PROJECT MANUAL

TENDER
WR 53073 – Carl A. Pollock Hall
Third and Fourth Floor Renovations
Issued for Tender
2026-11-05

UNIVERSITY OF WATERLOO

CLOSING DATE:	**December 15, 2026**
CLOSING TIME:	**3:00 pm EDT**
INQUIRIES DEADLINE:	**December 11, 2026 – 5:00pm EDT**
CLOSING METHOD:	**Electronically: Bonfire**

Prepared By

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For

University of Waterloo
Plant Operations, General Services Complex (GSC)
200 University Avenue West
Waterloo, Ontario, N2L 3G1

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END OF SECTION

Professional seals and signatures are provided as required by governing legislation and apply only to those drawings and specifications prepared by each licensed professional of record as designated by the design discipline symbols (A) for architect, (M) for mechanical engineer, (E) for electrical engineer, as indicated in the Table of Contents, Section 00 01 10. The professional seals and signatures for the design disciplines noted above are as follows:

(A) Baird Sampson Neuert Architects (Architect of Record - Prime Consultant)

317 Adelaide St. W, Suite 1002
Toronto, ON M5V 1P9
Tel: 416-363-8877



REGISTERED PROFESSIONAL OF RECORD

(M) WalterFedy (Mechanical Engineer of Record)

675 Queen St S. #111
Kitchener, ON N2M 1A1
Tel: 519-579-2150



REGISTERED PROFESSIONAL OF RECORD

(E) WalterFedy (Electrical Engineer of Record)

675 Queen St S. #111
Kitchener, ON N2M 1A1
Tel: 519-579-2150



.

REGISTERED PROFESSIONAL OF RECORD

END OF DOCUMENT

1 PREFERRED DATA CABLING SUB-CONTRACTORS

.1 The following Sub-contractors are prefferred to submit a subcontract bid for the Data Cabling portion of the Work:

Name	Email	Phone
Paladin Technologies	jkristman@paladintechnologies.com	416-992-1017
Activo Inc.	pdurrer@activo.ca	519-746-8774
A.P.C.I. Communications Inc	bvdputte@apci.on.ca	905-847-0010

END OF LIST

1 PROJECT DESCRIPTION

.1 The Work consists of an interior renovation of a significant portion of the existing 3rd and 4th floor of the Carl Pollock Hall Building. The project scope is comprised of approximately 6900 sq.ft on the 3rd floor, consisting of interior full-gut renovation of classroom and student learning spaces, and of approximately 10600 sq.ft on the 4th floor, consisting of an interior full-gut renovation of classroom, studio, and lounge spaces. The interior renovation scope includes:

.1 reconfiguration of interior partitions, openings, and interior finish upgrades,
.2 mechanical heating and cooling system upgrades,
.3 electrical system upgrades,
.4 structural reconfiguration in limited areas, and
.5 other modifications as required to support the above-mentioned items.

.2 The Work is identified as Carl A. Pollock Hall (CPH) Third and Fourth Floor Renovations, also known as WR#53073 as prepared by Baird Sampson Neuert Architects on behalf of the Owner, University of Waterloo.

2 BID DOCUMENTS

.1 Sets of the Bid Documents are available on the University of Waterloo electronic plans room hosted by Bonfire.

.1 Prequalified Contractors may view and download Bid Documents at no charge.

3 BID INQUIRIES

.1 Direct bid inquires in writing by email to one of the following individuals at the office of the Owner: Jeff Wettlaufer, jwettlau@uwaterloo.ca, Telephone: 519-888-4567(x45645)

Architectural: Ruslan Ivanytskyy, rivanytskyy@bsnarchitects.com

Mechanical: John Zaleski, jzaleski@walterfedy.com

Electrical: Keyi Shi, kshi@walterfedy.com

Structural: Matthew Zen, mzen@walterfedy.com

.2 Inquires received in the last 48 hours before bid closing will not be responded to.

4 BID FORM

.1 Submit complete, signed and sealed Bids consisting of the Bid Form (Part 1) and the Bid Form Supplements (Part 2), as applicable, provided as part of the Bid Documents at the time and place indicated below.

5 BID CALL

.1 Bids signed under seal, executed and dated will be received in electronic format only on Bonfire on the date and time listed on the cover page.

.2 Bids submitted after the closing date and time shall not be accepted.

.3 Submit the Bid Form Supplements (Part 2) **within 24 hours** of the Bid Form, Part 1, Closing Time.

.4 Bids will be opened privately, immediately after the bid closing date and time.

.5 Amendments to the submitted offer will be permitted if ammended through Bonfire prior to the Bid closing date and time.

.6 Bids will not be accepted in person or by fax or email or by any other electronic means of submission other than through Bonfire.

6 PRE-BID EXAMINATION

.1 Visit the Place of Work and surrounding area before submitting a bid.

.2 A visit to the Place of Work is mandatory for General Contractors, and has been arranged for Tuesday November 17, 2026 at 10:30 a.m. local time. Meet at the CPH front door on the ground floor.

.3 Bidders not in attendance relinquish their right to submit a bid.

