insulated pipes and ducts: ensure integrity of insulation and vapour barrier at fire separation.

.5 Provide materials and systems capable of maintaining effective barrier against flame, smoke and gases. Ensure continuity and integrity of fire separation.

.6 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.

.7 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation. Provide “fire wrap” blanket around services penetrating fire walls. Extent of blanket must correspond to ULC recommendations.

.8 The fire stopping materials are not to shrink, slump or sag and to be free of asbestos, halogens and volatile solvents.

.9 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.

.10 Fire stop materials are to be capable of receiving finish materials in those areas which are exposed and scheduled to receive finishes. Exposed surfaces are to be acceptable to consultant prior to application of finish.

.11 Firestopping shall be inspected and approved by local authority prior to concealment or enclosure.

.12 Install material and components in accordance with ULC certification, manufacturers instructions and local authority.

.13 Submit product literature and installation material on fire stopping in shop drawing and product data manual. Maintain copies of these on site for viewing by installers and consultant.

.14 Manufacturer of product shall provide certification of installation. Submit letter to the consultant.

.15 Acceptable Manufacturer:
Minnesota Mining and Manufacturing

.16 Acceptable Alternate Manufacturers to approval of local authority:
Fryesleeve Industries Inc.
General Electric Pensil Firestop Systems
International Protective Coatings Corp.
Rectorseal Corporation (Metacaulk)
Proset Systems
3M
AD Systems
Hilti

.17 Ensure firestop manufacturer representative performs on site inspections and certifies installation. Submit inspection reports/certification at time of substantial completion.

1.16 ESCUTCHEONS

.1 On pipes and ductwork passing through walls, partitions, floors and ceilings in exposed finished areas and on water and drain pipes inside millwork and cabinets.

.2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws.

.3 Outside diameter to cover opening or sleeve.

.4 Inside diameter to fit around finished pipe.

1.17 PAINTING

.1 Refer to Section Interior Painting and specified elsewhere.

.2 Apply at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.

.3 Apply two coats of paint to exposed piping service in mechanical room, base colour as specified in Mechanical Identification Section.

.4 Prime and touch up marred finished paintwork to match original.

.5 Restore to new condition, or replace equipment at discretion of consultant, finishes which have been damaged too extensively to be merely primed and touched up.

1.18 SPARE PARTS

.1 Furnish spare parts in accordance with general requirements and as follows:

.1 One set of packing for each pump.

.2 One casing joint gasket for each size pump.

.3 One set of belts for each type or each size of machinery.

.4 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.

.2 Provide list of equipment in maintenance manuals indicating corresponding spare parts required. List of spare parts to be signed off by receiving personnel.

1.19 ACCESS DOORS

.1 Provide access doors to concealed mechanical equipment for operating, inspecting, adjusting and servicing.

.2 Flush mounted 600 x 600 mm (24" x 24") for body entry and 300 x 300 mm (12" x 12") for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.

.3 Material:

.1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by Consultant.

.2 Remaining areas: use prime coated steel.

.3 Fire rated areas: provide ULC listed access doors

.4 Installation:

.1 Locate so that concealed items are accessible.

.2 Locate so that hand or body entry (as applicable) is achieved.

.5 Acceptable materials:
Le Hage
Zurn
Acudor
Nailor Industries Inc.

1.20 DIELECTRIC COUPLINGS

.1 General:

.1 To be compatible with and to suit pressure rating of piping system.

.2 Where pipes of dissimilar metals are joined.

.2 Pipes NPS 50 mm (2") and under: isolating unions.

.3 Pipes NPS 65 mm (2 1/2") and over: isolating flanges.

1.21 DRAIN VALVES

.1 Locate at low points and at section isolating valves unless otherwise specified.

.2 Minimum NPS 20 mm (3/4") unless otherwise specified: bronze, with hose end male thread and complete with cap and chain.

.3 Drain valves on potable water systems shall be complete with vacuum breaker.

1.22 REPAIRS, CUTTING, AND RESTORATION

.1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

.2 Each Section of this Division shall bear expense of cutting, patching, and repairing to install their work and/or replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

.3 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

.4 All patching, painting and making good of the existing walls, floors, ceilings, partitions and roof will be at the expense of this Contractor, but performed by the Contractor specializing in the type of work involved unless otherwise noted.

1.23 EXISTING SYSTEMS

.1 Connections into existing systems to be made at time approved by Consultant. Request written approval of time when connections can be made.

.2 Be responsible for damage to existing plant by this work.

1.24 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units prior to turn over to owner.

.2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition including replacement of all filters in all air and piping systems.

1.25 DISCONNECTION AND REMOVAL

.1 Disconnect and/or remove equipment, piping, ductwork, etc. as indicated.

.2 Cap and conceal all redundant and obsolete connections.

.3 Provide a list of equipment to be removed to the owner, for his acceptance of same. Remove all equipment from site, which the owner does not retain.

.4 Store equipment to be retained by owner on site where directed by consultant.

1.26 OWNER SUPPLIED EQUIPMENT

.1 Connect to equipment supplied by the owner and make operable.

1.27 DEMOLITION

.1 The general requirements are indicated on the drawings and on the outline specification in Division 1.

.2 The general execution of the demolition is to be carried out in a clean and efficient manner.

.3 Demolition of existing ceiling, walls etc., to facilitate removal of existing services or equipment or installation of new to be kept to a minimum and then restored to match existing.

.4 All openings or holes created by removal of existing mechanical systems which are not being reused are to be patched with the same material surrounding surfaces.

.5 All new holes and openings to facilitate mechanical systems are to be patched to match surrounding surfaces.

.6 Protect all existing furnishings materials and equipment. Any damage occurring as a result of the work of this Division shall be repaired or replaced at the expense of this Division.

.7 Where work involves breaking into or connecting to existing services, carry out work at times directed by the Owners in an expedient manner with minimum disruption to the facility and systems downtime.

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

.9 Where the location of any services has been shown on the plans, such information is not guaranteed. It is this Division's responsibility to verify locations, invert elevations, etc., immediately after moving on site. Should for any reason the information obtained necessitates changes in procedure or design, advise the Consultant at once. If verification of existing conditions is not done at the outset and any problems arise, the responsibility for same is entirely this Division's.

1.28 LOCATION OF EXISTING UNDERGROUND SERVICES

.1 This contractor shall locate existing services prior to starting any work in the affected area.

.2 This contractor shall use a video camera for the existing storm and/or sanitary drainage at the indicated connection point to confirm location, size and invert of the existing piping.

1.29 EXCAVATING AND BACKFILLING

.1 Provide all excavating and backfilling inside and outside the building for plumbing pipes, drains and equipment. All backfilling shall be new clean granular 'A' fill brought in specifically for the purpose of backfilling to the underside of floor slab. All backfilling shall be compacted at intervals not more than 150 mm (6") layer to the satisfaction of the Consultant.

.2 Provide excavating and backfilling outside the building with granular A brought in specifically for backfilling to a minimum of 450 mm (18") over the pipe. Backfilling outside building over and above the 450 mm (18") backfill as previously specified herein shall be by the Mechanical Contractor as specified under Division 2. Where backfilling outside the building is not specified under Division 2 the mechanical contractor shall provide new clean granular 'A' fill to grade level.

.3 Bottoms of trenches shall be excavated so that the pipe will be supported on a 150 mm (6") compacted bed of clean granular 'A' fill. Provide all necessary pumping to maintain excavation free of water.

.4 Should water be encountered during excavation, the mechanical contractor shall provide all labour and material, including all equipment required for dewatering the excavation. After the water has been removed, this Contractor shall install a 300 mm (12") base of compacted 50 mm (2") clear stone covered with filter cloth before installing backfill as detailed and/or as specified.

.5 Be responsible for all weather protection required to install piping and/or equipment to the satisfaction of the Consultant.

.6 Be responsible for providing all clear stone or granular 'A' material suitable for application to replace existing soil not suitable for backfilling above the 450 mm (18") bedding material.

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

.1 Conform to the General Provisions of General Requirements Section.

.2 This project is one of a retrofit nature in part, and which will require some demolition.

.3 Allow for all remedial work in areas indicated on the drawings and as generally defined in the relevant sections of the specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1 Electrical Division.

1.3 SCOPE OF WORK

.1 The scope of work is essentially the selected disconnection and/or removal of services and/or equipment, piping ductwork etc. as indicated or required to complete the work.

Part 2 Products

2.1 GENERAL

.1 This Division is to liaise with the Owners or Consultant for equipment being removed that may be suitable for reuse to that specified or handed over to the owner.

.2 This Division to take full responsibility for any special tools or equipment required to disassemble or remove material from building.

Part 3 Execution

3.1 GENERAL

.1 The general requirements are indicated on the drawings and on the outline specification in Division 1.

.2 The general execution of the demolition is to be carried out in a clean and efficient manner.

.3 Demolition of existing ceiling, walls etc., to facilitate removal of existing services or equipment or installation of new to be kept to a minimum and then restored to match existing.

.4 All openings or holes created by removal of existing mechanical systems which are not being reused are to be patched with the same material surrounding surfaces.

.5 All new holes and openings to facilitate mechanical systems are to be patched to match surrounding surfaces.

.6 Protect all existing furnishings materials and equipment. Any damage occurring as a result of the work of this Division shall be repaired or replaced at the expense of this Division.

.7 Where work involves breaking into or connecting to existing services, carry out work at times directed by the Owners in an expedient manner with minimum disruption to the facility and systems downtime.

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

.9 Where the location of any services has been shown on the plans, such information is not guaranteed. It is this Division's responsibility to verify locations, invert elevations, etc., immediately after moving on site. Should for any reason the information obtained necessitates changes in procedure or design, advise the Consultant at once. If verification of existing conditions is not done at the outset and any problems arise, the responsibility for same is entirely this Division's.

.10 Disconnect and/or remove equipment piping, ductwork, etc. as indicated.

.11 Cap and conceal all redundant and obsolete connections.

.12 Provide a list of equipment to be removed to the owner, for his acceptance of same. Remove all equipment from site which the owner does not retain.

.13 Maintain equipment to be retained by owner on site where directed by consultant.

.14 Demolition of all parts of the work must be completed within the confines of the work area and in such a way as the dust produced and risk to injury of will not adversely affect the building users.

.15 Demolished areas of the existing building will remain in their current use in some cases. Demolition in these areas must be kept to the minimum required to complete the work.

.16 Demolition shall take place within areas isolated from all other areas with appropriate hoarding, scaffolding, netting, fencing or other means of security between building users and the work.

.17 Co-ordinate making safe electrical devices, capping plumbing and removal of fixtures prior to commencement of demolition.

.18 All piping and equipment to be removed and/or abandoned shall be drained prior to capping and/or abandoning. Disposal of all liquids shall be to the approval of authority of having jurisdiction and/or provincial regulations.

3.2 EXISTING SYSTEM DRAINAGE

.1 Drain all existing piping and drainage systems including all related equipment as required to facilitate system renovations.

.2 Disposal of existing system shall be to the requirements of the local and/or provincial regulations.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 American Society for Testing and Materials

.1 ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A105/A105M, Specification for Carbon Steel Forgings for Piping Applications.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate for each item as applicable:

.1 Manufacturer, model number, line contents, pressure and temperature rating.

.2 Movement handled; axial, lateral, angular and the amounts of each.

.3 Nominal size and dimensions including details of construction and assembly.

1.3 CLOSEOUT SUBMITTALS

.1 Submit maintenance data in accordance with general requirements.

.2 Data to include:

.1 Servicing requirements, including any special requirements, stuffing box packing, lubrication and recommended procedures.

Part 2 Products

2.1 FLEXIBLE CONNECTION

.1 Application: to suit motion.

.2 Minimum length in accordance with manufacturer's recommendations to suit offset.

.3 Inner hose: stainless steel corrugated.

.4 Braided wire mesh stainless steel outer jacket.

.5 Diameter and type of end connection: as indicated.

.6 Operating conditions:

.1 Working pressure: 1034 kPa (150 psi).

.2 Working temperature: 250°C (482°F).

.3 To match system requirements.

2.2 ANCHORS AND GUIDES

.1 Anchors:

.1 Provide as indicated.

.2 Alignment guides:

.1 Provide as indicated.

.2 To accommodate specified thickness of insulation.

.3 Vapour barriers, jackets to remain uninterrupted.

2.3 EXPANSION COMPENSATORS (EXP)

.1 Packless guided construction complete with multi ply stainless steel bellows.

.2 Operating temperature (750°F).

.3 Provide model H3 for steel pipe and model HB for copper pipe.

.4 Material to match piping system.

.5 Acceptable materials:
Senior Flexonics

Part 3 Execution

3.1 INSTALLATION

.1 Install expansion joints with cold setting, as indicated as instructed by Consultant. Make record of cold settings.

.2 Install expansion joints and flexible connections in accordance with manufacturer's instructions.

.3 Install pipe anchors and guides as indicated. Anchors to withstand 150% of axial thrust.

3.2 APPLICATION

.1 Provide on all vibration isolated equipment.

.2 Provide where requested by equipment manufacturers installation manuals.

.3 Install in accordance with manufacturer’s recommendations.

.4 Provide expansion compensators (exp.) on radiation heating element exceeding 3.6 M (12' – 0") in length. Provide one expansion compensators on each length of return piping in cabinet.

3.3 THERMAL EXPANSION

.1 Provide in long runs of heating mains exceeding 100 ft. in length.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ANSI/ASME B40.100, Pressure Gauges and Gauge Attachments.

.3 CAN/CGSB-14.4, Thermometers, Liquid-in-Glass, Self Indicating, Commercial/Industrial Type.

.4 CAN/CGSB-14.5, Thermometers, Bimetallic, Self-Indicating, Commercial/Industrial Type.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general requirements.

.2 Submit manufacturer's product data for following items:

.1 Thermometers.

.2 Pressure gauges.

.3 Stop clocks.

.4 Wells.

Part 2 Products

2.1 GENERAL

.1 Design point to be at mid point of scale or range.

.2 Ranges: suitable for application.

2.2 PRESSURE GAUGES

.1 115 mm (4 1/2"), dial type: to ANSI/ASME B40.100, Grade 1, stainless steel phosphor bronze bourdon tube having 1% accuracy full scale unless otherwise specified.

.1 Acceptable materials:

.1 Winters PCT

.2 Trerice

.3 Wiess

.2 Provide:

.1 Snubber for pulsating operation.

.2 Diaphragm assembly for corrosive service.

.3 Gasketted pressure relief back with solid front.

.4 Bronze stop cock.

Part 3 Execution

3.1 GENERAL

.1 Install so they can be easily read from floor or platform. If this cannot be accomplished, install remote reading units.

.2 Install between equipment and first fitting or valve.

3.2 PRESSURE GAUGES

.1 Install in following locations:

.1 Upstream and downstream of control valves.

.2 Inlet and outlet of backflow prevention.

.3 In other locations as indicated.

.2 Install gauge cocks for balancing purposes, elsewhere as indicated.

.3 Use extensions where pressure gauges are installed through insulation.

3.3 NAMEPLATES

.1 Install engraved lamicoid nameplates as specified in elsewhere identifying medium.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 American National Standards Institute/ American Society of Mechanical Engineers (ANSI/ASME)

.1 ANSI/ASME B31.1, Power Piping, (SI Edition).

.3 American Society for Testing and Materials (ASTM)

.1 ASTM A 125, Specification for Steel Springs, Helical, Heat-Treated.

.2 ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A 563, Specification for Carbon and Alloy Steel Nuts.

.4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)

.1 MSS SP-58, Pipe Hangers and Supports - Materials, Design, Manufacture Selection, Application, and Installation.

1.2 DESIGN REQUIREMENTS

.1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.

.2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP-58.

.3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.

.4 Design hangers and supports to support systems under all conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.

.5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment to be in accordance with MSS SP-58.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general requirements.

.2 Submit shop drawings and product data for following items:

.1 All bases, hangers and supports.

.2 Connections to equipment and structure.

.3 Structural assemblies.

1.4 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 GENERAL

.1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS-SP-58.

.2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

2.2 PIPE HANGERS

.1 Finishes:

.1 Pipe hangers and supports: to ANSI & ULC requirements

.2 Ensure steel hangers in contact with copper piping are copper plated.

.2 Upper attachment structural: Suspension from upper flange of I-Beam or joist.

.1 Cold piping NPS 50 mm (2") maximum: Ductile iron C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.

.1 Rod: 10 mm (3/8") UL listed

.2 Cold piping NPS 65 mm (2 1/2") or greater, all hot piping: Malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL listed & FM approved.

.3 Upper attachment structural: Suspension from upper flange of I-Beam.

.1 Cold piping NPS 50 mm (2") maximum: Ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL listed.

.2 Cold piping NPS 65 mm (2 1/2") or greater, all hot piping: Malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nuts.

.4 Upper attachment to concrete.

.1 Ceiling: Carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm (1/4") minimum greater than rod diameter.

.2 Concrete inserts: wedge shaped body with knockout protector plate ULC listed. Note: Rapidex and Siporex are <u>not</u> considered concrete. Should one of these systems be encountered, piping/ductwork and/or equipment shall be supported from adjacent walls or from supplemental steel provided by this contractor attached to the adjacent walls/structure.

.5 Shop and field-fabricated assemblies.

.1 Trapeze hanger assemblies: ASME B31.1.

.2 Steel brackets: ASME B31.1.

.6 Hanger rods: threaded rod material to MSS SP-58.

.1 Ensure that hanger rods are subject to tensile loading only.

.2 Provide linkages where lateral or axial movement of pipework is anticipated.

.7 Pipe attachments: material to MSS SP-58.

.1 Attachments for steel piping: carbon steel.

.2 Attachments for copper piping: copper plated black steel.

.3 Use insulation shields for all piping.

.4 Oversize pipe hangers and supports to accommodate thermal insulation. Provide 1.5 mm (16 gauge) saddles.

.8 Adjustable clevis: material to MSS SP-58 UL listed, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.

.1 Ensure "U" has hole in bottom for rivetting to insulation shields.

2.3 RISER CLAMPS

.1 Steel or cast iron pipe: black carbon steel to MSS-SP-58, type 42, UL listed.

.2 Copper pipe: carbon steel copper plated to MSS-SP-58, type 42.

.3 Bolts: to ASTM A 307.

.4 Nuts: to ASTM A 563.

2.4 INSULATION PROTECTION SHIELDS

.1 Insulated cold piping:

.1 64 kg/m² (13.12 lbs/ft²) density insulation plus insulation protection shield to: MSS SP-69, galvanized sheet carbon steel. Length designed for maximum 3 m (10') span.

.2 Insulated hot piping:

.1 Curved plate 300 mm (12") long, with edges turned up, welded-in centre plate for pipe sizes NPS 300 mm (12") and over, carbon steel to comply with MSS SP-58.

2.5 EQUIPMENT SUPPORTS

.1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel meeting requirements of miscellaneous metals, specified herein. Submit calculations with shop drawings.

2.6 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

.1 Provide templates to ensure accurate location of anchor bolts.

2.7 HOUSE-KEEPING PADS

.1 For base-mounted equipment: Reinforced concrete, at least 100 mm (4") high, 150 mm (6") larger all around than equipment, and with chamfered edges as indicated.

.2 Size of housekeeping pads shall be determined from approved shop drawings.

.3 Concrete: 30 Mpa concrete with reinforced wire mesh.

.4 Install all housekeeping pads not indicated on architectural drawings.

2.8 ROOF MOUNTED EQUIPMENT

.1 Install as per manufacturers' instructions on roof curbs provided by manufacturer as indicated.

.2 Provide all necessary continuous pressure treated wood blocking and 24 gauge metal liner on all exposed wood as required to install roof curb level.

2.9 OTHER EQUIPMENT SUPPORTS

.1 From structural grade steel meeting requirements of structural steel section specified herein.

.2 Submit structural calculations with shop drawings.

2.10 MANUFACTURER

.1 Acceptable materials:

.1 Anvil

.2 Myatt

.3 Taylor

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with:

.1 Manufacturer's instructions and recommendations.

.2 Vibration Control Devices:

.1 Install on piping systems at pumps, elsewhere as indicated.

.3 Clamps on riser piping:

.1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.

.2 Bolt-tightening torques to be to industry standards.

.3 Steel pipes: Install below coupling or shear lugs welded to pipe.

.4 Cast iron pipes: Install below joint.

.4 Clevis plates:

.1 Attach to concrete with 4 minimum concrete inserts at each corner.

.5 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

3.2 HANGER SPACING

.1 Plumbing piping: most stringent requirements of Canadian Plumbing Code, Provincial Code, or authority having jurisdiction.

.2 Fire protection: to applicable fire code.

.3 Gas and fuel oil piping: up to NPS 15 mm (1/2"): every 1.8 m (6').

.4 Copper piping: up to NPS 15 mm (1/2"): every 1.5 m (5').

.5 Flexible joint roll groove pipe: in accordance with table below, but not less than one hanger at joints.

.6 Within 300 mm (12") of each elbow and:

Maximum Pipe Size: NPS	Spacing Steel	Maximum Spacing Copper
up to 32 mm (1 1/4")	2.1 m (7')	1.8 m (6')
40 mm (1 1/2")	2.7 m (9')	2.4 m (8')
50 mm (2")	3.0 m (10')	2.7 m (9')
65 mm (2 1/2")	3.6 m (12')	3.0 m (10')
80 mm (3")	3.6 m (12')	3.0 m (10')
90 mm (3 1/2")	3.9 m (13')	3.3 m (11')
100 mm (4")	4.2 m (14')	3.6 m (12')
125 mm (5")	4.8 m (16')	
150 mm (6")	5.1 m (17')	
200 mm (8")	5.7 m (19')	
250 mm (10")	6.6 m (22')	
300 mm (12")	6.9 m (23')	

.7 Pipework greater than NPS 300 mm (12"): to MSS SP-69.