.4 Bidders visiting the Place of the Work will be required to be accompanied at all times by a representative of the Owner.

.5 Examine pertinent data assembled on the design and projected construction of the Project. This information may include soils investigations, preliminary construction schedules, and existing drawings and specifications where applicable.

.6 Examine carefully the Place of the Work for matters relating to the nature of the Project, the means of access and egress, the obstacles to be met with and the rights and interests which may be interfered with during the performance of the Work.

.7 Examine carefully the Contract Documents to determine the extent of the Work necessary to ensure the full and proper construction of the Project and the conditions under which it will be performed.

.8 Any such investigations carried out by the Bidder prior to the receipt of Bids shall be at no cost or risk to the Owner.

.9 Upon completion of site examination, reinstate the Place of Work to its original condition. Pay for costs of repair to all damaged Product and systems designated to be relocated or remain.

7 OMISSIONS AND DISCREPANCIES

.1 Notify the Owner at once of any discrepancies found in, or omissions from the Bid Documents.

.2 Contact the Owner if in doubt as to the meaning of any of the Bid Documents.

.3 In the event a discrepancy in the documents occur, the Owner will issue and Addendum to all known Bidders to clarify or correct the discrepancy.

.4 The Owner will not be responsible for any verbal instructions or clarifications given during the bidding period.

.5 Should any clarifications, discrepancies or omissions go unreported to the Owner during the bidding period, the proper interpretation shall be at the discretion of the Owner. The Bidder is expected to make “best practice” judgements as to the methods of construction and constructability. If such requirements are not raised during the bid period, they are deemed to be understood by the Bidder and the requirements included in the Bid.

.6 The Contract Documents include the drawings and specifications, which are complementary in nature. Together, the drawings and specifications set out the requirements of the Work.

.1 Refer to CCDC 2, GC 1.1 – Contract Documents.

.2 Should Products or portions of the Work be indicated either on the Drawings or within the Specifications, they are considered to be part of the Contract Documents, even if not shown on both.

.3 Failure to describe a Product that is required to construct a complete system or assembly will not relieve the Contractor from the responsibility of providing a completed Project in accordance with the requirments of the Contract Documents.

8 WITHDRAWAL OF BIDS

.1 Prior to Bid Closing:

.1 A Bidder may request that their Bid be withdrawn. Bid withdrawal will be allowed if the request is made before the deadline for receipt of Bids.

.2 Withdrawal requests must be directed to the Owner by letter or in person. Telephone, Fax or email requestions will not be considered.

.3 When withdrawals of unopened Bids are made in person, submit to the Owner a letter confirming the withdrawal details.

.1 If the person withdrawing the Bid is someone other than an authorized representative of the company, an authorized representative of the company must confirm the authenticity of the request.

.4 Withdrawal letters received after the Bid has been deposited but before the deadline for receipt of Bids, shall, together with the confirmation of withdrawal, be submitted to the Owner.

5 Withdrawn Bids will remain unopened and will be identified at the Bid opening as a Withdrawn Bid.

.6 The withdrawal of a Bid does not disqualify a Bidder from submitting a subsequent Bid for the same Bid Call.

.2 After Bid Closing:

.1 Bids may be withdrawn after the deadline for receipt of Bids, with written request submitted to the Owner.

9 ACCEPTANCE OF BIDS

.1 In the case of incorporated companies, Bids shall be signed and sealed. In the case of an individual, partnership or unincorporated companies, Bids shall be signed and witnessed.

.2 The Owner reserves the right to accept any Bid or reject any or all Bids without explanation. The lowest Bid Price will not necessarily be accepted.

.1 The “lowest Bid Price” shall be defined as the lowest base bid price. Alternate Prices, Separate Prices and any Substitutions that may affect the Contract Price shall not be considered in determining the “lowest Bid Price”.

.3 The Bidder acknowledges and agrees that nothing contained herein, in the Bid Documents or elsewhere, no act done or expense incurred by it in the preparation and submission of this Bid, no trade or industry custom or practice, and no representation or assurance that may have been made or given to it by or on behalf of the Owner, shall in any manner legally bind the Owner, in any circumstances, to accept this Bid, lowest Bid Price, Bid submitted in compliance with the requirements of the Bid Documents, or any Bid at all.

.4 The Bidder further acknowledges and agrees that the Owner shall have complete and unrestricted liberty in this regard and may reject any or all Bids or may accept any Bid in whatever manner, at whatever Bid Price, on whatever terms and for whatever reasons as the Owner, in its absolute discretion, considers to be in its own best interests, all without liability or obligation of any kind to the Bidder.

10 INFORMAL OR CONDITIONAL BIDS

.1 Bids that are incomplete, conditional, illegible, obscure, or that contain reservations, erasures, alterations, or irregularities of any kind shall, at the discretion of the Owner, be declared informal.

.2 Bids that fail to include proof of WSIB coverage or insurance requirements shall, at the discretion of the Owner, be declared informal.

.3 Bids based upon prices seeming so unbalanced as to adversely affect the interests of the Owner shall, at the discretion of the Owner, be declared informal.

.4 Bids based upon an unreasonable period of time for completion of the Work shall, at the discretion of the Owner, be declared informal.

.5 Bids are by invitation only from a list of invited Bidders. Bids received from unsolicited Bidders shall be returned unoppened.

.6 The Owner reserves the right to waive compliance with certain formalities and requirements of the Bid Documents.

11 BID EVALUATION

.1 Bid evaluation will be dependent on the value of the Base Bid and Alternate Prices, not only the Base Bid price.

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

.3 The Owner may solicit additional information after close of Bids from any or all Bidders to support their bid evaluation. The evaluation of the Bids submitted and the decision to award the Contract may be made by the Owner on the basis of, but not necessarily limited to, the following critera:

.1 Price.

.2 Experience with other projects currently in progress.

.3 Quality assurance.

.4 Ability to handle current and anticipated future workload.

.5 Proposed construction schedule and completion date.

.6 Qualifications and experience of proposed personnel.

.7 The effect of alternative prices on the Bid Price.

.8 Ability to ensure continuity of qualified and experienced personnel.

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

.5 Refer to section 4.4.2 Capital Infrastructure, of the Buy Ontario Procurement Directive (https://www.ontario.ca/page/buy-ontario-procurement-directive). Bids will be evaluated using the following methodology:

.1 Apply a 10% evaluation advantage to the bidder with the highest proportion of Ontario-Made Goods and Ontario Services, followed by Canadian-Made Goods and Canadian Services in the Domestic Supply Chain Plan.

.2 A Domestic Supply Chain Plan that identifies, at a minimum, the source and dollar value of each Major Good and each Service, required for the Work, including those supplied by subcontractors in accordance with Section 4.4.2 Capital Infrastructure of the Buy Ontario Procurement Directive is attached to this bid form supplement. Failure to submit a complete Domestic Supply Chain Plan will render the Bid non-compliant and ineligible for award.

The Domestic Supply Chain Plan shall be submitted in PDF format as an appendix to Bid Form Supplement (Part 2) – 00 41 02.

.6 Requests for information shall not be construed as acceptance of a Bid.

12 BID FORM REQUIREMENTS

.1 Contractor Identification:

.1 Print clearly the legally registered name, address, postal code, phone, and fax number of your company in the space provided

.2 Addenda:

.1 Enter in the space provided on the Bid Form, addenda received prior to close of Bids.

.2 Addenda issued by the Owner to known Bidders before the receipt of Bids are considered part of the Contract Documents.

.3 Taxes:

.1 Refer to CCDC 2, GC 10.1 – Taxes and Duties. Include all applicable taxes in the Bid Price at the time of bid closing, except Harmonized Sales Tax (HST). Include any taxes and duties that are known to apply during the course of the stated construction period.

.4 Allowances:

.1 Bidders must include allowances specified in Section 01 21 00

.2 Allowances do not include Harmonized Sales Tax (HST).

.5 Bonding Requirements (where applicable under Construction Act of Ontario):

.1 Bid Security:

.1 Attach to the Bid Form a bid bond in the amount of 10% of the Bid Price, valid for the full bid acceptance period.
.2 The Bid Security shall be forfeited to the Owner if the successful Bidder fails to enter into a contract or fails to provide a Performance Bond and a Labour & Materials Payment Bond as described in the Contract Documents, within seven (7) days of being so requested by the Owner.
.3 Bid Bonds shall be returned to the unsuccessful Bidders immediately after signing of a Contract with the successful Bidder.
.4 Bid Bond will be returned to the successful Bidder after signing of the Contract and execution and delivery of the required bonds.
.5 Include cost of the Bid Security in the Bid Price.

.2 Consent of Surety:

.1 Attach to the Bid Form a Consent of Surety certifying that the Surety Company will issue in favour of the Owner, at the time of Contract execution, the bonds described in the Contract Documents.
.2 The surety company must be authorized to transact the business of suretyship in the Province where the Place of the Work is located.
.3 Include cost of the consent of surety and the related bonds in the Bid Price.

.3 Performance and Labour & Materials Bond:

.1 Each Bid shall be accompanied by an agreement to bond issued by the same surety company that provides the Bid Bond, undertaking to provide a fifty percent (50%) Performance Bond and a fifty percent (50%) Labour and Material Payment Bond, both to be delivered to the Owner if the Bidder is awarded the Contract.

.6 Workplace Safety and Insurance Board: Submit with the Bid a clearance certificate and Workplace Injury Summary Report from the Workplace Safety and Insurance Board (WSIB).

.7 Undertaking of Insurance: Submit with the Bid a signed “Undertaking of Insurance” on a standard form provided by the insurance company stating their intention to provide insurance to the Bidder in accordance with the insurance requirements of the Contract Documents.

.8 Bid Acceptance Period:

.1 It is understood that in submitting a Bid, each Bidder agrees that his Bid may be subject to acceptance up to thirty (30) days from the date of Bid closing.

.9 List of Subcontractors:

.1 List in the Bid Form, the names of requested Subcontractors whose prices have been included in the Bid Price.