3.3 HANGER INSTALLATION

.1 Install hanger so that rod is vertical under operating conditions.

.2 Adjust hangers to equalize load.

.3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

.4 Do “NOT” support piping, ductwork and equipment from roof deck, on bottom chord of floor and/or roof joist and/or from OWSJ bridging. Provide structural member between joist.

3.4 HORIZONTAL MOVEMENT

.1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4mm (5/32") from vertical.

.2 Where horizontal pipe movement is less than 15 mm (1/2"), offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.5 FINAL ADJUSTMENT

.1 Adjust hangers and supports:

.1 Ensure that rod is vertical under operating conditions.

.2 Equalize loads.

.2 Adjustable clevis:

.1 Tighten hanger load nut securely to ensure proper hanger performance.

.2 Tighten upper nut after adjustment.

.3 C-clamps:

.1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.

.4 Beam clamps:

.1 Hammer jaw firmly against underside of beam.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel.

.2 CAN/CGSB-24.3, Identification of Piping Systems.

.3 Canadian Standards Association (CSA).

.1 Natural Gas and Propane Installation Code CSA B149.1.

.4 National Fire Protection Association

.1 NFPA 13, Installation of Sprinkler Systems.

1.2 PRODUCT DATA

.1 Submit product data in accordance with General Requirements.

.2 Product data to include paint colour chips, all other products specified in this section.

1.3 PRODUCT LITERATURE

.1 Submit product literature in accordance with General Requirements.

.2 Product literature to include nameplates, labels, tags, lists of proposed legends.

Part 2 Products

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

.1 Metal or plastic lamicoid nameplate mechanically fastened to each piece of equipment by manufacturer.

.2 Lettering and numbers to be raised or recessed.

.3 Information to include, as appropriate:

.1 Equipment: Manufacturer's name, model, size, serial number, capacity.

.2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATES

.1 Colours:

.1 Hazardous: red letters, white background.

.2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).

.2 Construction:

.1 3 mm (1/8") thick laminated plastic, matte finish, with square corners, letters accurately aligned and machine engraved into core.

.3 Sizes:

.1 Conform to following table:

Size	No. of Sizes mm (")	Height of Line mm (")	Letters mm (")
1	10 x 50 (3/8" x 2")	1 (3/64")	3 (1/8")
2	15 x 75 (1/2" x 3")	1 (3/64")	6 (1/4")
3	15 x 75 (1/2" x 3")	2 (5/64")	3 (1/8")
4	20 x 100 (3/4" x 4")	1 (3/64")	10 (3/8")
5	20 x 100 (3/4" x 4")	2 (6/64")	6 (1/4")
6	20 x 200 (3/4" x 8")	1 (3/64")	10 (3/8")
7	25 x 125 (1" x 5")	1 (3/64")	15 (1/2")
8	25 x 125 (1" x 5")	2 (5/64")	10 (3/8")
9	32 x 200 (1¼" x 8")	1 (3/64")	20 (3/4")

.2 Use maximum of 25 letters/numbers per line.

.4 Locations:

.1 Terminal cabinets, control panels: Use size #5.

.2 Equipment in Mechanical Rooms: Use size #9.

.3 Roof top equipment: use size #9.

.4 Equipment above ceiling: use size #1 riveted to ceiling suspension system.

2.3 FIRE DAMPER/FIRE STOP FLAP NAMEPLATES

.1 Colours:

.1 Black letters, yellow background.

.2 Construction:

.1 Self adhesive 50 mm x 25 mm, matte finish, with round corners.

.3 Locations:

.1 Install on adjacent ceiling grid. Where fire stop flap is installed in gypsum ceiling install on diffuser/grille frame. Where fire damper is installed above gypsum ceiling install on adjacent wall.

2.4 EXISTING IDENTIFICATION SYSTEMS

.1 Apply existing identification system to new work.

.2 Where existing identification system does not cover for new work, use identification system specified this section.

.3 Before starting work, obtain written approval of identification system from Consultant.

.4 Upon completion of this project all references to room names and numbering shall be to the Owner's requirements which may or may 'NOT' be the numbering system used on the drawings. Each contractor shall verify the proper numbering scheme to be used prior to project completion.

.5 All equipment shall be identified in sequence from the existing equipment and "NOT" duplicate numbering of equipment.

2.5 PIPING SYSTEMS GOVERNED BY CODE

.1 Identification:

.1 Natural and propane gas: To CSA B149.1-00 and authority having jurisdiction and as indicated elsewhere.

.2 Sprinklers: To NFPA 13.

2.6 IDENTIFICATION OF PIPING SYSTEMS

.1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

.2 Legend:

.1 Block capitals to sizes and colours listed in CAN/CGSB-24.3.

.3 Arrows showing direction of flow:

.1 Outside diameter of pipe or insulation less than 75 mm (3"): 100 mm (4") long x 50 mm (2") high.

.2 Outside diameter of pipe or insulation 75 mm (3") and greater: 150 mm (6") long x 50 mm (2") high.

.3 Use double-headed arrows where flow is reversible.

.4 Extent of background colour marking:

.1 To full circumference of pipe or insulation.

.2 Length to accommodate pictogram, full length of legend and arrows.

.5 Materials for background colour marking, legend, arrows:

.1 Pipes and tubing 20 mm (3/4") and smaller: Waterproof and heat-resistant pressure sensitive plastic marker tags.

.2 All other pipes: Pressure sensitive vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150°C (300°F) and intermittent temperature of 200°C (395°F).

.6 Colours and Legends:

.1 Where not listed, obtain direction from Consultant.

.2 Colours for legends, arrows: To following table:

Background colour:	Legend:	Arrows:
Yellow	White	Black
Green	White	Black
Red	White	Black

.7 Background colour marking and legends for piping systems:

.8

CONTENTS	BACKGROUND COLOUR MARKING	LEGEND
Hot water heating supply	Yellow	HEATING SUPPLY
Hot water heating return	Yellow	HEATING RETURN
Trap Primer	Green	TRAP PRIMER
Sanitary	Green	SAN
Plumbing vent	Green	SAN. VENT
Condensate	Green	CONDENSATE
Refrigeration liquid	Yellow	REF. LIQUID
Control wiring	White	CONTROL WIRING___VOLTS

2.7 IDENTIFICATION DUCTWORK SYSTEMS

.1 50 mm (2") high stencilled letters and directional arrows 150 mm (6") long x 50 mm (2") high.

.2 Colours: Black, or co-ordinated with base colour to ensure strong contrast.

2.8 VALVES, CONTROLLERS

.1 Brass tags with 15 mm (1/2") stamped identification data filled with black paint.

.2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

.3 Provide adhesive coloured tab (max. size 15 mm) indication on ceiling to locate valves/equipment above. Same applies to grid. Colour to be approved by consultant.

2.9 CONTROLS COMPONENTS IDENTIFICATION

.1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.

.2 Inscriptions to include function and (where appropriate) fail-safe position.

.3 Provide equipment identification and/or indication on ceiling to locate devices/equipment above ceiling. Install identification on grid. Colours to be approved by contractor.

2.10 LANGUAGE

.1 Identification to be in English.

Part 3 Execution

3.1 TIMING

.1 Provide identification only after all painting specified has been completed.

3.2 INSTALLATION

.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

.2 Provide ULC and/or CSA registration plates as required by respective agency.

3.3 NAMEPLATES

.1 Locations:

.1 In conspicuous location to facilitate easy reading and identification from operating floor.

.2 Standoffs:

.1 Provide for nameplates on hot and/or insulated surfaces.

.3 Protection

.1 Do not paint, insulate or cover in any way.

3.4 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

.1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels not more than 1.7 m (5'-8") intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.

.2 Adjacent to each change in direction.

.3 At least once in each small room through which piping or ductwork passes.

.4 On both sides of visual obstruction or where run is difficult to follow.

.5 On both sides of separations such as walls, floors, partitions.

.6 Where system is installed in pipe chases, ceiling spaces, galleries, other confined spaces, at entry and exit points, and at each access opening.

.7 At beginning and end points of each run and at each piece of equipment in run.

.8 At point immediately upstream of major manually operated or automatically controlled valves, dampers, etc. Where this is not possible, place identification as close as possible, preferably on upstream side.

.9 Identification to be easily and accurately readable from usual operating areas and from access points.

.1 Position of identification to be approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 VALVES, CONTROLLERS

.1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S" hooks.

.2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Consultant. Provide one copy (reduced in size if required) in each operating and maintenance manual.

.3 Number valves in each system consecutively. Where existing numbering system is installed start new numbering system at 100.

END OF SECTION

Part 1 General

1.1 CONTRACT REQUIREMENTS

.1 TAB contractor will work under the mechanical contractor.

.2 This contractor must co-ordinate their work with that of the TAB contractor.

1.2 GENERAL

.1 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do all other work as specified in this section including all air handling systems and equipment, all plumbing systems and equipment and all temperature controls system, building automation systems and equipment.

1.3 QUALIFICATIONS OF TAB AGENCIES

.1 Only the following NEBB (National Environmental Balancing Bureau) TAB contractors may quote:

.1 Air Audit Inc.
110 Turnbull Court, Unit 11
Cambridge, Ontario
N1T 1K6
(519) 740-0871

.2 Air Velocities Control Ltd.
100 Premium Way
Mississauga, Ontario
L5B 1A2
(905) 279-4433

.3 Clark Balancing Ltd.
8094 Esquesing Line
Milton, Ontario
L9T 2X9
(905) 693-1518

.4 Flowset Balancing Ltd.
431 Willis Dr.
Oakville, Ontario
L6L 4V6
(416) 410-9793

.5 Air Adjustments & Balancing Inc.
P.O. Box 176,
Schomberg, Ontario
L0G 1T0
(416) 254-3004

1.4 PURPOSE OF TAB

.1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average (95% design) and low (75% of design) loads using actual or simulated loads. TAB contractor to perform equipment evaluation upon start up and once during each season in the first year of operation.

.2 Adjust and regulate equipment and systems so as to meet specified performance requirements and to achieve specified interaction with all other related systems under all normal and emergency loads and operating conditions. Confirm all equipment interlocks and functions of associated systems.

.3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges and temperatures. Refer to BAS for system operating functions.

1.5 EXCEPTIONS

.1 TAB of systems and equipment regulated by codes, standards to be to satisfaction of authority having jurisdiction.

1.6 CO-ORDINATION

.1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule so as to ensure completion before acceptance of project.

.2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems. Co-ordinate with other trades to ensure all systems are interlocked as indicated elsewhere prior to TAB.

1.7 PRE-TAB REVIEW

.1 Review contract documents before project construction is started and confirm in writing to Consultant adequacy of provisions for TAB and all other aspects of design and installation pertinent to success of TAB.

.2 Review specified standards and report to Consultant in writing all proposed procedures which vary from standard.

.3 During construction, co-ordinate location and installation of all TAB devices, equipment, accessories, measurement ports and fittings.

.4 During construction indicate all tolerances of piping, ductwork etc conforms to specifications.

1.8 START-UP

.1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.

.2 Follow special start-up procedures specified elsewhere in the Mechanical Division.

1.9 OPERATION OF SYSTEMS DURING TAB

.1 Operate systems for length of time required for TAB and as required by Consultant for verification of TAB reports.

1.10 START OF TAB

.1 Notify Consultant in writing 3 days prior to start of TAB.

.2 Start TAB only when building is essentially completed, including:

.1 Installation of ceilings, doors, windows, other construction affecting TAB.

.2 Application of weather-stripping, sealing, caulking.

.3 All pressure, leakage, other tests specified elsewhere in the Mechanical Division.

.4 All provisions for TAB installed and operational.

.5 Start-up, verification for proper, normal and safe operation of all mechanical and associated electrical and control systems affecting TAB including but not limited to:

.1 Proper thermal overload protection in place for electrical equipment.

.2 Air systems:

.1 Filters in place, clean.

.2 Duct systems clean.

.3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.

.4 Correct fan rotation.

.5 Fire, smoke, volume control dampers installed and open.

.6 Coil fins combed, clean.

.7 Access doors, installed, closed.

.8 All outlets installed, volume control dampers open.

.3 Liquid systems:

.1 Flushed, filled, vented.

.2 Correct pump rotation.

.3 Strainers in place, baskets clean.

.4 Isolating and balancing valves installed, open.

.5 Calibrated balancing valves installed, at factory settings.

.6 Chemical treatment systems complete, operational.

.7 Control valves are properly piped.

.8 Coils and radiation are properly piped.

.9 BAS in operation.

1.11 APPLICATION TOLERANCES

.1 Do TAB to following tolerances of design values:

.1 HVAC systems: plus 10%, minus 5%.

.2 Hydronic systems: plus or minus 10%.

1.12 ACCURACY TOLERANCES

.1 Measured values to be accurate to within plus or minus 2% of actual values.

1.13 INSTRUMENTS

.1 Prior to TAB, submit to Consultant list of instruments to be used together with serial numbers.

.2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.

.3 Calibrate within 3 months of TAB. Provide certificate of calibration to Consultant.

1.14 SUBMITTALS

.1 Submit, prior to commencement of TAB:

.1 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.15 PRELIMINARY TAB REPORT

.1 Submit for checking and approval of Consultant, prior to submission of formal TAB report, sample of rough TAB sheets. Include:

.1 Details of instruments used.

.2 Details of TAB procedures employed.

.3 Calculations procedures.

.4 Summaries.

1.16 TAB REPORT

.1 Format to be in accordance with NEBB.

.2 TAB report to show all results in SI or imperial units as indicated on plans and to include:

.1 Project record drawings.

.2 System schematics.

.3 Submit 3 copies of TAB Report to consultant for verification and approval, in English in D-ring binders, complete with index tabs.

1.17 VERIFICATION

.1 All reported results subject to verification by Consultant.

.2 Provide manpower and instrumentation to verify up to 30% of all reported results.

.3 Number and location of verified results to be at discretion of Consultant.

.4 Bear costs to repeat TAB as required to satisfaction of Consultant.

1.18 SETTINGS

.1 After TAB is completed to satisfaction of Consultant, replace drive guards, close all access doors, lock all devices in set positions, ensure sensors are at required settings. Replace all ceiling tile etc.

.2 Permanently mark all settings to allow restoration at any time during life of facility. Markings not to be eradicated or covered in any way.

1.19 COMPLETION OF TAB

.1 TAB to be considered complete only when final TAB Report received and approved by Consultant.

1.20 AIR SYSTEMS

.1 Standard: TAB to be to most stringent of TAB standards of NEBB, AABC, SMACNA, ASHRAE.

.2 Do TAB of all systems, equipment, components, controls specified in the Mechanical Division including but not limited to following:

.1 Air handling systems and equipment

.2 Duct testing to SMACNA standards.

.3 Qualifications: personnel performing TAB to be current member in good standing of NEBB.

.4 Quality assurance: Perform TAB under direction of qualified supervisor.

.5 Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dewpoint), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.

.6 Locations of equipment measurements: To include, but not be limited to, following as appropriate:

.1 Inlet and outlet of each damper, filter, coil, humidifier, fan, and other equipment causing changes in conditions.

.2 At each controller, controlled device.

.7 Locations of systems measurements to include, but not be limited to, following as appropriate: Each main duct, main branch, sub-branch, grille, register or diffuser.

.8 To ensure excessive noise is not generated by the VVT systems, the following shall be performed:

.1 For each VVT system, the Test and Balance Agency shall measure the static pressure in the main duct at the location of the bypass damper using a manometer when the system has been stabilized (all zone dampers are full open and the bypass damper is full closed). This information shall be given to the Temperature Control Contractor for verification that the VVT system is properly calibrated.

.2 For each VVT system, 10% of the dampers shall be set to the full open position and 90% shall be set at their minimum position (fully closed). When operating with these damper positions, the static pressure in the main duct at the location of the bypass damper shall again be measured by the Test and Balance Agency using a manometer to ensure it remains at the value measured when in the stabilized mode. This information shall be given to the Temperature Control Contractor for verification that the VVT system is operating correctly and is properly calibrated.

1.21 HYDRONIC SYSTEMS

.1 Definitions: for purposes of this section, to include low pressure hot water heating, chilled water, condenser water, glycol systems.

.2 Standard: TAB to be the most stringent of TAB standards of NEBB, AABC, MACNA, or ASHRAE.

.3 Do TAB of all systems, equipment, components, controls specified in Mechanical Division including but not limited to hydronic equipment testing.

.4 Qualifications: personnel performing TAB to be current member in good standing of NEBB.

.5 Quality assurance: perform TAB under direction of qualified supervisor.

.6 Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls: Flow rate, static pressure, pressure drop (or loss), temperature, specific gravity, density, RPM, electrical power voltage, noise, vibration.

.7 Locations of equipment measurement: To include, but not be limited to, following as appropriate:

.1 Inlet and outlet of each boiler, coil, pump, PRV, control valve, other equipment causing changes in conditions.

.2 At each controller, controlled device.

.8 Locations of systems measurements to include, but not be limited to, following as appropriate: Supply and return of each primary and secondary loop (main, main branch, branch, sub-branch of all hydronic systems, inlet connection of make-up water.

1.22 DUCT LEAKAGE TESTING

.1 Co-ordinate leakage testing with the sheet metal contractor. TAB contractor will be responsible for all duct testing.

.2 Duct to be tested in accordance with SMACNA HVAC Duct Leakage Test Manual and as indicated.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ASTM B32, Specification for Solder Metal.

.3 ASTM B306, Specification for Copper Drainage Tube (DWV).

.4 ASTM C564, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.5 CAN/CSA-B70, Cast Iron Soil Pipe, Fittings and Means of Joining.

.6 CAN/CSA-B125.3, Plumbing Fittings.

Part 2 Products

2.1 COPPER TUBE AND FITTINGS

.1 Above ground sanitary, and vent, maximum 65 mm (2½") Type DWV copper to: ASTM B306.

- .1 Fittings.
  - .1 Cast brass: to CAN/CSA B125.3.
  - .2 Wrought copper: to CAN/CSA B125.3.
- .2 Solder: tin-lead, 50:50, to ASTM B32, type 50A.

.2 Plastic pipe is also acceptable. Refer to 22 13 17.

2.2 CAST IRON PIPING AND FITTINGS

.1 Above ground sanitary, and vent, minimum NPS 80 mm (3"), cast iron to: CAN/CSA-B70.

- .1 Mechanical joints (vents)
  - .1 Neoprene or butyl rubber compression gaskets: to ASTM C564 or CAN/CSA-B70.
  - .2 Stainless steel clamps (2 band).
- .2 Mechanical joints (sanitary)
  - .1 Heavy duty neoprene or butyl rubber compression gaskets to: ASTM C1540.
  - .2 Stainless steel clamps (4 band min).

.2 Plastic pipe is also acceptable. Refer to 22 13 17.

2.3 VENT FLASHINGS

.1 Thaler spun aluminum complete with insulation, cap, and rubber gasket.

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with Provincial Plumbing Code and local authority having jurisdiction.

.2 Install above ground piping parallel and close to walls and ceilings to conserve headroom and space, and to grade as indicated.

.3 Place Cleanouts

.1 Where shown on Drawings and near bottom of each stack and riser.

.2 At every 90 degree change of direction for horizontal lines.

.3 Every 15 m (50') of horizontal run.

.4 Extend clean out to accessible surface. Do not place cleanouts in carpeted floors. In such locations, use wall type cleanouts.

.4 Each fixture and appliance discharging water into sanitary sewer or building sewer lines shall have a seal trap in connection with a complete venting system so gases pass freely to atmosphere with no pressure or syphon condition on water seal.

.5 Vent entire waste system to atmosphere.

.1 Discharge 500 mm (20") above roof. Join lines together in fewest practicable number before projecting above roof.

.2 Set back vent lines so they will not pierce roof near an edge or valley.

.3 Do not terminate vents within 3600 mm of any building intake and/or exhaust opening.

.4 Provide copper vent piping through roof as per detail.

.6 Use torque wrench to obtain proper tension in cinch bands when using hubless cast iron pipe. Butt ends of pipe against centering flange of coupling.

.7 Flash pipes passing through roof with 453 g (16 oz) sheet copper flashing fitted snugly around pipes and caulk between flashing and pipe with flexible waterproof compound.

.1 Flashing base shall be at least 600 mm (24") square.

.2 Flashing may be a 24 kg/m^2 (5 lb/ft^2) lead flashing fitted around pipes and turned down into pipe 15 mm (½") with turned edge hammered against pipe wall.

.8 Before piping is covered, conduct tests in presence of Consultant and correct leaks or defective work. Conduct test prior to placing floor slab but after backfill is placed.

.1 Do not caulk threaded work.

.2 Fill waste and vent system to roof level [a minimum of 3,100 mm - (10')] with water and show no leaks for 2 hours.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ASTM D2235, Specification for Solvent Cement for Acrylonitrille-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.

.3 ASTM D2564, Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems.

.4 CAN/CSA-B181.1, ABS Drain, Waste and Vent Pipe and Pipe Fittings.

.5 CAN/CSA-B181.2, PVC and CPVC Drain, Waste and Vent Pipe and Pipe Fittings.

.6 CAN/CSA-B182.1, Plastic Drain and Sewer Pipe and Pipe Fittings.

Part 2 Products

2.1 PIPING AND FITTINGS

.1 Buried sanitary, and vent piping to:

.1 80 mm (3”) and smaller: ABS drain waste and vent pipe to CAN/CSA-B181.1.

.2 100 mm (4”) and larger: SDR-35 PVC drain waste and vent pipe to CAN/CSA-B181.2.

.3 Vent piping: any size, PVC-DWV plastic drain and sewer pipe and fittings CAN/CSA-B181.2.

.2 Above grade sanitary and vent piping:

.1 80 mm (3”) and smaller: IPEX: PVC-XFR fire rated drain waste and vent pipe to CAN/CSA-B181.1.

.2 100 mm (4”) and larger: IPEX: PVC-XFR drain waste and vent pipe to CAN/CSA-B181.2.

.3 Vent piping: any size, IPEX: PVC-XFR plastic drain and sewer pipe and fittings CAN/CSA-B181.2.

.3 Use plastic XFR – DWV in pipe chase for urinal piping to 1.5 M (5' –0") above finished floor.

.4 Where piping pierces a fire separation an approved fire stop system to the approval of authority having jurisdiction shall be used.

2.2 JOINTS

.1 Solvent weld for PVC: to ASTM D2564.

.2 Solvent weld for ABS: to ASTM D2235.

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with Provincial Plumbing Code and local authority having jurisdiction.

.2 Installation of underground pipe

.1 Provide all excavation, bedding, backfill, and compaction.

.2 Install materials in accordance with Manufacturer's instructions.

.3 Use jacks to make-up gasketed joints.

.4 Stabilize unstable trench bottoms.

.5 Bed pipe true to line and grade with continuous support from firm base.

.1 Bedding depth - 100 mm to 150 mm (4" to 6").

.2 Material and compaction to meet ASTM standard noted above.

.6 Excavate bell holes into bedding material so pipe is uniformly supported along its entire length. Blocking to grade pipe is forbidden.

.7 Trench width at top of pipe -

.1 Minimum 450 mm (18") or diameter of pipe plus 300 mm (12"), whichever is greater.

.2 Maximum - Outside diameter of pipe plus 600 mm (24").

.8 Piping and joints shall be clean and installed according to manufacturer's recommendations. Break down contaminated joints, clean seats and gaskets and reinstall.

.9 Do not use back hoe or power equipment to assemble pipe.

.10 Initial backfill shall be 300 mm (12") above top of pipe with material specified in referenced ASTM standard.

.3 Place Cleanouts

.1 Where shown on Drawings and near bottom of each stack and riser.

.2 At every 90 degree change of direction for horizontal lines.

.3 Every 15 m (50 ft) of horizontal run.

.4 Extend clean out to accessible surface. Do not place cleanouts in carpeted floors. In such locations, use wall type cleanouts

.4 Each fixture and appliance discharging water into sanitary sewer or building sewer lines shall have a seal trap in connection with a complete venting system so gases pass freely to atmosphere with no pressure or syphon condition on water seal.

.5 Before piping is covered, conduct tests in presence of Consultant and correct leaks or defective work. Conduct test prior to placing floor slab but after backfill is placed.

.1 Fill waste and vent system a minimum of 1.8 m (6 ft) above finished floor with water and show no leaks for 2 hours.

.2 Conduct ball test in presence of consultant to ensure proper grade and clear of obstructions.

.6 Vent entire waste system to atmosphere.

.1 Discharge 350 mm (14") above roof. Join lines together in fewest practicable number before projecting above roof.

.2 Set back vent lines so they will not pierce roof near an edge or valley.

.7 Flash pipes passing through roof with 453 g (16 oz) sheet copper flashing fitted snugly around pipes and caulk between flashing and pipe with flexible waterproof compound.

.1 Flashing base shall be at least 600 mm (24") square.

.2 Flashing may be a 24 kg/m^2 (5 lb/ft^2) lead flashing fitted around pipes and turned down into pipe 15 mm (½") with turned edge hammered against pipe wall.

.8 Install above ground piping parallel and close to walls and ceilings to conserve headroom and space, and to grade as indicated.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian General Standards Board (CGSB)

.1 ASTM C553, Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.2 CAN/ULC-S702, Mineral Fiber Thermal Insulation for Buildings.

.3 ASTM C612, Mineral Fiber Block and Board Thermal Insulation.

.4 CGSB 51-GP-52Ma-[89], Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.3 Underwriters Laboratories of Canada (ULC).

.1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.

.4 American Society for Testing and Materials (ASTM).

.1 ASTM C 335, Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

.2 ASTM C 449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.3 ASTM B 209M, Specification for Aluminum and Aluminum Alloy Sheet and Plate.

.5 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).

.1 ASHRAE Standard 90.1.

.6 Manufacturer's Trade Associations.

.1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for duct jointing recommendations.

1.3 INSTALLATION INSTRUCTIONS

.1 Submit manufacturer's installation instructions in accordance with general requirements.

.2 Installation instructions to include procedures to be used, installation standards to be achieved.

1.4 QUALIFICATIONS

.1 Installer to be specialist in performing work of this section, and have successful experience in this size and type of project, qualified to standards of TIAC.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labeled with manufacturer's name, address.

.2 Protect from weather and construction traffic.

.3 Protect against damage from any source.

.4 Store at temperatures and conditions required by manufacturer.

1.6 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - will mean "not concealed" as defined herein.

.2 Insulation systems - insulation material, fasteners, jackets, and other accessories.

Part 2 Products

2.1 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 Mineral fibre as specified herein includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C (75°F) mean temperature when tested in accordance with ASTM C 335.

.3 Type C-1: Rigid mineral fibre board to ASTM C612, with factory applied vapour retarder jacket to CGSB 51-GP-52Ma:

.1 Mineral fibre: to ASTM C553.

.2 Jacket: to CGSB 51-GP-52 Ma.

.3 Maximum "k" factor: to ASTM C553.

.4 Type C-2: Mineral fibre blanket to ASTM C553 faced with factory applied vapour retarder jacket to CGSB 51-GP-52Ma:

.1 Mineral fibre: to ASTM C553.

.2 Jacket: to CGSB 51-GP-52 Ma.

.3 Maximum "k" factor: to ASTM C553.

.5 Manufacturers:

.1 All materials must be supplied by the same manufacturer.

.2 Acceptable Materials:

.1 Johns Manville

.2 Fibreglass Canada

.3 Knauf

.4 Manson

.5 Roxul

2.3 JACKETS

.1 Canvas:

.1 220 g/m² (0.0451 lb/ft²) cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921.

.2 Lagging adhesive: Compatible with insulation.

2.4 ACCESSORIES

.1 Vapour retarder lap adhesive:

.1 Water based, fire retardant type, compatible with insulation.

.2 Indoor Vapour Retarder Finish:

.1 Vinyl emulsion type acrylic, compatible with insulation.

.3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C 449.

.4 ULC Listed Canvas Jacket:

.1 220 g/m² (0.0451 lb/ft²) cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921.

.5 Tape: self-adhesive, aluminum, reinforced, 75 mm (3") wide minimum.

.6 Contact adhesive: quick-setting Duro Dyne 1A-22.

.7 Canvas adhesive: washable.

.8 Tie wire: 1.5 mm (16 gauge) stainless steel.

.9 Facing: 25 mm (1") stainless steel hexagonal wire mesh stitched on one face of insulation

.10 Fasteners: weld pins, length to suit insulation, with 40 mm (1½") diameter clips.

Part 3 Execution

3.1 PRE-INSTALLATION REQUIREMENTS

.1 Pressure testing of ductwork systems to be complete, witnessed and certified.

.2 Surfaces to be clean, dry, free from foreign material.

3.2 INSTALLATION

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturers instructions and this specification.

.3 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Hangers, supports to be outside vapour retarder jacket.

.4 Supports, Hangers in accordance with general requirements.

.1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.

.5 Fasteners: At 300 mm (12") oc. in horizontal and vertical directions, minimum two rows each side.

.6 Provide rigid insulation for exposed ductwork.

3.3 DUCTWORK INSULATION SCHEDULE

.1 Insulation types and thickness' conform to following table:

Application	Type	Thickness
Rectangular supply air ducts up to unit ventilator	none	
Round supply air ducts up from unit ventilator supply branch to diffuser	none	
Supply branch main from unit ventilator	none	
Supply, return and exhaust ducts exposed (visible) in space being served	none	
Outdoor air intake ductwork and plenums	C-1	50 mm (2")
Exhaust plenums dampers and louvres	C-1	25 mm (1")
Interior acoustically lined ducts	none	
Last 1.5m of Exhaust duct	C-1	25 mm (1")

.2 Exposed round ducts 600 mm (24") and larger, smaller sizes where subject to abuse:

.1 Use TIAC code C-1 insulation, scored to suit diameter of duct.

.3 Finishes: Conform to following table:

Application	Rectangular	Round
Indoor, concealed	none	none
Indoor, exposed	Canvas	Canvas

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian General Standards Board (CGSB)

.1 ASTM C553, Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.2 CGSB 51-GP-52Ma, Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.3 CAN/CGSB-51.53, Poly (Vinyl Chloride) Jacketing Sheet, for Insulating Pipes, Vessels and Round Ducts.

.3 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.4 American Society for Testing and Materials (ASTM)

.1 ASTM C 335, Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

.2 ASTM C 921, Practice for Determining the Properties Jacketing Materials for Thermal Insulation.

.3 ASTM B 209M, Specification for Aluminum and Aluminum Alloy Sheet and Plate.

.5 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).

.1 ASHRAE Standard 90.1.

.6 Manufacturer's Trade Associations

.1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for pipe, fittings, valves and jointing recommendations.

1.3 INSTALLATION INSTRUCTIONS

.1 Submit manufacturer's installation instructions in accordance with general requirements.

.2 Installation instructions to include procedures to be used, installation standards to be achieved.

1.4 QUALIFICATIONS

.1 Installer to be specialist in performing work of this section, and have successful experience in this size and type of project, qualified to standards of TIAC.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Protect from weather, construction traffic.

.3 Protect against damage from any source.

.4 Store at temperatures and conditions required by manufacturer.

1.6 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - will mean "not concealed" as defined herein.

Part 2 Products

2.1 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 Mineral fibre as specified herein includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C (75°F) mean temperature when tested in accordance with ASTM C 335.

.3 Type A-1: Rigid moulded mineral fibre with factory applied vapour retarder jacket.

.1 Mineral fibre: to ASTM C553.

.2 Jacket: to CGSB 51-GP-52 Ma.

.3 Maximum "k" factor: to ASTM C553.

.4 Type A-2: Mineral fibre faced with factory applied vapour retarder jacket.

.1 Mineral fibre: to ASTM C553.

.2 Jacket: to CGSB 51-GP-52 Ma.

.3 Maximum "k" factor: to ASTM C553.

.5 Materials:

.1 All materials must be supplied by the same manufacturer.

.2 Acceptable Materials:
Fibreglass Canada
Knauf
Manson
Pittsburg Corning

2.3 INSULATION SECUREMENT

.1 Tape: Self-adhesive, aluminum, reinforced, 50 mm (2") wide minimum.

.2 Contact adhesive: Quick setting.

.3 Canvas adhesive: Washable.

2.4 CEMENT

.1 Thermal insulating and finishing cement:

.1 To ASTM C553.

.2 Hydraulic setting or Air drying on mineral wool, to ASTM C 449M.

2.5 VAPOUR RETARDER LAP ADHESIVE

.1 Water based, fire retardant type, compatible with insulation.

2.6 INDOOR VAPOUR RETARDER FINISH

.1 Vinyl emulsion type acrylic, compatible with insulation.

2.7 JACKETS

.1 Polyvinyl Chloride (PVC):

.1 One-piece moulded type [and sheet] to CAN/CGSB-51.53 with pre-formed shapes as required.

.2 Colours: white.

.3 Minimum service temperatures: -20°C (-4°F).

.4 Maximum service temperature: 65°C (150°F).

.5 Moisture vapour transmission: 0.02 perm.

.6 Fastenings:

.1 Use solvent weld adhesive compatible with insulation to seal laps and joints.

.2 Tacks.

.3 Pressure sensitive vinyl tape of matching colour.

.2 Canvas:

.1 220 g/m^2 (0.0451 lb/ft^2) cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921.

.2 Lagging adhesive: Compatible with insulation.

2.8 CAULKING FOR JACKETS

.1 Caulking: Silicone clear caulking.

Part 3 Execution

3.1 PRE-INSTALLATION REQUIREMENT

.1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.

.2 Surfaces to be clean, dry, free from foreign material.

3.2 INSTALLATION

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturers' instructions and this specification.

.3 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Hangers, supports to be outside vapour retarder jacket.

.4 Supports, Hangers:

.1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.3 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES

.1 Application: At expansion joints, valves, primary flow measuring elements, flanges, and unions at equipment.

.2 Design: To permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.

.3 Insulation:

.1 Insulation, fastenings and finishes: same as system.

.2 Jacket: As per adjacent insulation.

3.4 PIPING INSULATION SCHEDULES

.1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.

.2 Install insulator and jackets to applicable TIAC codes.

.3 Insulate ends of capped piping with type and thickness indicated for capped service.

.4 Thickness of insulation to be as listed in following table.

.1 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Type	Pipe sizes through (NPS) and insulation thickness mm (")				
		to 25 (1")	32 (1¼") 40 (1½")	50 (2") 80 (3")	105 (4") 150 (6")	200 (8") & over
Condensate	A-1	40 (1½")	40 (1½")	50 (2")	50 (2")	50 (2")
Hot Water Heating	A-1	40 (1½")	50 (2")	50 (2")	50 (2")	50 (2")

.5 Finishes: Conform to the following table:

Application	Piping	Valves & Fittings
Exposed indoors	PVC	PVC
Exposed in mech. rooms	PVC	PVC
Concealed indoors	N/A	PVC

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian Standards Association (CSA).

.1 CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code.

.3 American Society for Testing and Materials (ASTM).

.1 ASTM A47/A47M, Specification for Ferritic Malleable Iron Castings.

.2 ASTM A278/A278M, Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures up to 650°F (350°C).

.3 ASTM A516/A516M, Specification for Pressure Vessel Plates, Carbon Steel, for Moderate - and Lower - Temperature Service.

.4 ASTM A536, Specification for Ductile Iron Castings.

.5 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.

.4 American Society of Mechanical Engineers (ASME).

.1 ANSI/ASME, Boiler and Pressure Vessels Code (BPVC).

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general requirements.

.2 Indicate on product data expansion tanks, air vents, separators, valves, strainers.

1.3 CLOSEOUT SUBMITTALS

.1 Submit maintenance data in accordance with general requirements.

Part 2 Products

2.1 COMBINATION SEPARATORS STRAINERS

.1 Steel, tested and stamped in accordance with ANSI/ASME BPVC, for 860 kPa (125 psi) operating pressure, with galvanized steel integral strainer with 5 mm (3/16") perforations, tangential inlet and outlet connections, and internal stainless steel air collector tube. Air separator to be ‘coalescing’ type.

.2 Size: to match piping.

.3 Acceptable material:

To be of the same manufacturer of pumps.

2.2 COMBINATION LOW PRESSURE RELIEF AND REDUCING VALVE

.1 Adjustable pressure setting: 206 kPa (30 psi) relief, 55 to 172 kPa (8.0 to 25 psi) reducing.

.2 Low inlet pressure check valve.

.3 Removable strainer.

2.3 PIPE LINE STRAINER

.1 NPS 15 mm to 50 mm (1/2" to 2"): bronze body to ASTM B62, screwed connections.

.2 NPS 65 mm to 300 mm (2 1/2" to 12"): cast steel body to ASTM A278M, Class 30, flanged connections.

.3 NPS 50 mm to 300 mm (2" to 12"): T type with malleable iron body to ASTM A47M, grooved ends.

.4 Blowdown connection: NPS 25 mm (1").

.5 Screen: stainless steel with 1.19 mm (50 mil) perforations.

.6 Working pressure: 860 kPa (125 psi).

Part 3 Execution

3.1 GENERAL

.1 Install as indicated and to manufacturer's recommendations.

.2 Run drain lines (and blow off connections) to terminate above nearest drain.

.3 Maintain proper clearance to permit service and maintenance.

.4 Should deviations beyond allowable clearances arise, request and follow Consultant's directive.

.5 Check shop drawings for conformance of all tappings for ancillaries and for equipment operating weights.

3.2 STRAINERS

.1 Install in horizontal or down flow lines.

.2 Ensure clearance for removal of basket.

.3 Install ahead of each pump.

.4 Install ahead of each automatic control valve and as indicated.

.5 Strainer size to match pipe size.

3.3 PRESSURE SAFETY RELIEF VALVES

.1 Run discharge pipe to terminate above nearest drain.

3.4 AIR SEPARATOR

.1 Provide independent support from structure.

.2 Provide high capacity air vent as indicated.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 HVAC Water Treatment Section.

1.2 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 Canadian Standards Association (CSA).

.1 CSA W47.1, Certification of Companies for Fusion Welding of Steel.

.3 American National Standards Institute (ANSI).

.1 ANSI/ASME B16.1, Gray Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.

.2 ANSI/ASME B16.3, Malleable-Iron Threaded Fittings, Classes 150 and 300.

.3 ANSI/ASME B16.5, Pipe Flanges and Flanged Fittings: NPS½ through NPS24 Metric/Inch.

.4 ANSI/ASME B16.9, Factory-Made Wrought Steel Buttwelding Fittings.

.5 ANSI B18.2.1, Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series).

.6 ANSI/ASME B18.2.2, Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).

.7 ANSI/AWWA C111/A21.11, Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.4 American Society for Testing and Materials (ASTM).

.1 ASTM A47/A47M, Specification for Ferritic Malleable Iron Castings.

.2 ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.

.3 ASTM A536, Specification for Ductile Iron Castings.

.4 ASTM B61, Specification for Steam or Valve Bronze Castings.

.5 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.

.5 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).

.1 MSS-SP-67, Butterfly Valves.

.2 MSS-SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.

.3 MSS-SP-71, Cast Iron Swing Check Valves, Flanged and Threaded Ends.

.4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.

.5 MSS-SP-85, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Indicate on manufacturers catalogue literature the following:

.1 Piping

.2 Valves

.3 Accessories

1.4 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 PIPE

.1 Steel pipe: to ASTM A53/A53M, Grade B, as follows:

.1 NPS 32 mm (1¼") and smaller: Schedule 40.

.2 Final connection to copper heating elements.

.1 Type “L” copper with 95/5 solder joints and dielectric couplings. Maximum length 600 mm (24").

2.2 PIPE JOINTS

.1 NPS 32 mm (1¼") and under: screwed fittings with pulverized lead paste.

.2 Pipe thread: taper.

2.3 FITTINGS

.1 Screwed fittings: malleable iron, to ANSI/ASME B16.3, Class 150.

.2 Unions: malleable iron, to ASTM A47/A47M and ANSI/ASME B16.3.

2.4 VALVES MANUFACTURERS

.1 All valves shall be of commercial grade and of same manufacturer.

.2 Acceptable Manufacturers:

.1 Newman Hattersley Canada Ltd.

.2 Jenkins/Crane

.3 Milwaukee

.4 Toyo

.5 Kitz

2.5 VALVES

.1 Connections:

.1 NPS 32 mm (1¼") and smaller: screwed ends.

.2 Drain valves: Gate, Class 125, non-rising stem, solid wedge disc, with chain and cap.

.3 Swing check valves:

.1 NPS 32 mm (1¼") and under:

.1 Class 150, swing, with PFTE disc, as specified. Bronze. Jenkins 4475TJ.

.4 Ball valves:

.1 NPS 32 mm (1¼") and under:

.1 Body and cap: cast high tensile bronze to ASTM B62.

.2 Pressure rating: Class 125, 860 kPa (125 psi) steam, WP = 1.4 MPa (203 psi) WOG.

.3 Connections:

.1 NPS 32 mm (1¼") and under screwed ends to ANSI B1.20.1 and with hex. shoulders.

.4 Stem: stainless steel tamperproof ball drive.

.5 Ball and seat: replaceable stainless steel solid ball and teflon seats.

.6 Stem seat: TFE with external packing nut.

.7 Stem packing nut: external to body.

.8 Operator: removable lever handle.

.9 Extended handles on chilled water valves.

.10 Full port.

.11 Jenkins 201SJ.

2.6 BALANCING VALVES

.1 Size 15 mm (1/2") to 32 mm (1¼"). Bronze body, brass ball, NPT connections and variable orifice.

.2 Differential pressure readout ports with internal EPT inserts and check values, 6 mm (¼")NPT tapped drain/purge ports, memory stop and calibrated nameplate.

.3 Acceptable materials:

.1 Tour & Anderson (match Victaulic pipe section).

2.7 AUTOMATIC AIR VENT

.1 Industrial float vent: cast iron body and NPS 15 mm (1/2") connection and rated at 860 kpa (125 psi) working pressure.

.2 Float: solid material suitable for 115°C (240°F) working temperature.

.3 Acceptable materials:

.1 Honeywell EA122 series c/w integral shutoff

.2 Spirax Sarco

Part 3 Execution

3.1 PIPING INSTALLATION

.1 Installation shall be by a licensed pipe fitter.

.2 Connect to equipment in accordance with manufacturer's instruction unless otherwise indicated.

.3 Install concealed pipes close to building structure to keep furring space to minimum. Install to conserve headroom and space. Run exposed piping parallel to walls. Group piping wherever practical.

.4 Slope piping in direction of drainage and for positive venting.

.5 Use eccentric reducers at pipe size change installed to provide positive drainage or positive venting.

.6 Provide clearance for installation of insulation and access for maintenance of equipment, valves and fittings.

.7 Ream pipes, clean scale and dirt, inside and outside, before and after assembly.

.8 Assemble piping using fittings manufactured to ANSI standards.

.9 Saddle type branch fittings may be used on mains if branch line is no larger than half the size of main. Hole saw or drill and ream main to maintain full inside diameter of branch line prior to welding saddle.

3.2 VALVE INSTALLATION

.1 Install rising stem valves in upright position with stem above horizontal.

.2 Install butterfly valves on chilled water and condenser water lines only.

.3 Install gate or ball valves at branch take-offs and to isolate each piece of equipment, and as indicated.

.4 Install globe valves for balancing and in by-pass around control valves as indicated.

.5 Provide silent check valves on discharge of pumps and in vertical pipes with downward flow and as indicated.