.10 Alternate Prices:

.1 Submit on the Bid Form the extra or credit amount to the Bid Price as per the requested Alternate Prices.

.2 The value of the Alternate Prices are not included in the Bid Price and reflects the net change.

.3 Alternate Prices are to include the work required by all Subcontractors affected by the requested alternative.

.4 Alternate Prices do not include Harmonized Sales Tax (HST).

.11 Hourly Rates:

.1 Submit on the Bid Form, the requested labour rates as outlined in 01 26 00

.2 The labour rates will be used for assessing additions and deletions to the Contract Price as a result of Changes to the Work.

.3 Hourly rates do not include Harmonized Sales Tax (HST).

.12 Unit Prices:

.1 Submit on the Bid Form the requested Unit Prices.

.2 Unit Prices include all mark-ups, as defined in the Contract Documents.

.3 The Unit Prices shall be used for additions and deletions to the Contract Price as a result of Changes to the Work.

.15 Substitutions:

.1 The Bid shall be based upon materials and equipment specified.

.2 Should a Bidder wish to substitute products other than those specified, the Bidder may do so by submitting on the Bid Form Supplement a list of proposed substitutions and consequent changes to the Bid Price should the substitution be approved for use in the Contract.

.3 Difference in cost shall include all work required by all Sub-contractors affected by the substitution.

.4 Substitutions shall fit into the space allocations designed for items indicated in the Contract Documents.

.5 Where two or more manufacturers are listed as acceptable, provide the name of the manufacturer being carried in the Bid Price.

.6 Mechanical and Electrical Sub-contractors shall refer to the Bid Form Supplements and the common work result Sections of the specifications for any additional instructions pertaining to materials and equipment specified and alternates.

.7 Substitution Prices do not include Value Added Taxes.

13 TRADE UNIONS

.1 It is the Contractor's and Subcontractor's responsibility to follow Trade Union requirements to which they are party to.

.2 If conflicts, disputes, pickets or any other disturbances or lost time occurs, the Contractor must take the necessary steps expediently to resolve the matter.

.3 The Owner will not be held liable for any cost of injunctions or lost time.

.4 Contractors that have an "All Trades Agreement" must list Subcontractors on their Bid Form that meet the requirements of this Agreement. Failure to follow this requirement will render the Bid Form informal.

14 CONTRACT EXECUTION

.1 It is the understanding of the Owner that the successful Bidder will enter into a Contract with the Owner within seven (7) days after notification of Contract award.

15 BASIS OF DESIGN / STANDARD OF ACCEPTANCE

.1 Materials, products, and equipment selections specified in the bid and contract documents shall be understood to represent the Basis of Design / Standard of Acceptance. The Basis of Design / Standard of Acceptance describes characteristics including but not limited to the physical dimensions and weight, durability/lifecycle, energy efficiency and technical performance. Contractors and Subcontractors proposing suppliers and manufacturers "As Equal" shall follow the requirements of Section 01 25 00 – Substitution Procedures.

.2 Refer to section 9, Bid Evaluation above, where materials, products and equipment selections are proposed to comply with the "Buy Ontario" Procurement Directive, they must first meet the requirements described in the Basis of Design / Standard of Acceptance. An Ontario-made or Canadian-made selection that does not meet the performance or technical requirements set forth in the specifications will not be considered an approved equal.

16 PROPOSED PROJECT SCHEDULE

.1 Carry out the work of this Contract in accordance with the proposed scheduled start and finish dates listed below.

.1 Proposed Start Date: Construction is expected to commence not before **January 18, 2027**.

.2 Ready-for-Takeover date to be as indicated in Section 01 10 00 – Summary.

17 TESTING, ADJUSTING AND BALANCING

.1 Ensure the Mechanical Subcontract Bid includes the costs for the start-up testing and balancing of the mechanical systems.

END OF SECTION

1 General

1.1 EXISTING RECORD DOCUMENTS

.1 A set of existing drawings is available for review upon request from the office of the Consultant and the Owner.

.2 Existing record documents are made available for general reference purposes only. Neither the Consultant nor the Owner accepts responsibility for the accuracy or currency of the information contained therein. Contract responsible to verify existing conditions at the Place of the Work.

.3 Should conditions at the Place of the Work observed during a pre-bid visit vary substantially from this content, immediately notify Consultant prior to the closing of bids.

1.2 HAZARDOUS BUILDING MATERIAL REPORT

.1 A copy of a report forming part of the Bid Documents is attached as an appendix, and is identified as follows:

.1 Title: Designated Substances and Hazardous Building Materials Assessment, Final Report (Revised), Carl A. Pollock Hall, Building No. 29, 3rd and 4th Floor Refresh WR53073, 200 University Avenue West, Waterloo, Ontario.

.2 Project No.: 10107.227;

.3 Dated: October 30, 2026;

.4 Prepared By: Andy Andriotis
Access Environmental Solutions
775 Lucerne Avenue, Waterloo, Ontario
Phone: 226-989-8082
Email: andy@accessenvironmental.ca

.2 The Owner and Consultant assume no responsibility for any interpretation or deduction that a third party may make from the contents of the report.