.6 Provide swing check valves in horizontal lines as indicated.

.7 Install chain operators on valves NPS 65 mm (2 1/2") and over where installed more than 2400 mm (96") above floor in Boiler Rooms and Mechanical Equipment Rooms.

3.3 AIR VENTS

.1 Install at high points of systems.

.2 Install ball valve on automatic air vent inlet.

.3 Extend vent lines in Mechanical Room with screwdriver stop at 1.8 m AFF.

3.4 CIRCUIT BALANCING VALVES

.1 Install flow measuring stations and flow balancing valves as indicated and as follows:

.1 On return side of all heating devices (convectors, panels, force flows, radiation, coils, etc).

.2 On return side of all reverse return piping loops and/or branch circuits.

.2 Install to manufacturers requirements.

.3 Valve size shall be one trade size smaller than piping.

.4 Refer to Testing Adjusting and Balancing Section for applicable procedures.

3.5 FILLING OF SYSTEM

.1 Refill system with clean water adding water treatment as specified.

.2 Co-ordinate filling of system with HVAC water treatment contractor.

3.6 TESTING

.1 Test system in accordance with Mechanical General Requirements Section.

.2 For glycol systems, retest with propylene glycol to ASTM E202, inhibited, for use in building system after cleaning. Repair any leaking joints, fittings or valves.

3.7 FLUSHING AND CLEANING

.1 Refer to chemical treatment section 23 25 13.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 American National Standards Institute (ANSI).

- .1 ANSI/ASME B16.1, Gray Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.
- .2 ANSI/ASME B16.3, Malleable-Iron Threaded Fittings, Classes 150 and 300.
- .3 ANSI B18.2.1, Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series).
- .4 ANSI/ASME B18.2.2, Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).
- .5 ANSI/AWWA C111/A21.11, Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.3 American Society for Testing and Materials (ASTM).

- .1 ASTM A47/A47M, Specification for Ferritic Malleable Iron Castings.
- .2 ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
- .3 ASTM A536, Specification for Ductile Iron Castings.
- .4 ASTM B61, Specification for Steam or Valve Bronze Castings.
- .5 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.

.4 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).

- .1 MSS-SP-67, Butterfly Valves.
- .2 MSS-SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.
- .3 MSS-SP-71, Cast Iron Swing Check Valves, Flanged and Threaded Ends.
- .4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.
- .5 MSS-SP-85, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Indicate on manufacturers' catalogue literature the following:

- .1 Piping
- .2 Valves
- .3 Accessories

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 ACCEPTABLE MATERIALS

.1 Victaulic.

.2 No alternates.

2.2 PIPE

.1 Steel pipe: to ASTM A53/A53M, Grade B, as follows:

.1 NPS 40 mm (1½") to 150 mm (6"): Schedule 40.

.2 Final connection to copper heating elements.

.1 Type "L" copper with 95/5 solder joints and dielectric couplings. Maximum length 600 mm (24").

2.3 PIPE JOINTS

.1 NPS 32 mm (1¼") and under: screwed fittings with pulverized lead paste (refer to 23 21 13).

.2 Rolled grooved with Grade E (EPDM) gaskets.

2.4 FITTINGS

.1 Rolled grooved fittings:

.1 Couplings shall be Victaulic Style 07 Zero-Flex with angled bolt pad design and must be installed with Grade E (EPDM) gaskets.

.2 Flanges: Victaulic Style 741.

.3 Hole Cut Products and Branch Connections:

Victaulic Style 920 Mech. Tee
Victaulic Style 923 Vic-Let Outlet
Victaulic Style 924 Vic-O-Well Thermometer Outlet

2.5 VALVES

.1 Connections:

.1 NPS 40 mm (1½") and larger: rolled grooved ends.

.2 Butterfly valves: Application: Isolating each cell or section of multiple component equipment and where indicated.

.1 NPS 40 mm (1½") to 300 mm (12"): Victaulic Vic 300

.3 Drain valves: Gate, Class 125, non-rising stem, solid wedge disc, with chain and cap.

.4 Check valves:

.1 NPS 50 mm (2") and under:

.1 Class 150, swing, with PFTE disc, as specified.
Bronze. Jenkins 4475TJ.

.5 Ball valves:

.1 NPS 80 mm (3") and under:

.1 Body and cap: cast high tensile bronze to ASTM B62.

.2 Pressure rating: Class 125, 860 kPa (125 psi) steam, WP = 1.4 MPa (203 psi) WOG.

.3 Connections:

.1 NPS 50 mm (2") and under screwed ends to ANSI B1.20.1 and with hex. shoulders.

.2 NPS 65 mm (2½") and over flanged or grooved ends.

.4 Stem: stainless steel tamperproof ball drive.

.5 Stem packing nut: external to body.

.6 Ball and seat: replaceable stainless steel solid ball and teflon seats.

.7 Operator: removable lever handle.

.8 Extended handles on chilled water valves.

.9 Full port.

.10 Jenkins 201SJ.

.6 Strainers:

.1 Tee strainers: NPS 40 mm (1½") and over: Victaulic 730 Tee Type Vic-Strainer.

.2 Wye Strainer: NPS 50 mm (2") and over: Victaulic 732 Wye Type Vic-Strainer.

2.6 BALANCING VALVES

.1 Size 15 mm (1/2") to 50mm (2"): Bronze body, brass ball, NPT connections and variable orifice.

.2 Size 65 mm (2 1/2") to larger: Victaulic Tour Anderson Series 789.

.3 Differential pressure readout ports with internal EPT inserts and check values, 6 mm (¼")NPT tapped drain/purge ports, memory stop and calibrated nameplate.

.4 Acceptable materials:

.1 Tour & Anderson

.2 No alternates.

2.7 AUTOMATIC AIR VENT

.1 Industrial float vent: cast iron body and NPS 15 mm (1/2") connection and rated at 860 kPa (125 psi) working pressure.

.2 Float: solid material suitable for 115°C (240°F) working temperature.

.3 Acceptable materials:

.1 Honeywell EA122 series with integral shutoff

.2 Spirax Sarco

2.8 EXPANSION JOINTS AND FLEXIBLE CONNECTIONS

.1 Application: to suit motion.

.2 Minimum length in accordance with manufacturers recommendations to suit offset.

.3 Victaulic Style 150 Mover slip-type expansion joint. The expansion joint shall be installed with Style 07 Zero-Flex couplings.

Part 3 Execution

3.1 PIPING INSTALLATION

.1 Installation shall be by a licensed pipe fitter.

.2 Connect to equipment in accordance with manufacturer's instruction unless otherwise indicated.

.3 Install concealed pipes close to building structure to keep furring space to minimum. Install to conserve headroom and space. Run exposed piping parallel to walls. Group piping wherever practical.

.4 Slope piping in direction of drainage and for positive venting.

.5 Use eccentric reducers at pipe size change installed to provide positive drainage or positive venting.

.6 Provide clearance for installation of insulation and access for maintenance of equipment, valves and fittings.

.7 Ream pipes, clean scale and dirt, inside and outside, before and after assembly.

.8 Assemble piping using fittings manufactured to ANSI standards.

.9 Saddle type branch fittings may be used on mains if branch line is no larger than half the size of main. Hole saw or drill and ream main to maintain full inside diameter of branch line prior to welding saddle.

3.2 PIPE END PREPARATION

.1 Outside diameter of grooved pipe shall not vary more than the tolerance approved. For IPS pipe, the maximum allowable tolerance from square cut ends is 0.030" for ¾" through 3½", 0.045" for 4" through 6"; and 0.060" for sizes 8" O.D. and above; measured from true square line. Any internal or external weld bead or seams in the groove area must be ground smooth and flush. The end of the pipe internally must be cleaned of any material that might interfere with or damage the internal roll.

.2 Pipe surface shall be free from indentations and projections from the end of the pipe to the groove, to provide a leak tight seat for the gasket. All loose paint, scale, dirt, chips, grease and rust must be removed. It is the recommendations of Victaulic that the pipe be square cut. Beveled pipe may be used provided the wall thickness is standard wall (ANSI B36.10) or less and the bevel meets ANSI B16.25.

.3 Bottom of the groove must be free of loose dirt, chips, rust and scale that may interfere with proper coupling assembly.

.4 Groove dimensions shall conform to standard roll groove specifications as published by Victaulic.

.5 Pipe shall be grooved using Victaulic roll grooving system with track enhanced grooving rolls.

3.3 "ZERO-FLEX" COUPLING INSTALLATION

.1 Pipe must be free from indentation, projections, or roll marks on exterior from the end to the groove, to assure a leak tight seat for the gasket.

.2 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade. Apply a thin coat of Victaulic Lubricant to gasket lips and outside of gasket.

.3 Place gasket over pipe end, being sure lip does not overhang pipe end.

.4 Align and bring two pipe ends together and slide gasket into position centered between the grooves on each pipe. No portion of the gasket shall extend into the groove on either pipe.

.5 Loosely assemble all segments leaving one nut and bolt off to allow for "swing-over" feature.

.6 With one nut and one bolt removed, use "swing-over" feature to position housings over gasket and into position into the grooves on both pipes.

.7 Remaining bolt shall be inserted. Bolt track head must engage into housing recess.

.8 Nuts shall be tightened alternately and equally and must maintain metal-to-metal contact at the angle bolt-pads. Tighten securely to assure a rigid joint. Torque to manufacturer's recommendation.

3.4 "REDUCING" COUPLING INSTALLATION

.1 Pipe must be free from indentation, projections, or roll marks on exterior from the end to the groove, to assure a leak tight seat for the gasket.

.2 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade. Gasket must be thoroughly lubricated.

.3 Place large opening of the gasket over the larger pipe ends until the Assembly Washer touches the pipe end.

.4 Align the pipe centerlines and insert the smaller pipe end in the gasket. Assembly washer provided by Victaulic shall be used.

.5 Coupling housings shall be positioned over the gasket into the groove on each pipe.

.6 Insert bolts and apply nuts.

.7 Nuts must be tightened alternately and equal until housing bolt pads are firmly together – metal-to-metal.

3.5 "OUTLET" COUPLING INSTALLATION

.1 Pipe must be free from indentation, projections, or roll marks on exterior from the end to the groove, to assure a leak tight seat for the gasket.

.2 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade. Gasket must be thoroughly lubricated.

.3 Gasket shall be placed on one pipe end so the lips on one side cover the area between the pipe end and the groove. The gasket must not overlap the groove. The pipe ends shall be d to touch the reinforcement ribs inside the gasket.

.4 Bring mating pipe or fitting into position and insert into gasket. The gasket shall not overlap the groove, but fully cover the pipe end.

.5 Housings shall be placed over the gasket and the housing keys must engage into the grooves. Ample lubricant shall be applied to the gasket outlet neck and the upper housing interior.

.6 Insert bolts and apply nuts.

.7 Nuts must be tightened alternately and equally until housing bolt pads are firmly together – metal-to-metal.

3.6 VICTAULIC "FLANGE ADAPTOR" INSTALLATION

.1 Pipe must be free from indentation, projections, or roll marks on exterior from the end to the groove, to assure a leak tight seat for the gasket.

.2 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade.

.3 Victaulic Flange adaptor shall be opened fully and hinged flange shall be placed around the grooved pipe end with the circular key section locating into the groove.

.4 Standard bolt shall inserted through the mating holes of the Vic-Flange adaptor to secure firmly in the groove.

.5 Gasket shall be fully lubricated and pressed into the cavity between the pipe O.D. and flange recess.

.6 Standard flange bolt shall be place in the hinge hole (opposite the lock bolt) and the bolt assembly shall be directed to mate with the adjoining flange. Remaining flange bolts shall be added and tightened evenly until faces contact firmly.

.7 Where Vic-Flange adaptors do not mate to a hard smooth surface, Victaulic Flange Washers must be used.

3.7 MECHANICAL-T OUTLET INSTALLATION

.1 Holes must be drilled.

.2 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade.

.3 In preparation for assembly, one nut and bolt shall be removed from the housing. The other nut and bolt shall be loosened until it is flush with the nut and bolt. Remove the tape and lift the gasket from the mechanical-T outlet.

.4 Victaulic lubricant shall be applied to all surfaces of the gasket and the gasket shall be properly repositioned into the housing using alignment tabs.

.5 When assembling the coupling, the lower housing shall be rotated 90 degrees away from the upper housing. Place the upper, or outlet section on to the face of the pipe in line with the outlet hole. The lower section shall then be rotated around the pipe to close the two halves. The locating collar must be in the outlet hole.

.6 Insert bolt and apply nut. Oval neck must engage in recess of the housing.

.7 Nuts shall be tightened alternately and equally until the housing is in complete surface contact in the gasket pocket area and the assembly is rigid. **Nuts must be tightened to 30 ft. (S/921) and 50 ft. (S/920 and 929)** with even gaps between the bolt pads.

.8 Where mechanical-T are used as transition pieces between two runs, they must be assembled onto the runs before the branch connections are made.

3.8 VIC-LET STRAPLESS OUTLET & VIC-O-WELL STRAPLESS THERMOMETER & PRESSURE GAUGE INSTALLATION

.1 Holes must be drilled.

.2 Do not use for branch piping connections where size may not be available. Use first available size and reducer.

.3 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade. Victaulic lubricant shall be applied to exposed gasket sealing lip.

.4 Vic-Let outlet toe shall align with pipe. Tilt toe into the hole and drop into the pipe. The Vic-Let outlet must be positioned with the heel inside the pipe.

.5 Collar shall be held in position while nut is being hand tightened. Nut shall then be wrench tightened until collar deforms to contact pipe all around. Maintain collar/gasket alignment to prevent gasket pinching. Do not exceed 200 ft.lbs. Vic-Let outlet shall not be reused after initial installation.

3.9 ROUST-A-BOUT PLAIN END PIPE COUPLING INSTALLATION

.1 Pipe shall be marked 1" from the end.

.2 Gasket supplied must be checked to be certain it is suited for intended service. Colour code identifies gasket grade. Apply a thin coat of Victaulic Lubricant to gasket lips and outside of gasket.

.3 Place gasket over pipe end, being sure lip does not overhang pipe end.

.4 The pipe shall be butt and held in position while slide the gasket back into position. The gasket must be centered between the marks.

.5 Housings shall be placed over the gasket.

.6 Insert bolts and apply nuts.

.7 Nuts must be tightened alternately and equally to standard torque specifications as published by Victaulic. Segments must be assembled with equal gaps between the bolt pads.

3.10 VALVE INSTALLATION

.1 Install valves in upright position with stem above horizontal.

.2 Install butterfly valves on chilled water and condenser water lines only.

.3 Install butterfly or ball valves at branch take-offs and to isolate each piece of equipment, and as indicated.

.4 Install globe valves for balancing and in by-pass around control valves as indicated.

.5 Provide silent check valves on discharge of pumps and in vertical pipes with downward flow and as indicated.

.6 Provide swing check valves in horizontal lines as indicated.

.7 Install chain operators on valves NPS 65 mm (2 1/2") and over where installed more than 2400 mm (96") above floor in Boiler Rooms and Mechanical Equipment Rooms.

.8 Provide ball valves for glycol service.

3.11 AIR VENTS

.1 Install at high points of systems.

.2 Install isolating ball valve on automatic air vent inlet.

3.12 CIRCUIT BALANCING VALVES

.1 Install flow measuring stations and flow balancing valves as indicated.

.1 On return side of all heating devices (convectors, panels, force flows, radiation, coils, etc).

.2 On return side of all reverse return piping loops and/or branch circuits.

.2 Install to manufacturers requirements.

.3 Tape joints in prefabricated insulation on valves installed in chilled water mains.

.4 Refer to Testing Adjusting and Balancing Section for applicable procedures.

3.13 FLUSHING AND CLEANING

.1 Refer to Water Treatment Section 23 25 13.

3.14 FILLING OF SYSTEM

.1 Refill system with clean water adding water treatment as specified.

3.15 TESTING

.1 Test system in accordance with Mechanical General Requirements Section.

.2 For glycol systems, retest with propylene glycol to ASTM E202, inhibited, for use in building system after cleaning. Repair any leaking joints, fittings or valves.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ANSI/ASME B16.22, Wrought Copper Alloy and Copper Alloy Solder - Joint Pressure Fittings: Classes 150, 300, 600, 900, 1500, and 2500.

.3 ANSI/ASME B16.24, Cast Copper Pipe Flanges and Flanged Fittings.

.4 ANSI/ASME B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.

.5 ANSI/ASME B31.5, Refrigeration Piping and Heating Transfer Components.

.6 ASTM A307, Specification for Carbon Steel Bolts and Studs, 413.5 mPa (60,000 psi) Tensile Strength.

.7 ASTM B280, Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

.8 CSA B52, Mechanical Refrigeration Code.

.9 EPS 1/RA/2, Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.

Part 2 Products

2.1 TUBING

.1 Processed for refrigeration installations, deoxidized, dehydrated and sealed.

.1 Hard copper: to ASTM B280, type ACR-B.

2.2 FITTINGS

.1 Service: design pressure 2070 kPa (300 psi) and temperature 121°C (250°F).

.2 Brazed:

.1 Fittings: wrought copper to ANSI/ASME B16.22.

.2 Joints: silver solder, 45% Ag-15% Cu or copper-phosphorous, 95% Cu-5%P and non-corrosive flux.

.3 Flanged:

.1 Bronze or brass, to ANSI/ASME B16.24, Class 150 and Class 300.

.2 Gaskets: suitable for service.

.3 Bolts, nuts and washers: to ASTM A307, heavy series.

.4 Flared:

.1 Bronze or brass, for refrigeration, to ANSI/ASME 16.26.

2.3 PIPE SLEEVES

.1 Hard copper or steel, sized to provide 6 mm (1/4") clearance all around between sleeve and uninsulated pipe or between sleeve and insulation.

2.4 VALVES

.1 22 mm (7/8") and under: Class 500, 3.5 MPa (500 psi), globe or angle non-directional type, diaphragm, packless type, with forged brass body and bonnet, moistureproof seal for below freezing applications, brazed connections.

.2 Over 22 mm (7/8"): Class 375, 2.5 MPa (375 psi), globe or angle type, diaphragm, packless type, back-seating, cap seal, with cast bronze body and bonnet, moistureproof seal for below freezing applications, brazed connections.

2.5 FILTER-DRIER

.1 On lines 20 mm (3/4") outside diameter and larger, filter-drier shall be replaceable core type with Schraeder type valve.

.2 On lines smaller than 20 mm (3/4") outside diameter, filter-drier shall be sealed type using flared copper fittings.

.3 Size shall be full line size.

.4 Approved manufacturers:

.1 Mueller

.2 Parker

.3 Sporlan

.4 Virginia

2.6 SIGHT GLASS

.1 Combination moisture and liquid indicator with protection cap.

.2 Sight glass shall be full line size.

.3 Sight glass connections shall be solid copper or brass, no copper-coated steel sight glasses allowed.

.4 Approved manufacturers:

.1 Mueller

.2 Henry

.3 Parker

.4 Superior

2.7 SUCTION LINE TRAP

.1 Manufactured standard one-piece traps.

2.8 EXPANSION VALVES

.1 For pressure type distributors, externally equalized with stainless steel diaphragm, and same refrigerant in thermostatic elements as in system.

.2 Size valves to provide full rated capacity of cooling coil served. Co-ordinate selection with evaporator coil and condensing unit.

.3 Approved manufacturers:

.1 Henry

.2 Mueller

.3 Parker

.4 Sporlan

2.9 FLEXIBLE CONNECTORS

.1 Designed for refrigerant service with bronze seamless corrugated hose and bronze braiding.

.2 Approved manufacturers:

Anaconda “Vibration Eliminators” by Anamet

Vibration Absorber Model VAF by Packless Industries

Vibration Absorbers by Superior Valve Co

Style “BF” Spring-flex freon connectors by Vibration Mountings.

2.10 PIPING SUPPORT ASSEMBLY

.1 All channel members shall be fabricated from structural grade steel conforming to one of the following ASTM specifications: A1011/A1011M, A653/A653M.

.2 All fittings shall be fabricated from steel conforming to one of the following ASTM specifications: A575, A36/A36M or A635/A635M.

.3 Electro galvanized cush clamps with shoulder bolt and molded thermoplastic cushion, size to suit pipe.

.4 Acceptable materials:

.1 Unistrut

.2 Or equal

Part 3 Execution

3.1 GENERAL

.1 Hard copper to be used. Throughout the project, the use of annealed copper shall not be used without approval of the consultant.

.2 Install in accordance with CSA B52, EPS 1/RA/2 and ANSI/ASME B31.5.

.3 Connect to equipment with isolating valves and unions.

.4 Provide space for servicing, dissembly and removal of equipment and components all as recommended by manufacturer.

.5 Protect all openings in piping against entry of foreign material.

.6 Provide all necessary equipment including thermal expansion valve, sight glass, solenoid valve, filter dryer, etc., for a complete installed system. Pipe system as per manufacturer's recommendation and requirements.

.7 Provide number of refrigerant circuits and appropriate corresponding piping as per manufacturer's recommendations and requirements.

3.2 BRAZING PROCEDURES

.1 Bleed inert gas into pipe during brazing.

.2 Remove valve internal parts, solenoid valve coils, sight glass.

.3 Do not apply heat near expansion valve and bulb.

3.3 PIPING INSTALLATION

.1 General:

.1 Hard drawn copper tubing: do not bend. Minimize use of fittings.

.2 Pitch at least 1:240 down in direction of flow to prevent oil return to compressor during operation.

.3 Provide trap at base of risers greater than 2.4m (8') high and at each 7.6m (25'-0") thereafter.

.4 Provide inverted deep trap at top of each riser.

.5 Provide double risers for compressors having capacity modulation.

.1 Large riser: install traps as specified above.

.2 Small riser: size for 5.1 m/s (1000 ft/min) at minimum load. Connect upstream of traps on large riser.

3.4 PRESSURE AND LEAK TESTING

.1 Close valves on factory charged equipment and other equipment not designed for test pressures.

.2 Leak test to CSA B52 before evacuation to 2 MPa (290 psi) and 1 MPa (145 psi) on high and low sides respectively.

.3 Test Procedure: Build pressure up to 35 kPa (5 psi) with refrigerant gas on high and low sides. Supplement with nitrogen to required test pressure. Test for leaks with electronic or halide detector. Repair leaks and repeat tests.

3.5 DEHYDRATION AND CHARGING

.1 Close service valves on factory charged equipment.

.2 Ambient temperatures to be at least 13°C (55°F) for at least 12 h before and during dehydration.

.3 Use copper lines of largest practical size to reduce evacuation time.

.4 Use 2-stage vacuum pump with gas ballast on 2nd stage capable of pulling 5 Pa (0.02" WC) absolute and filled with dehydrated oil.

.5 Measure system pressure with vacuum gauge. Take readings with valve between vacuum pump and system closed.

.6 Triple evacuate all system components containing gases other than correct refrigerant or having lost holding charge as follows:

.1 Twice to 14 Pa (0.056" WC) absolute and hold for 4 h.

.2 Break vacuum with refrigerant to 14 kPa (0.056" WC).

.3 Final to 5 Pa (0.02" WC) absolute and hold for at least 12 h.

.4 Isolate pump from system, record vacuum and time readings until stabilization of vacuum.

.5 Submit all test results to Consultant.

.7 Charging:

.1 Charge system through filter-drier and charging valve on high side. Low side charging not permitted.

.2 With compressors off, charge only amount necessary for proper operation of system. If system pressures equalize before system is fully charged, close charging valve and start up. With unit operating, add remainder of charge to system.

.3 Re-purge charging line if refrigerant container is changed during charging process.

.8 Checks:

.1 Make all checks and measurements as per manufacturer's operation and maintenance instructions.

.2 Record and report all measurements to Consultant.

3.6 INSTRUCTIONS

.1 Post instructions in frame with glass cover in accordance with Operation and Maintenance Manual Section and CSA B52.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Plumbing Specialties and Accessories.

.2 Hydronic Systems – Steel.

1.2 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 American Society of Mechanical Engineers (ASME).

.3 ANSI/ASME Boiler and Pressure Vessel Code, Section VI.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with general requirements.

1.4 CLOSEOUT SUBMITTALS

.1 Submit operation and maintenance data for incorporation into manual specified in general requirements

.2 Include following:

.1 Log sheets as recommended by manufacturer.

.2 Test reports.

Part 2 Products

2.1 MANUFACTURER

.1 Equipment, chemicals, service by one supplier.

.2 Acceptable manufacturer:

.1 Aquarian Chemicals 905-825-3711

.2 No alternates.

2.2 POT FEEDER

.1 Welded steel, pressure rating 1200 kPa (175 psi). Temperature rating: 90°C (194°F).

2.3 CHEMICAL FEED PIPING

.1 Resistant to chemicals employed. Pressure rating: 1200 kPa (175 psi).

2.4 SHIPPING/ FEEDING CHEMICAL CONTAINERS

.1 High density moulded polyethylene, with liquid level graduations, cover.

.2 Agitators: as required by manufacturer.

2.5 CONDUCTIVITY CONTROLLER

.1 Fully transistorized, suitable for wall or flush panel mounting, linear over full measuring range of 0-5000 micro omhs.

.2 Insensitive to phase angle shifts, capable of operating on 95-130 Volts without affecting accuracy, power, bleedoff status lights.

2.6 CONDUCTIVITY PROBES

.1 Dual carbon elements in PVC holder, quick disconnect, self-locking connection.

2.7 WATER TREATMENT FOR HYDRONIC SYSTEMS

.1 Hot water heating system: Pot feeder, 25 l (6.6 gal) or 19 l (5 gal).

.2 Micron filter for each pot feeder:

.1 Capacity 2% of pump recirculating rate at operating pressure.

.2 Six (6) sets of filter cartridges for each type, size of micron filter.

.3 Balancing valve set for 2% pump capacity.

2.8 CHEMICALS

.1 Provide 1 year's supply.

2.9 TEST EQUIPMENT

.1 Provide one set of test equipment for each system to verify performance.

.2 Complete with carrying case, reagents for chemicals, all specialized or supplementary equipment.

2.10 CLEANING CHEMICALS

.1 Provide as required to make system clean.

.2 Cleaner chemical: compatible and of the same manufacturer of the water treatment supplier.

2.11 RECORD MANAGEMENT

.1 Provide cards and card holder mounted on wall adjacent to each pot feeder.

Part 3 Execution

3.1 INSTALLATION

.1 Install HVAC water treatment systems in accordance with ASME Boiler Code Section VII, and requirements and standards of authorities having jurisdiction, except where specified otherwise.

.2 Ensure adequate clearances to permit performance of servicing and maintenance of equipment.

3.2 CHEMICAL FEED PIPING

.1 Install crosses at all changes in direction. Install plugs in all unused connections.

3.3 WATER TREATMENT SERVICES

.1 After entire new and existing system is cleaned as specified elsewhere, provide monthly water treatment monitoring and consulting services for period of one year after system start-up. Provide written report to consultant after each visit. Service to include:

.1 Initial water analysis and treatment recommendations.

.2 System start-up assistance.

.3 On site system testing and recording of treated hydronic system.

.4 Operating staff training.

.5 Visit plant every 7 days during first month of operation and as required until system stabilizes, and advise consultant in writing on treatment system performance.

.6 Provide monthly visits with reports after system has stabilized to the satisfaction of the owner.

.7 Provide necessary monthly recording charts and log sheets for one year operation.

.8 Provide necessary laboratory and technical assistance.

.9 Instructions and advice to operating staff to be clear, concise and in writing.

3.4 START-UP

.1 Start up water treatment systems in accordance with manufacturer's instructions.

3.5 SYSTEM COMMISSIONING AND TRAINING

.1 Commissioning and training shall be provided by installing water treatment sub-contractor and water treatment supplier.

.2 Coordinate with and obtain approval of Board chemical treatment technician and consultant.

.3 Timing:

.1 After start-up deficiencies rectified.

.2 After start-up and before TAB of connected systems.

.4 Pre-commissioning Inspections:

.1 Verify:

.1 Presence of test equipment, reagents, chemicals, details of specific tests to be performed, operating instructions.

.2 Suitability of log book.

.3 Currency and accuracy of initial water analysis.

.4 Required quality of treated water.

.5 Commissioning procedures - applicable to all Water Treatment Systems:

.1 Establish, adjust as necessary and record all automatic controls and chemical feed rates.

.2 Monitor performance continuously during commissioning of all connected systems and until acceptance of project.

.3 Establish test intervals, regeneration intervals.

.4 Record on approved report forms all commissioning procedures, test procedures, dates, times, quantities of chemicals added, raw water analysis, treated water analysis, test results, instrument readings, adjustments made, results obtained.

.5 Establish, monitor and adjust automatic controls and chemical feed rates as necessary.

.6 Visit project at monthly intervals after commissioning is satisfactorily completed to verify that performance remains as set during commissioning (more often as required until system stabilizes at required level of performance).

.7 Advise Engineer in writing on all matters regarding installed water treatment systems.

.6 Commissioning procedures - Closed Circuit Hydronic Systems:

.1 Analyse water in system.

.2 Based upon an assumed rate of loss approved by Engineer, establish rate of chemical feed.

.3 Record types, quantities of chemicals applied.

.4 Provide written verification of glycol solution concentration.

.7 Training:

.1 Commission systems, perform tests in presence of, and using assistance of, assigned O&M personnel.

.2 Train O&M personnel in softener regeneration procedures.

.8 Certificates:

.1 Upon completion, furnish certificates confirming satisfactory installation and performance.

.9 Commissioning Reports:

.1 To include system schematics, test results, test certificates, raw and treated water analyses, design criteria, all other data required by Consultant.

.10 Commissioning activities during Warranty Period:

.1 Check out water treatment systems on regular basis and submit written report to Consultant.

3.6 CLEANING OF MECHANICAL SYSTEM

.1 Coordinate cleaning of mechanical systems with mechanical contractor.

.2 Provide copy of recommended cleaning procedures and chemicals for approval by Consultant.

.3 Procedure:

.1 Flushing and cleaning should only take place after successful piping pressure testing.

.2 Terminal device (reheat coils, heat pumps, perimeter radiation, etc.), air handling unit coils and their associated control and balancing valves should be bypassed during the preliminary flushing and cleaning process.

.3 Instruments such as flow meters, flow metering valves and orifice plates should only be installed after flushing and cleaning.

.4 Timing:

.1 The overall construction schedule identifies piping flushing and cleaning with realistic time allotments.

.2 The mechanical contractor is required to provide a detailed report outlining the processes and procedures for flushing and cleaning per piping system at least 4 to 6 weeks in advance of work.

.3 As a minimum, at least one piping flushing and cleaning procedure shall be witnessed, by the consultant and/or commissioning agent.

.5 The mechanical contractor shall to utilize a qualified water treatment specialist to supervise the flushing and cleaning process and provide the certified water analysis report certifying that the piping systems are clean.

.6 Coordinate flushing and cleaning of mechanical systems with HVAC water treatment contractor.

.7 Flush and clean new piping system in presence of Consultant.

.8 Flush after pressure test for a minimum of 4 hrs.

.9 Fill system with solution of water and non-foaming, phosphate-free detergent 3% solution by weight. Circulate for minimum of 8 hrs.

.10 Thoroughly flush all new mechanical systems and equipment with approved cleaning chemicals designed to remove deposition from construction such as pipe dope, oils, loose mill scale and other extraneous materials. Chemicals to inhibit corrosion of various system materials and be safe to handle and use.

.11 During circulation of cleaning solution, periodically examine and clean filters and screens and monitor changes in pressure drop across equipment.

.12 Refill system with clean water. Circulate for at least 2 hours. Clean out strainer screens/baskets regularly. Then drain.

.13 Drainage to include drain valves, dirt pockets, strainers, every low point in system.

.14 Drain and flush systems until alkalinity of rinse water is equal to make-up water. Refill with clean water treated to prevent scale and corrosion during system operation.

.15 Re-install strainer screens/baskets only after obtaining Consultant's approval and approval from HVAC water treatment contractor and board chemical treatment technician.

.16 Repeat system drain and flush as often as necessary to have a clean system.

.17 Disposal of cleaning solutions to be approved by authority having jurisdiction.

.18 Isolate new piping system from existing system as required for system cleaning.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 SMACNA HVAC Duct Construction Standards, Metal and Flexible.

.3 SMACNA HVAC Duct Leakage Test Manual.

.4 ASTM A480/A480M, Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.

.5 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process. (Metric).

.6 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.

.7 ANSI/NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section general requirements.

.2 Indicate following:

.1 Sealants

.2 Tape

.3 Proprietary Joints

.4 Fittings

1.3 CERTIFICATION OF RATINGS

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 DUCTWORK

.1 Galvanized Steel:

.1 Galvanized steel with Z90 designation zinc coating lock forming quality: to ASTM A653/A653M.

.2 Thickness:

Size Type	**Class A Gauge**	**Class B Gauge**	**Class C Gauge**
Square and Rectangular			
Up to 600 mm (24”)	22	24	24
625 mm to 1000 mm (25” to 40”)	20	22	24
1025 mm to 1800 mm (41” to 72”)	18	20	22
1825 mm to 2400 mm (73” to 96")	16	18	20
2450 mm and over (97")	16	16	16
Round and Oval			
Up to 300 mm (12”)	24	24	24
325 mm to 600 mm (13” to 24”)	22	24	24
625 mm to 900 mm (25" to 36")	20	22	24
925 mm to 1200 mm (37” to 48”)	18	20	22
1225 mm (49”) and over	18	18	20

.3 All ductwork between HVAC unit connections and 3.0 m (10'-0") downstream or to silencers shall be 1.4 mm (18 gauge).

2.2 DUCT CONSTRUCTION

.1 Round and oval:

.1 Ducts: factory fabricated, spiral wound, with matching fittings and specials to SMACNA.

.2 Transverse joints up to 900 mm (36"): slip type with tape and sealants.

.3 Transverse joints over 900 mm (36"): Ductmate or Exanno Nexas Duct System.

.2 Square and rectangular:

.1 Ducts: to SMACNA.

.2 Transverse joints, longest side:

up to and including 750 mm (30"): SMACNA proprietary duct joints.

.3 Ducts with sides over 750 mm (30") to 1200 mm (48"), transverse duct joint system by Ductmate/25, Nexus, or WDCI (Lite) (SMACNA ”E” or “G” Type connection). Weld all corners.

.1 Acceptable materials:

.1 Ductmate Canada Ltd.

.2 Nexus, Exanno Corp.

.3 WDCI

.4 Ducts 1200 mm (48") and larger, Ductmate/35, Nexus, or WDCI (heavy) (SMACNA "J" Type connection). Weld all corners.

.1 Acceptable materials:

.1 Ductmate Canada Ltd.

.2 Nexus, Exanno Corp.

.3 WDCII.

2.3 FITTINGS

.1 Fabrication: to SMACNA.

.2 Radiused elbows:

.1 Rectangular: standard radius and or short radius with single thickness turning vanes Centreline radius: 1.5 times width of duct.

.2 Round:

.1 In exposed areas one-piece smooth radius, 1.5 times diameter.

.2 In concealed areas 3-piece adjustable, 1.5 times diameter.

.3 Mitred elbows, rectangular:

.1 To 400 mm (16"): with double thickness turning vanes.

.2 Over 400 mm (16"): with double thickness turning vanes.

.4 Branches:

.1 Rectangular main and branch: with 45º entry on branch.

.2 Round main and branch: enter main duct at 45º with conical connection.

.3 Provide volume control damper in branch duct near connection to main duct.

.4 Main duct branches: with splitter damper.

.5 Diffuser connection to main:

.1 90º round spin in collars with balancing damper and locking quadrant.

.6 Transitions:

.1 Diverging: 20º maximum included angle.

.2 Converging: 30º maximum included angle.

.7 Offsets:

.1 Full short radiused elbows.

.8 Obstruction deflectors: maintain full cross-sectional area.

2.4 SEAL CLASSIFICATION

.1 Classification as follows:

Maximum Pressure Pa (" w.c.)	SMACNA Seal Class
2500 (10")	A
1500 (6")	A
1000 (4")	A
750 (3")	A
500 (2")	B
250 (1")	B
125 (0.5")	C

.2 Seal classification:

.1 Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant and tape.

.2 Class B: longitudinal seams, transverse joints and connections made airtight with sealant.

.3 Class C: transverse joints and connections made air tight with gaskets, or sealant or combination thereof. Longitudinal seams sealed with foil tape or sealant.

2.5 SEALANT

.1 Sealant: oil resistant, polymer type flame resistant duct sealant. Temperature range of -30°C (-22°F) to plus 93°C (199°F).

.1 Acceptable materials:

.1 Duro Dyne S-2

.2 Foster

2.6 TAPE

.1 Tape: polyvinyl treated, open weave fiberglass tape, 50 mm (2") wide.

.1 Acceptable material:

.1 Duro Dyne FT-2

2.7 DUCT LEAKAGE

.1 In accordance with SMACNA HVAC Duct Leakage Test Manual.

2.8 FIRESTOPPING

.1 40 mm x 40 mm x 3 mm (1½" x 1½" x 16ga) retaining angles all around duct, on both sides of fire separation.

.2 Firestopping material and installation must not distort duct.

.3 All ductwork passing through partition walls shall be firestopped.

2.9 HANGERS AND SUPPORTS

.1 Band hangers: use on round and oval ducts only up to 500 mm (20") diameter, of same material as duct but next sheet metal thickness heavier than duct.

.2 Trapeze hangers: ducts over 500 mm (20") diameter or longest side, to ASHRAE and SMACNA.

.3 Hangers: galvanized steel angle with black steel rods to ASHRAE and SMACNA following table:

Duct Size mm (")	Angle Size mm (")	Rod Size mm (")
up to 750 (30)	25 x 25 x 3 (1 x 1 x 1/8)	6 (1/4)
>750 to 1050 (>30 to 42)	40 x 40 x 3 (1½ x 1½ x 1/8)	6 (1/4)
>1050 to 1500 (>42 to 60)	40 x 40 x 3 (1½ x 1½ x 1/8)	10 (3/8)
>1500 to 2100 (>60 x 84)	50 x 50 x 3 (2 x 2 x 1/8)	10 (3/8
>2100 to 2400 (>84 x 96)	50 x 50 x 5 (2 x 2 x 1/8)	10 (3/8)
>2400 (96) and over	50 x 50 x 6 (2 x 2 x ¼)	10 (3/8)

.4 Upper hanger attachments:

.1 For concrete: manufactured concrete inserts.

.1 Acceptable material:

.1 Myatt fig. 485

.2 For steel joist: manufactured joist clamp or steel plate washer.

.1 Acceptable material:

.1 Grinnell fig. 61 or 60

.3 For steel beams: manufactured beam clamps:

.1 Acceptable material:

.1 Grinnell Fig. 60

Part 3 Execution

3.1 GENERAL

.1 The following systems shall conform to these requirements:

System	Class	Material
HVAC Supply and Return General Exhaust Exhaust Plenum	B B B	Galvanized steel Galvanized steel Galvanized steel
Individual Exhaust	C	Galvanized steel

.2 Do work in accordance with ASHRAE and SMACNA.

.3 Do not break continuity of insulation vapour barrier with hangers or rods.

.4 Support risers in accordance with ASHRAE and SMACNA.

.5 Install breakaway joints in ductwork on each side of fire separation.

.6 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.

.7 Manufacture duct in lengths to accommodate installation of acoustic duct lining.

3.2 HANGERS

.1 Strap hangers: install in accordance with SMACNA.

.2 Angle hangers: complete with locking nuts and washers.

.3 Hanger spacing: in accordance with ASHRAE, SMACNA and as follows:

Duct Size mm (")	Spacing mm (")
to 1500 (60")	3000 (120")
over 1500 (60")	2500 (100")

.4 Do not support ductwork over 250 mm x 250 mm (10" x 10") from roof deck.

3.3 SEALING

.1 Apply sealant to outside of joint to manufacturer's recommendations.

.2 Bed tape in sealant and recoat with minimum of 1 coat of sealant to manufacturers recommendations.

3.4 LEAKAGE TESTS

.1 Co-ordinate leakage testing with TAB contractor. TAB contractor will be responsible for all duct testing.

.2 Duct to be tested in accordance with SMACNA HVAC Duct Leakage Test Manual.

.3 Leakage tests to be done in sections.

.4 Trial leakage tests to be performed as instructed to demonstrate workmanship.

.5 Install no additional ductwork until trial test has been passed.

.6 Test section to be minimum of 15 m (50'-0") long with not less then 3 branch takeoffs and two 90º elbows. Maximum test length and area to be determined by BAS testing equipment. Allow for twelve (12) tests.

.7 Complete test before insulation or concealment.

.8 Provide all necessary end caps and fittings as required for the TAB contractor. Remove same after successful completion of duct test.

.9 Pressure test ductwork to 1½ times operating pressure (minimum pressure 500 Pa (2" wc) all systems).

3.5 CLEANING

.1 Keep ducts clear from dust and debris

.2 Keep duct liner clean from dust, debris, and moisture.

.3 At completion of project vacuum ducts if dirt or dust is present.

.4 Where new systems connect into existing systems the existing systems shall be cleaned and vacuumed prior to reconnection.

.5 Ensure all systems are clean prior to start up.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 SMACNA HVAC Duct Construction Standards, Metal and Flexible.

.3 ANSI/NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.

.4 CSA B228.1, Pipes, Ducts and Fittings for Residential Type Air Conditioning.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate the following:

.1 Flexible connections.

.2 Duct access doors.

.3 Turning vanes.

.4 Instrument test ports.

1.3 CERTIFICATION OF RATINGS

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 GENERAL

.1 Manufacture in accordance with CSA B228.1.

2.2 FLEXIBLE CONNECTIONS

.1 Frame: galvanized sheet metal frame with fabric clenched by means of double locked seams.

.2 Material:

.1 Fire resistant, self extinguishing, neoprene coated glass fabric, temperature rated at -40°C (-40°F) to plus 90°C (194°F), density of 1.3 kg/m.

2.3 ACCESS DOORS IN DUCTS

.1 Non-insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm (25 gauge) thick complete with sheet metal angle frame.

.2 Insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm (24 gauge) thick complete with sheet metal angle frame and 25 mm (1") thick rigid glass fibre insulation.

.3 Gaskets: neoprene.

.4 Hardware:

.1 Up to 300 mm (12"): 2 sash locks

.2 301 mm to 450 mm (13" to 18"): 4 sash locks Complete with safety chain.

.3 451 mm to 1000 mm (19" to 40"): piano hinge and minimum 2 sash locks.

.4 Doors over 1000 mm (40"): piano hinge and 2 handles operable from both sides.

.5 Hold open devices.

.5 Acceptable materials:
Nailor
E. H. Price
Titus

2.4 TURNING VANES

.1 Factory or shop fabricated double thickness, to recommendations of SMACNA and as indicated.

.2 Acceptable materials:
Duro Dyne
Ductmate

2.5 INSTRUMENT TEST PORTS

.1 1.6 mm (16 gauge) thick steel zinc plated after manufacture.

.2 Cam lock handles with neoprene expansion plug and handle chain.

.3 28 mm (1 1/8") minimum inside diameter. Length to suit insulation thickness.

.4 Neoprene mounting gasket.

.5 Acceptable material:
Duro Dyne IP1 or IP2
Duct mate

Part 3 Execution

3.1 INSTALLATION

.1 Flexible connections:

.1 Install in following locations:

.1 Inlets and outlets to supply air units and fans. (Unless internally isolated)

.2 Inlets and outlets of exhaust and return air fans.