.3 The Owner and Consultant assume no responsibility for the scope or accuracy of the information contained in the report.

.4 Direct questions pertaining to the report to the author of the report. Copy Consultant and Owner on all correspondence.

.5 Supplementary Hazardous Building Material Documentation within the proposed building is attached as an Appendix.

.1 The attached documents / file names are listed below:

(1) Environmental Consultant's Specifications November 2026.
(2) 29-Carl A Pollock Hall November 2025
(3) 29-CPH-Designated Substance Hazardous Materials Assessment-Sept 2016
(4) 2021 Asbestos Reassessment
(5) 2022 CPH Assessment Repairs
(6) CPH Asbestos Reassessment- June 2023

(7) CPH Asbestos Reassessment- November 2025
(8) ACM Firespray CPH Corridor 3883
(9) Asbestos Bulk Sample Report - U of W CPH Corridor 3879

1.3 ELECTRONIC FUNDS TRANSFER (EFT) DIRECT DEPOSIT FORM

.1 An EFT Authorization Agreement form is attached as an appendix.

.2 Direct any questions about the form to the Owner.

1.4 FIXED FURNITURE BASIS OF DESIGN DOCUMENTS

.1 A set of preliminary design documents describing the basis of design for two separate fixed furnishings are available for review within the Appendix. These do not encompass the entirety of the FF&E portion of the contract.

.2 The design documents are to be read in conjunction with rest of the contract documents, inclusive of drawings and specifications.

.3 The fixed furniture basis of design documents attached are the following:

.1 Fixed Classroom Tables

(1) Note – These are for the large classroom in Scope 1 [Base Price]
(2) Note – These drawings are missing the accessible table scope. Refer to architectural plans for extent of accessible table requirements.

.2 Evolve Power Beams

(1) Note – These are for the PhD Studio in Scope 4 [Alternate Price 02]

END OF SECTION

SUBMITTED TO: UNIVERSITY OF WATERLOO
200 UNIVERSITY AVENUE WEST
WATERLOO, ON, N2L 3G1

STIPULATED BID PRICE

We, _____

(Registered Company Name)

of, _____

(Registered Address and Postal Code)

Business: Phone Number _____

Fax Number _____

Bid Contact Name _____

Email Address _____

Website _____

having visited the Place of the Work and carefully examined the Bidding Requirements, Contract Forms and Conditions of the Contract, along with Specifications, Drawings and Addenda No's _____ to _____ inclusive for **Carl A. Pollock Hall (CPH) Third and Fourth Floor Renovations, UW WR #53073**

:

We hereby offer to enter into a Contract to perform the Work required by the Bid Documents for the stipulated sum of:

_____

($_____) In Canadian Dollars

which amount includes the specified cash and contingency Allowances, applicable taxes and duties in force at this date, and taxes known to be applicable during the construction period.

Bid Price **excludes** Harmonized Sales Tax. (HST).

Declarations

We hereby declare that:

.1 No person, firm or corporation other than the undersigned has any interest in this Bid or in the proposed Contract for which this Bid is made.

.2 This Bid along with the Bid Form Supplements are irrevocable and open to acceptance for a period of Thirty (30) days from the date of Bid closing.

.3 We agree to perform the work in compliance with the required completion date stated in the Bid Documents.

Bidders shall read and acknowledge all mandatory requirements below:

☐ A Bid Bond or Certified Cheque is attached hereto

☐ An Agreement to Bond is attached hereto, pursuant to The Construction Act of Ontario, Section 85 requiring any contractor who enters into a "public contract" in the amount of $500,000 or greater to provide 50% performance and payment bonds using the prescribed forms:

Form 31 – Labour and Material Payment Bond

Form 32 – Performance Bond

☐ We acknowledge that we will be required to subscribe and attain good standing in the Owner's preferred Contractor Compliance software application prior to award of contract.

The Owner's preferred Contractor Compliance software ISNetworld.com ("ISN") is a dual-subscription model requiring both the Owner and the Contractor(s) to pay fees. It is the Contractor's responsibility to review and understand the subscription terms and conditions.

☐ We declare that all site and office personnel assigned to the project have completed, or will complete prior to the start of construction, the University of Waterloo Safety Orientation module in ISN. A written confirmation shall be required, prior to the start of construction.

☐ We confirm we are **NOT** a U.S. Business, defined by the Ontario Ministry of Public and Business Service Delivery and Procurement, as follows:

"U.S. business" means a supplier, manufacturer, or distributor of any business structure (includes a sole proprietorship, partnership, corporation, or other business structure that:

1. Has its headquarters or main office located in the U.S.*; **AND**
2. Has fewer than 250 full-time employees in Canada at the time of the applicable procurement process.

☐ We confirm this bid submission complies with section 4.4.2 Capital Infrastructure, of the Buy Ontario Procurement Directive (https://www.ontario.ca/page/buy-ontario-procurement-directive) and agree to submit a Domestic Supply Chain Plan that identifies, at a minimum, the source and dollar value of each Major Good and each Service, required for the Work, including those supplied by subcontractors appended to Bid Form – Stipulated Sum (Part 2), Specification Section 00 41 02.