.3 As indicated.

.2 Length of connection: 100 mm (4").

.3 Minimum distance between metal parts when system in operation: 75 mm (3").

.4 Install in accordance with recommendations of SMACNA.

.5 When fan is running:

.1 Ducting on each side of flexible connection to be in alignment.

.2 Ensure slack material in flexible connection.

.2 Access doors and viewing panels:

.1 Size:

.1 600 mm x 600 mm (24" x 24") for person size entry.

.2 600 mm x 1000 mm (24" x 40") for servicing entry.

.3 300 mm x 300 mm (12" x 12") for viewing.

.4 As indicated.

.2 Location:

.1 At fire dampers.

.2 At control dampers.

.3 At devices requiring maintenance.

.4 At locations required by code.

.5 Elsewhere as indicated.

.3 Instrument test ports.

.1 General:

.1 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.2 Locate to permit easy manipulation of instruments

.3 Install insulation port extensions as required.

.4 Locations.

.1 For traverse readings:

.1 At ducted inlets to roof and wall exhausters.

.2 At inlets and outlets of other fan systems.

.3 At main and sub-main ducts.

.4 And as indicated.

.2 For temperature readings:

.1 At outside air intakes.

.2 In mixed air applications in locations as approved by Consultant.

.3 At inlet and outlet of coils.

.4 Downstream of junctions of two converging air streams of different temperatures.

.5 And as indicated.

.4 Turning vanes:

.1 Install in accordance with recommendations of SMACNA and as indicated.

.2 Install on supply ducts only.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 SMACNA HVAC Duct Construction Standards, Metal and Flexible.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements

.2 Indicate the following: performance data.

Part 2 Products

2.1 GENERAL

.1 Manufacture to SMACNA standards.

2.2 SINGLE BLADE DAMPERS

.1 Of same material as duct, but one sheet metal thickness heavier. V-groove stiffened, minimum 1.6 mm (16 gauge).

.2 Size and configuration to recommendations of SMACNA, except maximum height 100 mm (4").

.3 Shaft extension to accommodate insulation thickness and locking quadrant.

.4 Inside and outside nylon end bearings.

.5 Channel frame of same material as adjacent duct, complete with angle stop.

2.3 MULTI-BLADED DAMPERS

.1 Factory manufactured of material compatible with duct.

.2 Opposed blade: configuration, metal thickness and construction to recommendations of SMACNA.

.3 Maximum blade height:

.1 50 mm (2") up to 375 mm (15") high duct.

.2 100 mm (4") max 400 mm (16") high duct and over.

.4 Bearings: self-lubricating nylon.

.5 Linkage: shaft extension with locking quadrant.

.6 Channel frame of same material as adjacent duct, complete with angle stop.

.7 Shaft extension to accommodate insulation thickness and locking quadrants.

.8 Acceptable materials:

.1 Duro Dyne
.2 National Controlled Air (NCA)
.3 Nailor
.4 T.A. Morrison
.5 Tamco
.6 Ruskin
.7 Ventex/Alumavent
.8 United Enertech

2.4 LOCKING QUADRANTS

.1 6 mm (1/4") dial regulator with square bearing shaft.

.1 18 gauge oval frame, cadmium plated, clearly shows damper position.
.2 18 gauge formed handle for easy adjustment.
.3 Bolt and wing nut lock damper securely.
.4 Offset mounting holes avoid interference with damper movement and mechanical fastening to duct.

.2 9 mm (3/8") and larger: clamp quadrant with square bearing shaft.

.1 Accommodates and securely locks square rod, bearing fitting and adaptor pins.
.2 Heavily ribbed 16 gauge steel frame, 3 mm (1/8") thick formed steel handle, cadmium-plated.
.3 By tightening nut, bearing is securely locked in handle, preventing slippage and rattle.
.4 Neoprene and steel washer assembly seals bearing opening to eliminate air-leakage.
.5 Screw holes for mechanically fastening to ductwork.

.3 High pressure system locking quadrant:

.1 Airtight, rattle-proof regulator, designed for ZERO leakage at high pressure. Use for applications up to 500°F constant temperature.
.2 Handle design for easy recognition of damper position.
.3 Heavy-gauge, zinc-plated steel, 2 high temperature rubber seals and washers, end bearing support, and 2 end bearings. Pressure loss and damper rattle in ductwork has been a constant annoyance for as long as HVAC ductwork has been installed. Now, a truly air-tight, rattle-proof regulator is available. The SPEC-SEAL regulator utilizes a special high-temperature rubber seal to eliminate leakage and rattle even at many times the pressure found in high pressure.
.4 Soft, comfortable grip handle with a highly-visible, plastic cover which indicates the damper position.
.5 Handle to accommodate 9 mm (3/8") or 12 mm (1/2") to match damper shaft size, square and round bearing shafts.

.4 Acceptable manufacturers:
Duro Dyne
Ductmate

Part 3 Execution

3.1 INSTALLATION

.1 Install where indicated.

.2 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.3 For supply, return and exhaust systems, locate balancing dampers in each branch duct.

.1 Single blade dampers up to 200 mm (8").

.2 Multi-blade dampers over 200 mm (8").

.4 Runouts to registers and diffusers: install single blade damper located as close as possible to main ducts.

.5 All dampers to be vibration free.

.6 Leave all dampers in open position for T.A.B.

.7 Fasten locking quadrants to ductwork and shaft.

.8 Place locking quadrants on standoffs where ductwork insulated.

.9 Lock down quadrant arm in the open position.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.

.3 CAN/ULC-S112, Standard Method of Fire Test of Fire Damper Assemblies.

.4 CAN/ULC-S112.1, Standard Method of Fire Test of Ceiling Firestop Flap Assemblies.

.5 ULC-S505, Fusible Links for Fire Protection Service.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate the following:

.1 Fire dampers.

.2 Operators.

.3 Fusible links.

1.3 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

1.4 MAINTENANCE MATERIALS

.1 Provide following:

.1 6 fusible links of each type.

1.5 CERTIFICATION OF RATINGS

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 FIRE DAMPERS (STATIC)

.1 Fire dampers: arrangement as indicated, listed and bear label of ULC, meet requirements of provincial fire authority and authorities having jurisdiction. Fire damper assemblies to be fire tested in accordance with CAN/ULC-S112.

.2 Mild steel, factory fabricated for fire rating requirement to maintain integrity of fire wall and/or fire separation.

.3 Top hinged: offset single damper, round or square; multi-blade hinged or interlocking type; guillotine type; sized to maintain full duct cross section.

.4 Fusible link actuated, weighted to close and lock in closed position when released or having negator-spring-closing operator for multi-leaf type or roll door type in horizontal position with vertical air flow.

.5 40 mm x 40 mm x 3 mm (1½" x 1½" x 16ga) retaining angle iron frame, on full perimeter of fire damper, on both sides of fire separation being pierced.

.6 Acceptable materials:

.1 Ruskin

.2 Nailor

.3 National Controlled Air (NCA)

.4 T.A. Morrison

.5 Tamco

.6 Ventex/Alumavent

.7 United Enertech

.8 Safeair-Dowco (stainless steel)

.9 Greenheck

2.2 FIRE DAMPERS (DYNAMIC)

.1 Multi blade or roll type, fire damper suitable for HVAC system velocities up to 2000 fpm (610 m/mm), dual direction air flow, max 4" wg pressure.

.2 Mild steel, factory fabricated for fire rating requirement to maintain integrity of fire wall and/or fire separation.

.3 Top hinged: offset single damper, round or square; multi-blade hinged or interlocking type; guillotine type; sized to maintain full duct cross section.

.4 Stainless closure spring to positively close damper upon fusible link release, for horizontal or vertical orientations.

.5 Linkage concealed in frame.

.6 40 mm x 40 mm x 3 mm (1½" x 1½" x 16ga) retaining angle iron frame, on full perimeter of fire damper, on both sides of fire separation being pierced.

.7 Fire damper assemblies and type to meet requirements of provincial fire authority and authority having jurisdiction.

.8 Acceptable materials:

.1 Ruskin

.2 Nailor

.3 National Controlled Air (NCA)

.4 T.A. Morrison

.5 Tamco

.6 Greenheck

.7 Ventex/Alumavent

Part 3 Execution

3.1 INSTALLATION

.1 Provide where indicated and at all fire rated partitions indicated, on architectural drawing.

.2 Install in accordance with ANSI/NFPA 90A and in accordance with conditions of ULC listing.

.3 Maintain integrity of fire separation.

.4 After completion and prior to concealment obtain approvals of complete installation from authority having jurisdiction.

.5 Install access door adjacent to each damper.

.6 Coordinate with installer of firestopping.

.7 Static fire dampers: Only on transfer air ducts where ductwork is not connected to a fan/blower.

.8 Dynamic fire dampers: In all duct work where air is moved by a fan/blower.

END OF SECTION

Part 1 General

1.1 GENERAL

.1 This section applies to operating dampers not specified in Controls Section.

1.2 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.3 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate the following:

.1 Performance data.

1.4 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

1.5 CERTIFICATION OF RATINGS

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency.

Part 2 Products

2.1 MOTORIZED DAMPERS

.1 Opposed blade type.

.2 Extruded aluminum, interlocking blades, complete with extruded vinyl seals, spring stainless steel side seals, extruded aluminum frame.

.3 Pressure fit self-lubricated bronze bearings.

.4 Linkage: plated steel tie rods, brass pivots and plated steel brackets, complete with plated steel control rod.

.5 Operator: Refer to BAS Section.

.6 Performance:

.1 Leakage: in closed position to be less than 2% of rated air flow at 250 kPa (36 psi) differential across damper.

.2 Pressure drop: at full open position to be less than 100 kPa (15 psi) differential across damper.

.7 Insulated aluminum dampers:

.1 Frames: insulated with extruded polystyrene foam with R factor of 5.0.

.2 Blades: constructed from aluminum extrusions with internal hollows insulated with polyurethane or polystyrene foam, R factor of 5.0.

.3 Use on services to the exterior.

.8 Acceptable materials:
Honeywell
Johnson
T. A. Morrison
National Controlled Air (NCA)
Tamco
Ruskin
Nailor
Henderson Industrial
Ventex/Alumavent

2.2 BACK DRAFT DAMPERS

.1 Automatic gravity operated, multi leaf, aluminum construction with nylon bearings, centre pivoted or counterweighted, as indicated.

.2 Acceptable materials:

T.A. Morrison
Tamco Series 7000
Ruskin
Nailor
National Controlled Air (NCA)
Henderson Industrial
Ventex/Alumavent

Part 3 Execution

3.1 INSTALLATION

.1 Install where indicated.

.2 Install in accordance with recommendations of SMACNA and manufacturer's instructions.

.3 Seal multiple damper modules with silicon sealant.

.4 Install access door adjacent to each damper. See Duct Accessories Section.

.5 Insulated dampers on all outside air intake and exhaust damper.

.6 Non-insulated dampers on all interior motorized dampers not exposed to outside air.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 CAN/ULC-S110, Standard Methods of Test for Air Ducts.

.3 UL 181, Factory Made Air Ducts and Air Connectors.

.4 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.

.5 ANSI/NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.

.6 SMACNA HVAC Duct Construction Standards - Metal and Flexible.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate the following:

.1 Thermal properties.

.2 Friction loss.

.3 Acoustical loss.

.4 Leakage.

.5 Fire rating.

1.3 CERTIFICATION OF RATINGS

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 GENERAL

.1 Factory fabricated to CAN/ULC S110.

.2 Pressure drop coefficients listed below are based on relative sheet metal duct pressure drop coefficient of 1.00.

.3 Flame spread rating not to exceed 25. Smoke developed rating not to exceed 50.

2.2 METALLIC – UNINSULATED

.1 Spiral wound flexible aluminum, Class 1 duct material.

.2 Performance:

.1 Factory tested to 2.5 kPa (10" w.c.) without leakage.

.2 Maximum relative pressure drop coefficient: 3.

.3 Operating pressure: 300 mm (12”).

.3 Acceptable materials:

.1 Flexmaster T/L

.2 Ductmate

2.3 METALLIC –INSULATED

.1 Spiral wound flexible aluminum with factory applied, 25 mm (1") thick flexible glass fibre thermal insulation with vapour barrier and vinyl jacket, Class 1 duct material.

.2 Performance:

.1 Factory tested to 2.5 kPa (10" w.c.) without leakage.

.2 Maximum relative pressure drop coefficient: 3.

.3 Operating pressure: 300 mm (12”).

.3 Acceptable materials:

.1 Flexmaster T/L – VT

.2 Ductmate

Part 3 Execution

3.1 DUCT INSTALLATION

.1 Install in accordance with: SMACNA.

.2 Maximum length of flexible duct: 1.8 m (6' 0").

.3 Minimum length of acoustical ductwork; 1.5 m (5' 0") with minimum of 1 bend.

.4 Provide support at centre of flexible duct with 25 mm (1") wide galvanized hanger.

.5 Insulated flexible ductwork in areas where ceilings are not utilized as return air plenums.

.6 Uninsulated flexible ductwork in areas where ceilings are utilized as return air plenums.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 All codes, standards, etc. as referenced shall be the latest edition.

.2 SMACNA HVAC Duct Construction Standards, Metal and Flexible.

.3 ASTM C553, Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.4 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.

.5 ANSI/NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.

1.2 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

Part 2 Products

2.1 DUCT LINER

.1 General:

- .1 Rigid fibrous glass duct liner: air stream side faced with mat facing.
- .2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50 when tested in accordance with CAN/ULC-S102.
- .3 Acceptable material:
  - .1 Johns Manville, Permacote Linacoustic R-300
  - .2 Owen Corning

.2 Rigid:

- .1 Use on flat surfaces.
- .2 25 mm (1") thick, to CGSB 51-GP-10M, fibrous glass rigid board duct liner.
- .3 Density: 36 kg/m² (7.4 lb/ft²).
- .4 Thermal resistance to be minimum 750 mm (30") C/W for 25 mm (1") thickness 1150 mm (45") C/W for 40 mm (1½") thickness when tested in accordance with ASTM C177, at 24°C (75°F) mean temperature.

2.2 ADHESIVE

.1 Meet requirements of ANSI/NFPA 90A and ANSI/NFPA 90B.

.2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50. Temperature range -29°C (-20°F) to 93°C (200°F).

.3 Acceptable material:

.1 Duro Dyne 1A-22

.2 Ductmate

2.3 FASTENERS

.1 Weld pins 2.0 mm (14 gauge) diameter, length to suit thickness of insulation. Metal retaining clips, 32 mm (1¼") square.

.2 Acceptable material:

.1 Duro Dyne

.2 Ductmate

2.4 JOINT TAPE

.1 Poly-Vinyl treated open weave fiberglass membrane 50 mm (2") wide.

.2 Acceptable materials:

.1 Duro Dyne FT2

.2 Ductmate

2.5 SEALER

.1 Meet requirements of ANSI/NFPA 90A and ANSI/NFPA 90B.

.2 Flame spread rating shall not exceed 25. Smoke development rating shall not exceed 50. Temperature range -68°C (-90F) to 93°C (200°F).

.3 Acceptable materials:

.1 Duro Dyne 1A-94

.2 Ductmate

Part 3 Execution

3.1 GENERAL

.1 Do work in accordance with recommendations of SMACNA duct liner standards as indicated in SMACNA HVAC Duct Construction Standards, Metal and Flexible, except as specified otherwise.

.2 Line inside of ducts where indicated.

.3 Duct dimensions, as indicated, are clear inside duct lining.

.4 Provide an interior of ductwork from fans from minimum distance of 3 m (10'-0").

3.2 DUCT LINER

.1 Install in accordance with manufacturer's recommendations, and as follows:

.1 Fasten to interior sheet metal surface with 100% coverage of adhesive.

.2 In addition to adhesive, install weld pins not less than 2 rows per surface and not more than 300 mm (12") on centres.

.2 Weld pins are to have cupped or beveled heads to prevent damage to lining surface.

.3 Store foam liners away from sunlight.

3.3 JOINTS

.1 Seal all butt joints, exposed edges, weld pin and clip penetrations and all damaged areas of liner with joint tape and sealer. Install joint tape in accordance with manufacturer's recommendations, and as follows:

.1 Bed tape in sealer.

.2 Apply 2 coats of sealer over tape.

.2 Replace damaged areas of liner at discretion of Consultant.

.3 Protect leading and trailing edges of each duct section with sheet metal nosing having 15 mm (1/2") overlap and fastened to duct.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

.1 Submit product data in accordance with general requirements.

.2 Indicate the following:

.1 Capacity.

.2 Throw and terminal velocity.

.3 Noise criteria.

.4 Pressure drop.

.5 Neck velocity.

1.2 MAINTENANCE MATERIALS

.1 Include:

.1 Keys for volume control adjustment.

.2 Keys for air flow pattern adjustment.

1.3 MANUFACTURED ITEMS

.1 Grilles, registers and diffusers of same generic type to be product of one manufacturer.

1.4 CERTIFICATION OF RATINGS

.1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

Part 2 Products

2.1 GENERAL

.1 To meet capacity, pressure drop, terminal velocity, throw, noise level, neck velocity as indicated.

.2 Frames:

.1 Full perimeter gaskets.

.2 Plaster frames where set into plaster or gypsum board and as specified.

.3 Concealed fasteners.

.4 Concealed operators.

.5 Colour and Finish: standard as directed by Consultant.

.6 Acceptable materials: Refer to schedule on drawings.

2.2 SUPPLY GRILLES AND REGISTERS

.1 General: with opposed blade dampers as indicated, concealed manual operator and gaskets.

.2 Type, size, and capacity: as indicated.

2.3 RETURN AND EXHAUST GRILLES

.1 General: with opposed blade dampers as indicated, concealed manual operator and gaskets.

.2 Type, size, and capacity: as indicated.

2.4 DIFFUSERS

.1 General: volume control dampers with flow straightening devices and blank-off quadrants, as indicated and gaskets.

.2 Type, size, and capacity: as indicated.

2.5 OPEN MESH SCREEN

.1 15 mm x 15 mm (½"x ½") open mesh screen fastened on 25 mm (1") border, screw fasten.

.2 On all open ends of ductwork and where indicated.

.3 Size: To match ductwork size.

2.6 DOOR GRILLES

.1 Heavy duty steel construction, sight proof, complete with flat border both sides, screwed fastening. Finish by Consultant.

.2 Install door grille in door.

.3 Acceptable manufacturer: As indicated.

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with manufacturer’s instructions.

.2 Install with flat head screws in countersunk holes where fastenings are visible.

.3 Bolt grilles, registers and diffusers, in place

.4 Provide concealed safety chain on each grille, register and diffuser in gymnasium, similar game rooms, and on exposed diffusers, and elsewhere as indicated.

.5 Clean grilles upon completion.

.6 Paint ductwork beyond grilles, matte black where visible.

.7 Ensure all grilles, diffusers, etc. match opening sizes as indicated on the drawings and as fabricated on site by the contractor.

END OF SECTION

Part 1 General

1.1 GENERAL

.1 Conform to general provisions for mechanical division in General Requirements section.

1.2 SUBMITTAL

.1 Submit shop drawings and product data in accordance with general requirements,

.2 Indicate the following: complete specifications, wiring diagrams (showing all interconnections); weight; performance details.

.3 Provide data for inclusion in the Operating and Maintenance manuals in accordance with general requirements,

Part 2 Products

2.1 UNIT VENTILATOR

.1 Exterior cabinet panels shall be constructed of heavy gauge steel. Units shall be constructed such that testing and trouble-shooting can be accomplished in the end pockets of the unit without affecting the normal airflow pattern through the unit.

.2 Floor mounted units shall have an integral pipe tunnel for convenient crossover of piping or electrical wiring in accordance with local and National Electric Codes (NEC). The front surface shall consist of three separate, removable panels. Control compartment must be accessible without removing the entire front panel. Unit discharge grille shall be welded continuous bar type with round edged steel bars placed for a 10° vertical deflection. Adjustable side deflection vanes shall be located beneath the continuous bar grille for easy adjustment by maintenance personnel]. A 6 mm (1/4”) painted galvanized mesh screen shall be furnished and located beneath the discharge grille. Unit top surface shall be supplied with a textured paint surface that resists scuffing and hides fingerprints.

Overall unit depth shall be 550 mm (21 7/8”).

Recessed ceiling units shall be similar, with front discharge.

.3 ECM Motor speed shall be factory programmed for three (3) speeds, HIGH-MEDIUM-LOW-OFF. Fan motor shall have hot leg protected by a factory installed cartridge fuse. Motors shall be located out of the airstream and have an internal thermal overload device (auto-reset). Fan motors shall have each hot line protected by factory installed cartridge type fuse(s). Motors shall have sleeve type bearings and require oiling no more than once annually. Bearings shall be located outside of the air stream.

.4 Hydronic coils are to be constructed with copper tubes and mechanically bonded aluminum corrugated plate fins. **Water coils** shall be furnished with a threaded drain plug at the lowest point. A manual air vent shall be provided at the high point of the coil on all floor mounted units. An auto air vent shall be provided at the high point of the coil on all ceiling mounted units. **Direct expansion coils (DX)** - all DX coils must be supplied with a factory installed thermal expansion valve. The expansion valve must be sized for the manufacturer's matching remote condensing unit.

.5 Air Cooled Condensing Units - The unit ventilator manufacturer shall provide remote air cooled condensing units where indicated on plans. The outdoor unit shall be factory precharged and shall be design matched to the indoor unit.

The installing contractor shall provide and install between indoor and outdoor unit the interconnecting refrigerant tubing of the size recommended by the unit manufacturer. The installing contractor shall evacuate the indoor coil and interconnection tubing and charge the system in accordance with manufacturer's instructions.

Condensing unit shall have corrosion resistant cabinet, with hermetically sealed compressor with internal spring isolation, external isolation, permanent split capacitor motor and overload protection, copper tube aluminum fin condenser coil, direct drive propeller fan with permanently lubricated ball bearing single phase motor with internal overload protection.

.6 Microprocessor-based control for each unit ventilator that must be adaptable to future network system. This control must be pre-engineered, preprogrammed and pretested and shall be factory installed before shipment. The microprocessor-based control shall monitor room conditions and automatically adjust unit operations to maintain these requirements. The control sequence shall be on the basis of [ASHRAE Cycle II. The manufacturer shall provide this DDC controller in each unit ventilator.

.7 Separate room air and outdoor air dampers. The room air damper shall be constructed of aluminum and shall be counterbalanced against back pressure. Outdoor air damper shall be two-piece double wall construction with 15 mm (1/2") thick, 1.5 lb. density fiberglass insulation sandwiched between welded 1.0 mm (20 Ga.) galvanized steel blades for rigidity and to inhibit corrosion. Dampers shall be fitted with blended mohair seals along all the sealing edges. Damper bearings shall be made of nylon or other material which does not require lubrication.

.8 Integral factory installed face and bypass damper. The face and bypass damper shall be constructed of aluminum and have a dead air space to minimize pickup in the bypass position. The long sealing edges of the damper shall be fitted with silicone rubber impregnated glass cloth seals with blended mohair seals on the ends for long life and positive sealing.

.9 Drain pan constructed of stainless steel and shall be insulated. A drain outlet shall be provided on both ends of the pan with one outlet capped. The drain hand of connection shall be easily field-reversed by relocating the cap to the opposite end.

.10 Filters shall be of the manufacturer's standard disposable/washable type.

.11 Unit manufacturer shall provide an external wall louvre for the outdoor air intake. The louvre and frame shall be of heavy gauge aluminum with 45 deg. blades. The blade profile shall be designed to prevent water penetration. The louvre shall have ½" birdscreen attached to the inner face and shall have a minimum free area of 1.1 sq. ft. The finish on the louver shall be: mill finish / primer coat / a color as per Architect's instruction.

.12 Unit manufacturer shall provide a decorative exterior aluminum wall grille constructed of heavy gauge aluminum with rectangular holes to match louvre blade spacing to maximize the air opening. Grille to be secured to wall louvre/exterior wall. The grille finish shall match the louvre above.

.13 All internal line voltage wiring shall be by the unit manufacturer.

.1 A suitably rated unfused disconnect switch shall be factory installed within the unit.

.14 Unit capacity: As indicated

.15 Acceptable manufacturers:

Daikin
Nesbitt Air
Engineered Air

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with manufacturer's instructions.

.2 Install equipment exposed to finished areas after walls and ceiling are finished and painted. Avoid damage.

.3 Protection: Provide finished cabinet units with protective covers during balance of construction.

.4 Unit Ventilators: Locate as indicated, level and shim units, and anchor to structure. Coordinate with existing wall louvre and radiation cabinet. Adjust existing adjacent surfaces as required for a complete finished installation.

.5 Hydronic Units: Install with shut-off valve on supply and lockshield balancing valve on return piping. If not easily accessible, extend vent to exterior surface of cabinet for easy servicing.

.6 Connect drain pan to condensate drain.

.7 Provide refrigerant piping, refrigerant accessories and refrigerant from condensing unit to DX coil.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS

.1 Submit shop drawings in accordance with general requirements.

.2 Indicate:

.1 Equipment, capacity, piping, and connections.

.2 Dimensions, internal and external construction details, recommended method of installation with proposed structural steel support, sizes and location of mounting bolt holes.

.3 Special enclosures.

.3 Primer coat to be off white.

.4 All hydronic heating shall be by a single manufacturer.

1.2 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in general requirements.

Part 2 Products

2.1 DAMPERS

.1 Factory built, internal damper, complete with operator, at enclosure air outlet grille for each convection type heating unit not thermostatically controlled. Refer to schedules on drawings.

2.2 CAPACITY

.1 As indicated.

2.3 FINNED TUBE RADIATION

.1 Heating elements: NPS 32 mm (1 1/4") seamless copper tubing, 1.2 mm (18 gauge) minimum wall thickness, mechanically expanded into flanged collars of evenly spaced aluminum fins, 100 mm x 100 mm (4" x 4") nominal, 164 fins per meter (50 fins/ft) suitable for sweat fittings.

.2 Element hangers: cradle type providing unrestricted longitudinal movement on enclosure brackets. Space brackets 900 mm (36") centres maximum.

.3 Standard enclosures: 1.6 mm (16 gauge) thick steel complete with bar grille, components for wall-to-wall or complete with die formed end caps having no knock-outs, with inside corners, outside corners, as indicated. Provide full length channel and sealer strip at top of wall edge. Height as indicated. Joints and filler pieces to be flush with cabinet. Support rigidly top and bottom, on wall mounted brackets. Joints and filler pieces to be clear of grilles located to provide easy access to valves and vents. Provide access doors for valves. Enclosure height as indicated. Style and finish as indicated..

.4 Special enclosures: as indicated.

.5 Dimensions for enclosures: measure site conditions. Do not scale from drawing.

.6 Provide for noiseless expansion of all components.

.7 Expansion compensators: Flexonics at each section by mechanical contractor as specified elsewhere.

.8 Acceptable materials: As indicated.

2.4 FINNED TUBE RADIATION (H-1)

.1 Heating elements: NPS 32 mm (1 1/4") seamless copper tubing, 1.2 mm (18 gauge) minimum wall thickness, mechanically expanded into flanged collars of evenly spaced aluminum fins, 100 mm x 100 mm (4" x 4") nominal, 164 fins per meter (50 fins/ft) suitable for sweat fittings.

.2 Element hangers: cradle type providing unrestricted longitudinal movement on enclosure brackets. Space brackets 900 mm (36") centres maximum.

.3 Standard enclosures: 600 mm (24") high, 1.6 mm (16 gauge) thick steel complete with stamped grille, components for wall-to-wall or complete with die formed end caps having no knock-outs, with inside corners, outside corners, as indicated. Provide full length channel and sealer strip at top of wall edge. Height as indicated. Joints and filler pieces to be flush with cabinet. Support rigidly top and bottom, on wall mounted brackets. Joints and filler pieces to be clear of grilles located to provide easy access to valves and vents. Provide access doors for valves. Finish cabinet with factory applied baked primer coat. Enclosure height as indicated. Sloping top.

.4 Special enclosures: as indicated.

.5 Dimensions for enclosures: measure site conditions. Do not scale from drawing.

.6 Provide for noiseless expansion of all components.

.7 Expansion compensators: Flexonics at each section by mechanical contractor as specified elsewhere.

.8 Acceptable materials:

.1 Engineered Air WF-1A Series

.2 Slant Fin

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with manufacturer's instructions.

.2 Install in accordance with piping layout and reviewed shop drawings.

.3 Provide for pipe movement during normal operation.

.4 Maintain sufficient clearance to permit performance of service maintenance.

.5 Check final location with Consultant if different from that indicated prior to installation. Should deviations beyond allowable clearances arise, request and follow Consultant's directive.

.6 Valves

.1 Install valves with stems upright or horizontal unless approved otherwise.

.2 Install isolating ball valves on inlet and outlet and balancing valves on outlet of each unit.

.7 Venting:

.1 Install screwdriver vent on cabinet convector, terminating flush with surface of cabinet.

.2 Install standard air vent with cock on continuous finned tube radiation.

.8 Clean finned tubes and comb straight.

.9 Install flexible expansion compensators as indicated.

.10 Mount wall mounted convectors at 200 mm (8") above finish floor.

.11 Mount wall mounted radiation at 200 mm (8") above finish floor unless otherwise indicated.

.12 On units fed from below floor provide factory manufactured piping shrouds on the exposed piping between base of the radiation cabinet and finished floor. Shroud shall be manufactured by the radiation manufacturer. Shroud shall match finish of the radiation cabinet.

.13 Provide new filter media.

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

.1 Conform to General Conditions for Mechanical Trades.

.2 Related Work Specified Elsewhere.

- .1 General Conditions for Mechanical Trades
- .2 Plumbing & Drainage
- .3 Heating, Ventilation & Air Conditioning
- .4 Heating, Ventilation & Air Conditioning Equipment
- .5 Electrical

1.2 DESCRIPTION OF SYSTEM

.1 Furnish and install all components, devices and control wiring for a fully integrated Energy Management and Environmental Control System incorporating Direct Digital Control (DDC), and equipment monitoring. The system shall control/monitor HVAC and plumbing equipment and systems as specified in this section. The work shall include but is not limited to the following:

- .1 All necessary hardware, software, control panels, control wiring, field devices, installation, documentation and owner training as specified.
- .2 The installed system shall incorporate electronic and digital control devices to perform the control sequences and monitoring outlined herein. Specific control sequence requirements are as detailed elsewhere in this Section of the specification.
- .3 Control and monitoring of the equipment and systems shown on the drawings (refer also to 'Sequence of Operation' for additional details).
- .4 Control valves shall be supplied by this Trade but installed in the piping system by the Mechanical Trade complete with transitions and unions as required.
- .5 Testing, debugging, calibrating, adjustment, programming and confirmation of total system operation.

1.3 MANUFACTURER AND INSTALLING CONTRACTOR

.1 The temperature control manufacturer shall be Tour Andover (TAC).

.2 The local TAC contractor is available at phone 519-893-2638.

.3 Any new building must be a seamless extension of the current Energy Management and Building Control System.

- .1 The existing TAC Vista software is, and shall continue to be, the only head-end BAS server for the entire School Board.

.2 The head-end server contains the secure Energy Management Settings (i.e. Master Setpoints & Schedules) that are sent to all schools in real-time. The control system must be an extension of the head-end server and be able to be managed exclusively through the Vista head-end server.

.3 Monitoring of all school board control systems are done in real-time and must be presented at the exclusive Vista head-end server as first-priority data.

.4 The Vista head-end server has all the required controller databases and software to be able to centrally maintain and modify network configuration and controller software for the entire School Board. The Vista head-end server is the only system that can access the LacNet programming variables inside the controllers for real-time configuration of setpoint and time scheduling parameters.

.5 The graphics and controller database must be presented inside the Vista head-end server in its native format in order to preserve the real-time speed, integrity and multi-site administration of the entire system.

1.4 SCOPE OF WORK

.1 Refer to drawings and specification for complete scope.

.2 Unit ventilator control (heating, cooling, free cooling, outdoor air ventilation).

.3 Gym supply fan outdoor air control (both AHU's).

1.5 QUALITY OF ASSURANCE

.1 The system components shall be listed by Underwriters Laboratories Inc. and Canadian Standards Association.

.2 The system control products shall be stored and handled according to manufacturer' recommendations.

.3 The work shall be performed by skilled technicians all of whom shall be properly trained and qualified for this work.

1.6 SUBMITTALS

.1 Prior to the installation of any equipment, the Contractor shall provide the Consultant with shop drawings and specifications for all devices and equipment used for the complete system installation. Shop drawings shall include the following:

.1 Identified schematic control diagrams for all systems, each diagram indicating or referencing input / output connection points, control components, component catalogue numbers, operation sequence, interlocking and RPU's to which they are connected.

.2 Complete network schematic indicating all programmable controllers and data connections.

.3 Detailed listing of inputs and outputs of each programmable controller.

.4 Control damper schedule indicating damper size, required torque and blade type.

.5 Technical data sheets / manufacturer application manuals of each system component.

.2 Upon completion of the installation and prior to acceptance and Owner training, the Contractor shall furnish the Consultant with three copies of installation and operation manuals for the system. Each manual shall include:

.1 Record drawings, including plan layout indicating major device locations and wiring diagrams as finally installed.

.2 All shop drawings, incorporating all required revisions to reflect as-built conditions.

.3 The Contractor shall also keep one copy of backup programs for the system archived in a software storage vault at their business location.

Part 2 Products

2.1 GENERAL

.1 The control system shall be a Tour Andover (TAC) Xenta/Distech building automation system (BAS).

.2 The system shall integrate the operation of intelligent building management controllers distributed into the network.

.3 The DDC System shall be generally comprised of the following devices to achieve the control functions described in this section:

.1 Xenta/Distech programmable controllers

.2 Distech input/ output programmable I/O modules.

.3 Control relays.

.4 Control dampers and valves.

.5 Sensors, actuators and other input/output devices.

.4 Controllers shall execute the application programs, calculations, and commands to provide the control function specified for that unit. Each controller shall include its own micro-computer controller, power supply, input/output modules, termination modules and real time clock.

.5 Controllers shall be capable of full control functionality and alarm reporting independently or as a part of the DDC network.

.6 The system shall be stored in flash ram so no batteries are required.

.7 Each control device shall be modular and expandable to provide additional inputs and outputs and control functionality for that device

.8 Each controller shall be able to transfer and receive data via the network for performance of control functions.

.9 The system shall be modular, permitting expansion by adding hardware and software without changes in communication or processing equipment.

.10 The complete system shall be capable of communication over a LonWorks network.

.11 The controllers shall monitor the status of all overrides and include this information in logs and summaries to inform the operator that automatic control has been inhibited.

.12 Controllers shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all subsidiary equipment and provide both local and remote annunciation of any component failures.

.13 Controllers shall activate an orderly shutdown of their operation in the event of loss of normal electrical power. Non-volatile memory shall be incorporated for all controller configuration data. The controllers shall automatically resume full operation without manual intervention.

.14 The controllers shall have sufficient memory to support their own operating system and data bases including:

- .1 control processes
- .2 energy management applications
- .3 alarm management
- .4 trend data
- .5 operator input/output
- .6 remote communications
- .7 manual override monitoring

.15 Controllers shall incorporate the following software features:

- .1 Energy management:
  - .1 Time of Day Scheduling
  - .2 Calendar Based Scheduling
  - .3 Holiday Scheduling
  - .4 Optimal Start and Stop
  - .5 Demand Limiting
  - .6 Heating/Cooling Interlock
- .2 Alarm Management:
  - .1 Alarm Management shall be provided to monitor, buffer and direct alarm reports to operator devices and memory files. The controllers shall perform alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic and prevent alarms from being lost.
  - .2 All alarm or point change report shall include the points English language description and the time and date of occurrence.
  - .3 The user shall be able to define the specific reaction for each point, the priority level (3 in total) and ability to inhibit alarm reporting for each point.

.4 The user shall be able to define conditions under which point changes need to be acknowledged by an operator and logged for analysis at a later date.

.5 The user shall be able to print, display or store a unique 60 character alarm message to more fully describe the alarm condition or direct operator response. The message shall be customizable to describe each individual alarm.

.6 In web access applications only critical alarms shall initiate a call to a remote operator device, otherwise call activity shall be minimized by time stamping and saving reports until a manual request is received or until the buffer space (minimum 50 alarms) is full.

.3 Trend Logs:

.1 Controllers shall provide an automatic roll-over trend log, which stores records up to an operator-selected number at an operator-selected sampling rate and then overwrites the oldest record with each new record.

.2 Sample intervals shall be from 1 minute to 24 hours.

.3 Provide graphical and tabular displays

.4 Runtime Totalization:

.1 The controllers shall automatically accumulate and store runtime hours for binary points with a sampling resolution of 1 minute. The user shall have the ability to define a warning limit to trigger maintenance or user-defined messages.

.5 Custom Programming:

.1 The controllers shall permit user defined custom control processes based on:

.1 any system measured data or status

.2 any calculated data

.3 any results from other processes

.4 Boolean logic

.2 The custom processes may be triggered by:

.1 Time-of-day

.2 calendar date

.3 events (point alarm etc.)

.16 The control strategy for each control loop shall be performed by software within the controller. The sequence of events required for each control loop is described for each system in the control sequence.

.17 Outdoor air temperature indication shall be available at each controller as an integral part of the control strategies for that controller. Should the network transmission of the common outdoor air temperature (or any other common value) fail, then each controller shall use the last good value received.

.18 Controls and Requirements for VVT Systems

.1 Where VVT controls are specified, units are to operate as part of a Variable Volume/Variable Temperature System complete with all necessary controls including zone dampers, temperature sensors, static pressure sensor probes and bypass damper.

2.2 NETWORK ARCHITECTURE

.1 The controllers on the local network shall communicate via a two wire LonTalk TP/FT-10 network.

2.3 CONTROL PANELS

.1 Control panels shall be fully enclosed cabinets with all steel construction. Cabinets shall have a hinged door with locking latch or bolt-on cover plate. All cabinet locks shall be common keyed. Cabinets shall be finished with two coats of paint.

2.4 TEMPERATURE SENSORS

.1 Provide thermistor temperature sensors, not requiring transmitters, to measure temperature.

.2 Accuracy shall be +/-0.2°C from 0 to 70°C.

.3 Temperature sensors shall be Greystone EC200 series.

.4 Space sensors in occupied areas shall be type AE or equal having an integral push button for unoccupied override and an integral slider to adjust set point (LED display not required).

.5 In corridors and where noted on the drawings, provide stainless steel plate type sensors (push button override and LED display not required), type AS.

.6 Duct temperature sensors shall be type B having a stainless steel probe length to suit application and ABS enclosure. Duct averaging temperature sensors shall be type FD having an element length to suit application, copper probe and ABS enclosure.

.7 Immersion temperature sensors shall be type C having a ¼" OD stainless steel probe, 4" long and ABS enclosure. Immersion sensors shall be complete with thermowells. Thermal conductive compound shall be added inside the thermowell to provide optimum thermal transfer from the fluid to sensor. Stainless steel thermowells shall be used for steel pipe and brass thermowells shall be used in copper pipe.

2.5 CARBON DIOXIDE SENSORS

.1 Sensors shall Greystone CDD series or equal having the following features:

.1 0-2000 ppm factory default detection range, field adjustable.

.2 Non-dispersive infrared sensing element with self-calibration algorithm.

.3 Guaranteed 5 year calibration interval.

.4 Powered by either AC or DC source.

.5 Accuracy: within 50 ppm or 3% of reading (whichever is greater).

.6 Operating humidity range: 0-95% RH.

.7 Operating temperature range: 0 to 50°C or greater.

.8 Stability: less than 2% full scale in 15 years

.9 Response time: less than 2 minutes for 90% step change.

.2 Duct mounted sensors shall be complete with ABS enclosure complete with sampling tube.

.3 Space mounted sensors shall be executive space type without LCD display.

2.6 MOTORIZED CONTROL DAMPERS

.1 Control dampers shall be the parallel or opposed blade type as below or as scheduled on drawings.

.1 Outdoor and/or return air mixing dampers and face and bypass (F & BP) dampers shall be parallel blade, arranged to direct air-streams toward each other.

.2 Other modulating dampers shall be the opposed blade type.

.3 Two-position shutoff dampers may be parallel or opposed blade type with blade and side seals.

.2 Damper frames shall be 13 gauge galvanized steel channel or 1/8 in. extruded aluminum with reinforced corner bracing.

.3 Damper blades shall not exceed 20 cm (8 in.) in width or 125 cm (48 in.) in length. Blades are to be suitable for medium velocity performance (10 m/s [2000 fpm]). Blades shall be not less than 16 gauge.

.4 Damper shaft bearings shall be as recommended by manufacturer for application, oil impregnated sintered bronze or better.

.5 All blade edges and top and bottom of the frame shall be provided with replaceable butyl rubber or neoprene seals. Side seals shall be spring-loaded stainless steel. The blade seals shall provide for a maximum leakage rate of 50 L/s m^2 (10 cfm per ft^2) at 1000 Pa (4 in. w.g.) differential pressure. Provide air foil blades suitable for a wide-open face velocity of 7.5 m/s (1500 fpm).

.6 Individual damper sections shall not be larger than 125 cm x 150 cm (48 in. x 60 in.). Provide a minimum of one damper actuator per section.

.7 Modulating dampers shall provide a linear flow characteristic where possible.

.8 Dampers shall have exposed linkages.

2.7 WATER CONTROL VALVES

.1 Heating and cooling control valves shall be Belimo CCV series characterized ball valves, complete with chrome plated brass trim and NPT female pipe connections. Radiation valves shall be complete with non-spring return modulating actuators. Control valves for coils heating a portion of outdoor air shall have spring return modulating actuators.

.2 Control valves shall be sized to provide approximately one half the circuit branch pressure drop to obtain good modulation control but they shall be no smaller than two pipe sizes less than the pipe they are installed in.

Part 3 Execution

3.1 INSTALLATION

.1 Installation

.1 All controllers and components in the system and on the network shall be installed according to manufacturer recommendations, general installation standards for digital controls and in accordance with the approved shop drawings.

.2 Locate room sensors in the locations shown on the mechanical drawings. All sensors shall be mounted at barrier free height (3'-11" (1175 mm) above finished floor).

.3 All control components for off site system access shall be located where noted on the drawings. The Electrical Contractor shall provide all required connections / cabling for off site access to the web access components.

.4 All programmable controllers, web access components, relays and other control components shall be located within control panels. Control Panels shall be wall mounted and shall be located within suspended ceiling spaces or other locations approved by the Consultant.

.5 The Electrical Contractor will provide hand-off-auto switches in all starters controlled by the BAS.

.2 Generally duct mount carbon dioxide sensors shall be used where specified for air handling units; but, for gyms and single zone libraries, a wall mount carbon dioxide sensor shall be mounted next to the room temperature sensor.

.3 All carbon dioxide levels which are measured by the carbon dioxide sensors shall be made available to the Owner in the form of trend logs. Record readings at 10 minute intervals and keep them for at least 30 days.

.4 Freeze-stats shall be installed so that their sensing element runs horizontally across the coil face (not diagonally) with no more than 12" vertical drops at the outside coil frame. The full face of the coil shall be covered with no horizontal runs being more than 12" apart. The top and bottom horizontal run shall be within 6" of the coil frame. If more than one freezestat is required they shall be wired in series in order to detect a low temperature in portion of the coil. The sensing elements shall be firmly secured in place to avoid vibration without added air restriction.