Bid Form, Part 2 is due within 24 hours of Bid Form Part 1 Submission

SIGNATURES

Signed, sealed and submitted for and on behalf of:

Registered Company Name	*Witness*

Signature

Witness

Name

Name

Title

DATED AT _____ this _____ day

of _____, 2026_____.

(Affix Company Seal Hereto)

BREAKDOWN OF BID PRICE

BASE BID – Scope 1 (Large Classroom), Scope 5 (Mid Size Classroom + Study Space) and Misc. corridor work	
Include all work associated with Scope 1 – Large Classroom, Scope 5 – Mid Size Classroom + Study Space, and any misc. corridor work necessary for Scope 1 and 5, complete, as indicated in the Contract Documents.	
Mechanical Bid Price	$
Electrical Bid Price	$
Demolition Including Hazardous Materials Abatement Bid Price	$
All Other Trades, including General Contractors overhead and profit	$
Cash Allowances	$ 64,500
TOTAL BID PRICE (excluding Harmonized Sales Tax)	$

ALTERNATIVE PRICE NO.1 (AP-01) – Scope 2 (undergraduate studio), Scope 3 (Faculty & Student Lounge)	
Add to the Base Bid all work associated with Scope 2 – Undergraduate Studio, and Scope 3 – Faculty Student Lounge, complete, as indicated in the Contract Documents.	
Mechanical Alternative Price No.1	$
Electrical Alternative Price No.1	$
Demolition Including Hazardous Materials Abatement Bid Price	$
All Other Trades, including General Contractors overhead and profit	$
Cash Allowances	$ 52,500
TOTAL ALTERNATIVE PRICE NO.1 (excluding Harmonized Sales Tax)	$

ALTERNATIVE PRICE NO.2 (AP-02) – Scope 4 (PhD Studio)	
Add to the Base Bid all work associated with Scope 4 – PhD Studio, complete, as indicated in the Contract Documents.	
Mechanical Alternative Price No.2	$
Electrical Alternative Price No.2	$
Demolition Including Hazardous Materials Abatement Bid Price	$
All Other Trades, including General Contractors overhead and profit	$
Cash Allowances	$ 15,000
TOTAL ALTERNATIVE PRICE NO.2 (excluding Harmonized Sales Tax)	$

ALTERNATIVE PRICE NO.3 (AP-03 – Corridor Upgrades (3rd Floor)	
Add to the Base Bid all work associated with Corridor Upgrades - 3rd Floor, complete, as indicated in the Contract Documents.	
Mechanical Alternative Price No.3	$

Electrical Alternative Price No.3	$
Demolition Including Hazardous Materials Abatement Bid Price	$
All Other Trades, including General Contractors overhead and profit	$
Cash Allowances	$2,000
TOTAL ALTERNATIVE PRICE NO.3 (excluding Harmonized Sales Tax)	$

ALTERNATIVE PRICE NO.4 (AP-04) – Corridor Upgrades (4th Floor)	
Add to the Base Bid all work associated with Corridor Upgrades - 4th Floor, complete, as indicated in the Contract Documents.	
Mechanical Alternative Price No.4	$
Electrical Alternative Price No.4	$
Demolition Including Hazardous Materials Abatement Bid Price	$
All Other Trades, including General Contractors overhead and profit	$
Cash Allowances	$ 2,000
TOTAL ALTERNATIVE PRICE NO.4 (excluding Harmonized Sales Tax)	$

Interest: 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 at two percent *(2%)* per annum above the bank rate on such unpaid amounts shall also become due and payable until payment. Such interest shall be compounded on a monthly basis. The bank rate shall be the rate established by the Bank of Canada as the minimum rate at which the Bank of Canada makes short term advances to the chartered banks

LIST OF SUBCONTRACTORS

Following is a list of Subcontractors we propose to use for the performance of the identified portions of the Work.

Only one (1) Subcontractor shall be listed for each identified portion of the Work.

Work to be performed by us is indicated by the words "BY OWN FORCES".

We agree that changes to this list will not be allowed without the express written permission of the Owner and a written release from the named Subcontractor.

We acknowledge that Subcontractors on this list may be so notified by the Owner.

Electrical _____

Mechanical _____

Roofing _____

Abatement _____

Demolition _____

Landscaping _____

Cast-in-Place Concrete _____

Masonry _____

Structural Metal Framing _____

Metal Decking _____

Miscellaneous Metals _____

Membrane Roofing & Sheet Metal _____

Joint Sealants _____

H.M. Doors & Frames _____

Aluminium Doors _____

Glass, Glazing & Aluminum _____

Hardware _____

Drywall & Acoustics _____

Resilient and Carpet Flooring _____

Painting & Wall Covering _____

Special Coatings _____

Mechanical Insulation _____

Sheet Metal _____

Testing, Adjusting and Balancing _____

Integrated Automation _____

Fire Suppression _____

ALTERNATE PRICES

The following are our prices for the alternative work listed hereunder. Such alternative work and amounts are **NOT** included in our Bid Price. These prices for the alternative work do not include Harmonized Sales Tax (HST).

Item	Amount to be Added to Bid Price	Amount to be Deducted From Bid Price
Alternative Price No.1 | Scope 2 – Undergraduate Studio and Scope 3 - Faculty & Student Lounge: - ADD to the Base Bid all Work associated with Scope 2 - Undergraduate Studio and Scope 3 - Faculty & Student Lounge, complete, as indicated in the Contract Documents.	$ _____	$ _____
Alternative Price No.2 | Scope 4 - PhD Studio: - ADD to the Base Bid all Work associated with Scope 4 - PhD Studio, complete, as indicated in the Contract Documents.	$ _____	$ _____
Alternative Price No.3 | Corridor Upgrades - 3rd Floor: - ADD to the Base Bid all Work associated with Corridor Upgrades - 3rd Floor, complete, as indicated in the Contract Documents.	$ _____	$ _____
Alternative Price No.4 | Corridor Upgrades - 4th Floor: - ADD to the Base Bid all Work associated with Corridor Upgrades - 4th Floor, complete, as indicated in the Contract Documents.	$ _____	$ _____

PROPOSED SUBSTITUTIONS

The following are our proposed substitutions for the work listed hereunder. Such work and amounts are **NOT** included in our Bid Price. These prices do not include Harmonized Sales Tax (HST).

	Amount to be	Amount to be

Item	**Added to Bid Price**	**Deducted From Bid Price**
	$	$
	$	$
	$	$
	$	$
	$	$

LABOUR RATES

The following labour rates shall be used for additions or deletions to the Contract Price. These labour rates do not include Harmonized Sales Tax (HST).

Description	**Addition to Contract**	**Deletion From Contract**
Superintendent ($/ hr)	$	$
Journeyman Carpenter ($/ hr)	$	$
Labourer ($/ hr)	$	$

The following labour rates shall be used for additions or deletions to the Contract Price by the identified Subcontractors. These labour rates do not include Harmonized Sales Tax (HST).

Description	**Addition to Contract**	**Deletion From Contract**
Journeyman Mechanical Tradesman ($/ hr)	$	$
Journeyman Electrical Tradesman ($/ hr)	$	$

UNIT PRICES

The following are our unit prices, including mark-up, for the units of work listed hereunder. The Unit Prices listed apply to performing the units of work only during the time scheduled for such work in the project schedule. These prices do not include Harmonized Sales Tax (HST).

Unit prices include labour, materials, equipment, permits, and disposal costs necessary to perform the work in accordance with regulatory and specification requirements.

All unit prices are subject to approval by the Client before the work commences. Any unforeseen conditions or deviations from the specified materials must be reported immediately to the Client for further instructions.

For Work involving designated substances, Unit Prices include compliance with the procedures and requirements applicable to the identified material and condition, in accordance with the Owner's Designated Substances Report and applicable abatement specification sections.

Item No.	Description of Work	Unit of Measure	Unit Price (Additions)	Unit Price (Deletions)
1	Remove sprayed fireproofing (friable, < 1 sm/~10 sf) following O. Reg. 278/05 Type 2 operations.	Per square foot (SF)		
2	Remove sprayed fireproofing (friable, > 1 sm/~10 sf) following O. Reg. 278/05 Type 3 operations.	Per square meter (SM)		
3	Remove pipe insulation (friable) following O. Reg. 278/05 Glove Bag operations.	Per linear meter (LM)		
4	Remove pipe insulation (non-friable) following O. Reg. 278/05 Type 2 operations.	Per linear meter (LM)		
5	Remove parging cement fitting insulation (friable) following O. Reg. 278/05 Glove Bag operations.	Per fitting		
6	Remove levelling compound following O. Reg. 278/05 Type 2 operations using power tools equipped with dust collection devices connected to a HEPA filtration system.	Per square meter (SM)		
7	Remove primer off masonry or concrete walls or ceilings following O. Reg. 278/05 Type 2 operations using power tools equipped with dust collection devices connected to a HEPA filtration system.	Per square meter (SM)		
8	Remove suspended ceiling tiles (more than ~8 sm/80 sf or ten 2x4 tiles) following O. Reg. 278/05 Type 2 operations.	Per square meter (SM)		
9	Addition or new acoustic ceiling tile to match existing standard square edge acoustic ceiling tile.	Per square meter (SM)		
10	Addition or Deletion from quantities indicated in the Contract Documents of existing ceiling suspension system including suspension wires, main tees, cross tees, perimeter trim, and accessories, complete.	Per square meter (SM)		
11	Addition of new fire-spray to steel deck, steel joists, steel beams, and steel deck components per specifications.	Per square meter (SM) – Deck Per linear meter		

		(LM) – Joist/Beam		
12	Wall type P1c – 16mm gypsum board on both sides of 92mm studs with insulation x 3.6m wall height	Per linear meter (LM)		

SIGNATURES

Signed, sealed and submitted for and on behalf of:

_____ _____
Registered Company Name *Witness*

_____ _____
Signature *Witness*

_____ _____
Name *Name*

_____
Title

DATED AT _____ this _____ day

of _____, 2026.