3.2 SYSTEM START-UP AND ACCEPTANCE

.1 Upon completion of installation, test, adjust and calibrate controls provided under this Section.

.2 On system completion, a demonstration of complete system operation shall be made to the Owner's authorized representative and Consultant.

.3 The Consultant shall verify through the Owners representatives that the entire system is complete and operating to the satisfaction of the Owner before final acceptance is approved.

3.3 TRAINING

.1 The Contractor shall provide competent instructors to give full instruction to designated personnel in the adjustment, operation and maintenance of the system installed rather than a general training course. Instructors shall be thoroughly familiar with all aspects of the subject matter they are to teach. All training shall be held during normal work hours of 8:00 a.m. to 4:30 p.m. weekdays as follows:

.2 Provide 4 hours of training for Owner's operating personnel. Training shall include:

.1 Explanation of drawings, operations and maintenance manuals

.2 Explanation of web access program

.3 Explanation of adjustment procedures

.4 Trend Analysis

3.4 WARRANTY

.1 Equipment, material and software shall be unconditionally guaranteed for a period of two years form the date of substantial completion.

.2 Provide warranty service at no cost to the Owner for the guarantee period, which shall include but not be limited to the following:

.1 Emergency repair service on regular working hour basis during warranty.

.2 Replacing defective parts and components as required.

.3 System software support.

3.5 IDENTIFICATION

.1 Provide system identification and provide nameplates identifying the following (nameplates shall be keyed to the wiring diagrams):

.1 Duct mounted sensors.

.2 Control panels (identify as to equipment / systems controlled). Each panel shall include an as-built drawing showing all the connected control points.

3.6 TESTING AND BALANCING

.1 During the system testing and balancing by the Testing and Balancing Agency, demonstrate the operation of all controls. During balancing procedures, set controls to a fixed mode (bypass damper locked fully closed and all zone dampers locked fully open) to prevent any changes during the balancing procedure.

3.7 ELECTRICAL WIRING

.1 All wiring shall be installed to the standards specified in the Electrical Division.

.2 Use Echelon recommended orange jacket cable for all network wiring.

.3 Run all wiring in EMT conduit where exposed, where running within concrete block walls and where required by the Ontario Electrical Code. Plenum rated cable shall be used in return air ceiling plenums.

.4 Control relays necessary for BAS operation shall be provided by the Temperature Control Contractor but all contactors and their power supplies handling power wiring to the equipment shall be by the Electrical Contractor.

Part 4 Sequence of Operation

4.1 GENERAL

.1 All setpoints shall be adjustable.

.2 Outdoor air temperature shall be broadcasted to all controllers.

.3 Heating mode: Heating is enabled between October 15 and April 15 or if the outdoor air temperature is below 10°C. This heating mode is used in all controllers for the building.

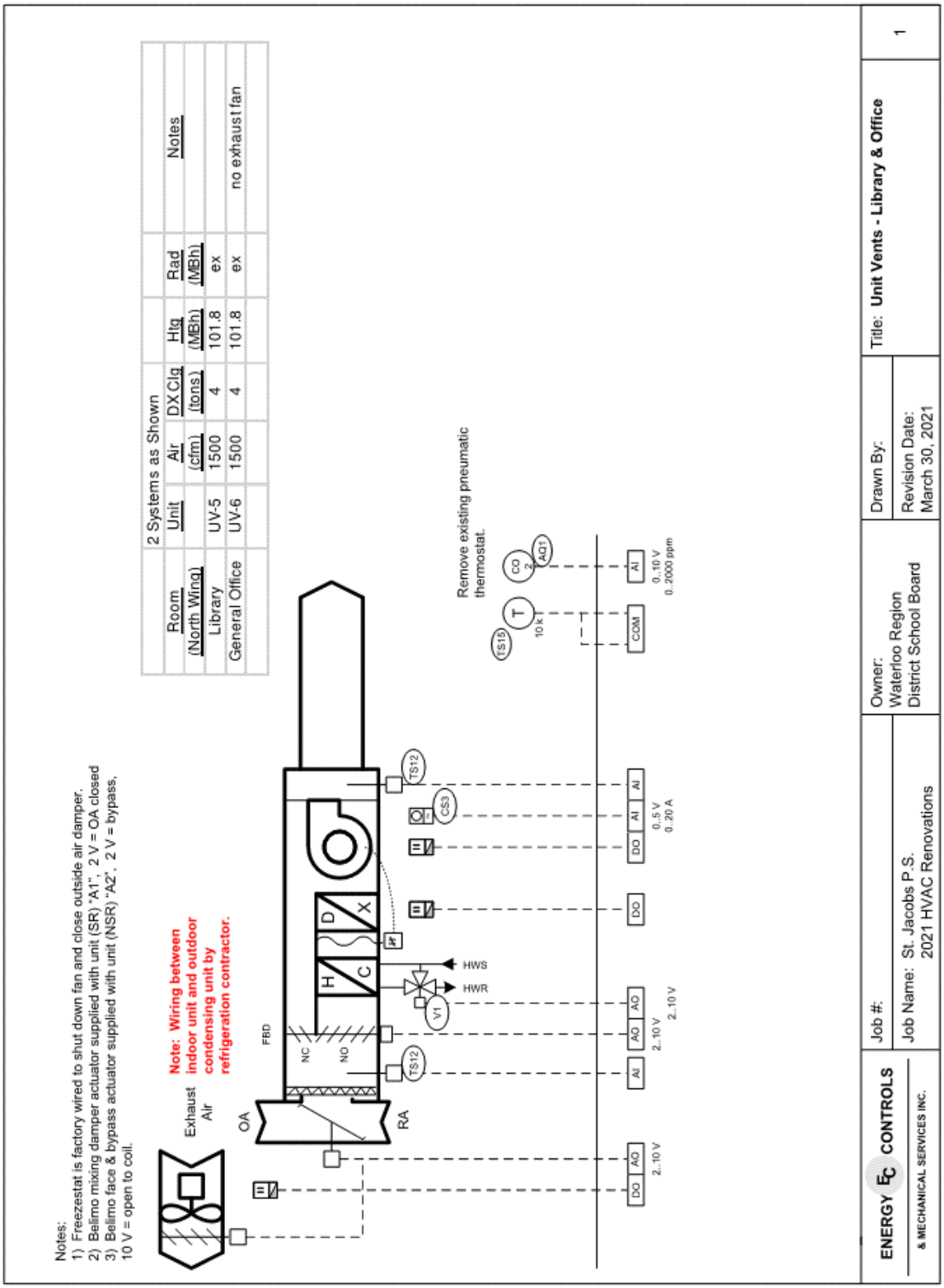
.4 Cooling Mode: Mechanical cooling is enabled if the outdoor air temperature is above 18°C.

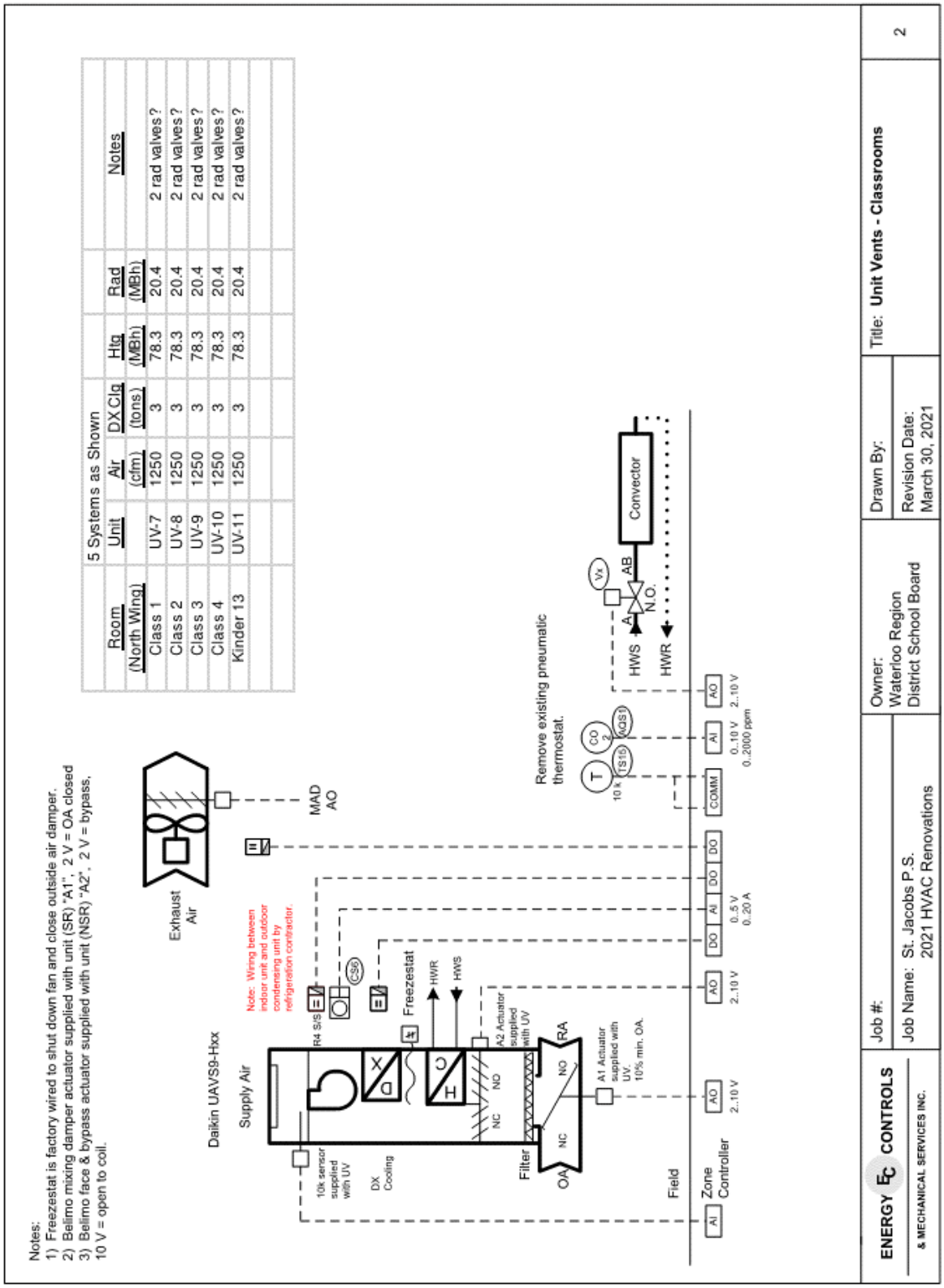
.5 Occupancy mode shall be determined by a weekly schedule with an annual holiday schedule. Each system shall have this schedule but there shall be provision for operating under a general (to the building) schedule as well. An adjustable parameter shall be available to select the local or general schedule for each system.

.6 Lead/lag: Devices designed for lead lag operation shall operate in automatic lead/lag mode to equalize run time. If the lead unit fails the lag shall automatically start and an alarm shall be generated. The lead unit shall be advanced through the series of devices in sequence every Tuesday at noon.

4.2 EQUIPMENT SERVICES

.1 Graphical sequence of operations will be provided by BAS contractor.


Notes:
1) Freezestat is factory wired to shut down fan and close outside air damper.
2) Belimo mixing damper actuator supplied with unit (SR) "A1", 2 V = OA closed
3) Belimo face & bypass actuator supplied with unit (NSR) "A2", 2 V = bypass, 10 V = open to coil.
2 Systems as Shown
Room (North Wing) | Unit | Air (cfm) | DX Clg (tons) | Htg (MBh) | Rad (MBh) | Notes
Library | UV-5 | 1500 | 4 | 101.8 | ex
General Office | UV-6 | 1500 | 4 | 101.8 | ex | no exhaust fan
Exhaust Air
OA
RA
FBD
NC
NO
H
C
D
X
HWS
HWR
V1
TS12
CS3
TS15
T
10 kΩ
CO 2
AQ1
Remove existing pneumatic thermostat.
Note: Wiring between indoor unit and outdoor condensing unit by refrigeration contractor.
DO
AO
AI
COM
2..10 V
0..5 V
0..20 A
0..10 V
0..2000 ppm
Owner: Waterloo Region District School Board
Drawn By:
Title: Unit Vents - Library & Office
Job #:
Job Name: St. Jacobs P.S. 2021 HVAC Renovations
Revision Date: March 30, 2021
ENERGY EC CONTROLS & MECHANICAL SERVICES INC.
1


Notes:
1) Freezestat is factory wired to shut down fan and close outside air damper.
2) Belimo mixing damper actuator supplied with unit (SR) "A1", 2 V = OA closed
3) Belimo face & bypass actuator supplied with unit (NSR) "A2", 2 V = bypass, 10 V = open to coil.
Daikin UAVS9-Hxx
Supply Air
Exhaust Air
MAD AO
Note: Wiring between indoor unit and outdoor condensing unit by refrigeration contractor.
R4 S/S
CS6
Freezestat
HWR
HWS
10k sensor supplied with UV
DX Cooling
A2 Actuator supplied with UV
A1 Actuator supplied with UV. 10% min. OA.
Filter
OA
RA
NC
NO
Field
Zone Controller
AI
AO
2..10 V
DO
0..5 V
0..20 A
COMM
0..10 V
0..2000 ppm
Remove existing pneumatic thermostat.
T
10 k
TS15
CO2
AQS1
Vx
AB
A
N.O.
Convector
HWS
HWR
Notes
2 rad valves?
Rad (MBh)
Htg (MBh)
DX Clg (tons)
Air (cfm)
Unit
Room (North Wing)
5 Systems as Shown
Class 1 UV-7 1250 3 78.3 20.4 2 rad valves?
Class 2 UV-8 1250 3 78.3 20.4 2 rad valves?
Class 3 UV-9 1250 3 78.3 20.4 2 rad valves?
Class 4 UV-10 1250 3 78.3 20.4 2 rad valves?
Kinder 13 UV-11 1250 3 78.3 20.4 2 rad valves?
ENERGY EC CONTROLS
& MECHANICAL SERVICES INC.
Job #:
Job Name: St. Jacobs P.S. 2021 HVAC Renovations
Owner: Waterloo Region District School Board
Drawn By:
Revision Date: March 30, 2021
Title: Unit Vents - Classrooms
2

SEQUENCE OF OPERATION

Unoccupied Mode

The fan is off, the face & bypass damper is in the face position, the DX cooling is off and the mixing dampers are in the 0% outside air position. First the rad valves open then the fan cycles with full heating to maintain the unoccupied heating setpoint (initially 17.5℃). If the pushbutton on the room sensor is pressed, the system will revert to occupied mode for a period of 2 hours.

Occupied Mode

An optimized start routine for heating advances the system start time when morning warm-up is required. The fan runs continuously to maintain room temperature. The room temperature sensor modulates the mixing dampers in sequence with DX cooling to maintain the cooling setpoint, and modulates the face & bypass dampers and rad valve to maintain the heating setpoint. The setpoint can be adjusted +/-2℃ at the room temperature sensor. The cooling setpoint is maintained at 2℃ higher than the heating setpoint and will not go below 23.5℃. Fan status is monitored by a current sensor.
The exhaust damper opens with the outdoor air damper signal. When the exhaust damper is open 50% and more the exhaust fan runs.

Limits and Safeties

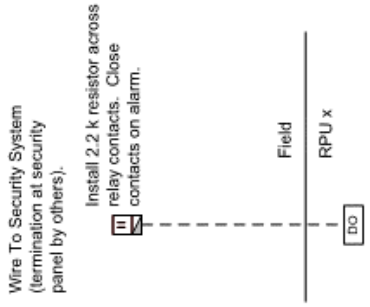
1) If the outside air temperature exceeds the free cooling setpoint, the mixing dampers return to minimum position.
2) Mixed air damper minimum position control is provided during occupied periods (initially 10% OA).
3) The minimum outdoor damper position is increased from minimum to 40% as the CO_2 increases from 1000 to 1200 ppm.
4) The fan must be running before the mixing dampers and DX cooling will operate.
5) The supply air sensor acts as a low limit to ensure temperature does not fall below setpoint (initially 16℃, reset to 13℃ on a call for free cooling).
6) A software freezestat on the supply air temperature shuts the fan down and closes the outdoor air damper when the supply air temperature is below 3℃ for 30 seconds (resets at 6℃ with 5 minute delay before restart).
7) If the hard-wired freezestat trips, the fan shuts down, outside air damper closes and face & bypass damper opens to face.
8) DX cooling is disabled when the outside air temperature falls below the global mechanical cooling disable setpoint (initially 14℃).
9) DX cooling has a minimum off time of 5 minutes.
10) DX cooling has a supply air temperature low limit (6/12℃).
11) The face & bypass damper is in the face position when DX cooling is operating.

Alarms

An alarm is indicated at the operator's terminal if any of the following occur:

1) Fan status does not match fan start/stop signal.
2) Room temperature too high (36/34℃) or too low (14/16℃).
3) Supply air temperature too high (65/63℃) or too low (8/10℃).
4) Software freezestat tripped.
5) Fan runtime exceeded weekly runtime setpoint.
6) Room CO_2 level too high (1700/1650 ppm) or too low (250/300 ppm).

LOW TEMPERATURE ALARM

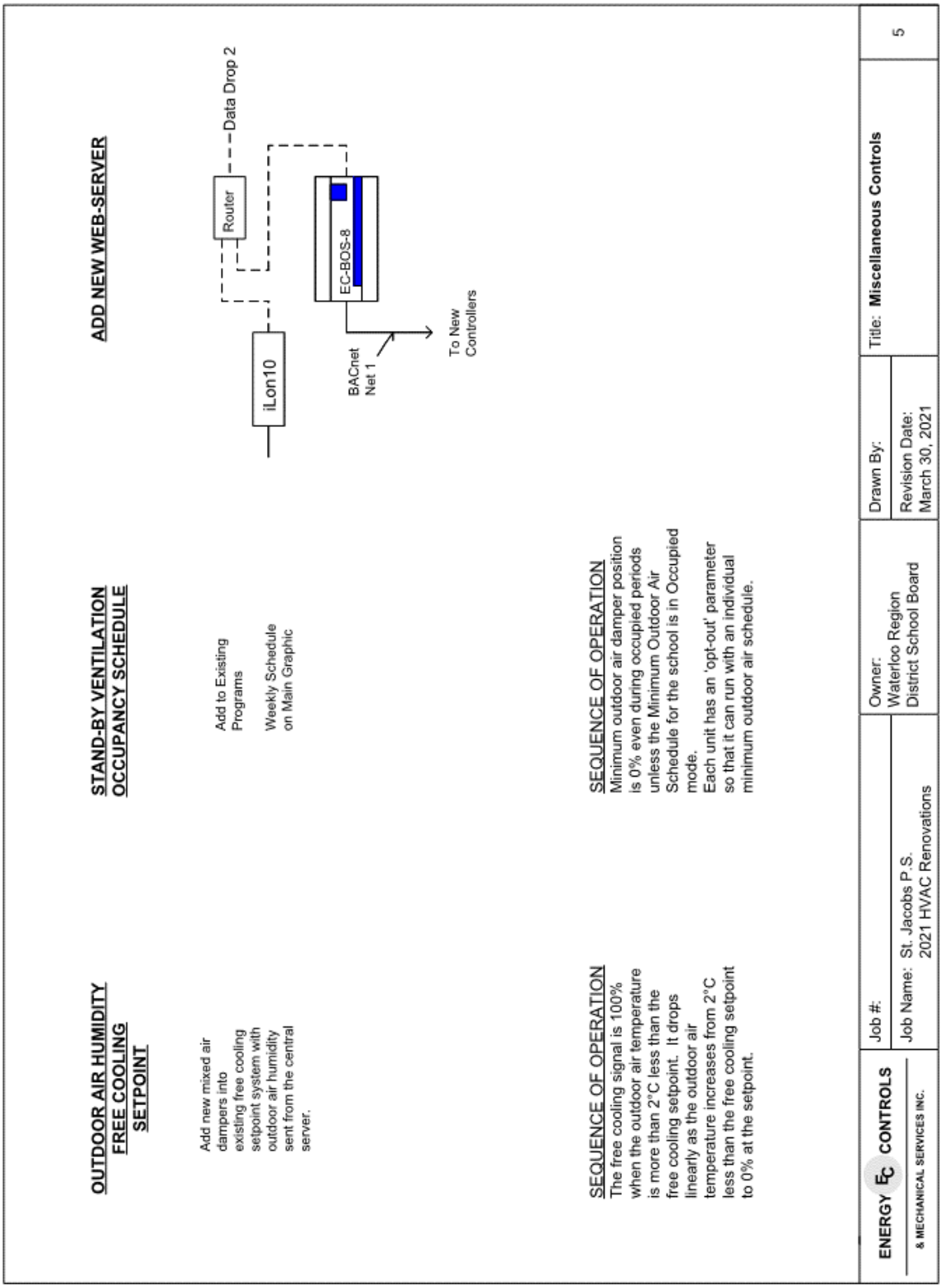


SEQUENCE OF OPERATION

If any space temperature falls below 14°C, a "heat loss" alarm will be activated through the security system.

If the hot water heating supply water temperature is more than 15°C below selpoint, or falls below 45°C, a critical alarm will be activated through the security system. An alarm will also be generated at the BAS. The alarm will be disabled between April 15 and October 15, which is when heating systems are typically allowed to shut down based on outside air temperature.

ENERGY EC CONTROLS & MECHANICAL SERVICES INC.	Job #:	Owner: Waterloo Region District School Board	Drawn By:	Title: **Miscellaneous Controls**
	Job Name: St. Jacobs P.S. 2021 HVAC Renovations		Revision Date: March 30, 2021	4



END OF SECTION