(Affix Company Seal Hereto)

DOMESTIC SUPPLY CHAIN

Complete the table below to identify the source and major goods and services required for the project, including those supplied by subcontractors. Indicate whether each item is Ontario Made, Canadian Made (outside Ontario), or from another jurisdiction (elsewhere), whether each service is an Ontario Service or Canadian Service, and indicate the value of said product or service in the respective cell. Include the total value of Base Bid and 4 Alternate Prices in this calculation.

Item Description (Major Good or Service)	Dollar Value (CAD) of Ontario Origin	Dollar Value (CAD) of Canadian Origin	Dollar Value (CAD) of Other Origin
Demolition			

Concrete, Concrete Reinforcements (i.e. rebar, wire mesh) & Metal Decking			
Structural Steel			
Unit Masonry			
Metal & Stainless Steel Fabrications			
Finish Carpentry and Casework			
Applied Fireproofing			
Firestopping and Smoke Seals			
Joint Sealants			
Metal Doors and Frames			
Fire-Rated Glazed Alum. Windows			
Glazing			
Glazing Films			
Floor Preparation			
Gypsum wall-board, tape, compound			
Cold-formed steel stud framing			
Acoustical Panel Ceilings			
Wood Grille Ceilings			
Resilient Flooring			

Carpeting			
Painting			
Visual Display Surfaces			
Demountable Partitions			
Specified FFE			
Electrical distribution equipment			
Electrical conductors, raceways, and wiring devices			
Lighting & and Lighting Controls			
Fire Alarm			
Communication and Auxiliary Systems			
Mechanical piping insulation			
Mechanical plumbing equipment, piping systems and components			
Mechanical plumbing fixtures			
Mechanical HVAC equipment			
Building Automation Equipment			
Mechanical Ductwork			
Mechanical Grilles and Louvers			
Mechanical HVAC accessories and fire suppression			

SUMMARY OF TOTAL VALUES

Ontario-Made Goods & Ontario Services

Canadian-Made Goods & Canadian Services

Elsewhere

1 General

1.1 AGREEMENT BETWEEN OWNER AND CONTRACTOR

.1 CCDC2 - 2020 Stipulated Price Contract, as amended below, and as modified by Section 00 73 00 – Supplementary Conditions, form the basis of Agreement between the Owner and Contractor including Definitions of specific words and terms.

.2 The University of Waterloo (the Owner) will provide two copies of the executed CCDC 2 -2020 contract, ready for signatures by both parties. (Contractor and Owner)

.3 At the time of signing, the successful Contractor shall provide:

.1 Two (2) CCDC 2 – 2020 Copyright Seals (adhesive-backed decal with the copyright message), as required by CCDC to authenticate both copies of the Contract.

.2 The successful Contractor shall include in the Contract Price, the supply of the above mentioned Copyright Seals.

.4 Notwithstanding sentences 1.1.1, 1.1.2, and 1.1.3 above, a CCDC2 2020 contract in the form of a CCDC2 –MA 2016 Master Agreement, complete with a CCDC 2 Work Authorization may alternatively be signed for Contract values less than $250,000.00.

2 Supplementary Agreement Items

2.1 ARTICLE A-5, PAYMENT:

.1 For a Contract value of $100,000.00 and greater, add sentences 5.1.4., and 5.1.5. as follows:

5.1.4. Paragraph 5.1: The holdback will be ten percent (10%), in accordance with applicable Construction Act legislation.

5.1.5. In accordance with Section 00 73 00 – Supplementary Conditions, a separately calculated Deficiency Holdback of two percent (2%) will be applied to each application of payment.

.2 For a Contract value less than $100,000.00 add Sentence 5.1.4. as follows:

5.1.4. 5.1.4. In accordance with Section 00 73 00 – Supplementary Conditions, a separately calculated Deficiency Holdback of two percent (2%) will be applied to each application of payment.

Definitions

.2 Add new Definition for Markup as follows: “Markup means the Contractor's or the Subcontractor's (in case of work being done by the Subcontractor) profit and overhead costs as related to the General Conditions and the Sections of Division 1 of the specification including costs of extension of contract time, office overhead, field supervision, layouts, co-ordination, travelling expenses, and any other direct or indirect costs.”

.3 Add new Definition for Schedules as follows: “Schedules are supplementary details and lists contained within or appended to the Drawings and Specifications."

.4 Add new Definition for Bid Documents as follows: "The Bid Documents shall consist of the Contract Documents, Instructions to Bidders, Available Project Information, Bid Form, and other information issued for the benefit of bidders."

.5 Add new Definition for Toxic or Hazardous Substances as follows: "Toxic or Hazardous Substances means designated substances, as currently defined by applicable statutory and regulatory requirements."

.6 Add new Definition for Make Good as follows: "Make Good means to restore new or existing work after being damaged, cut or patched, or rejected by the Consultant. Use materials identical to the original materials, with visible surfaces matching the appearance of the original surfaces in all details, and with no apparent junctions between new and original surfaces."

END OF SECTION

APPLICATION FOR PAYMENT FORM

To: <Enter Contractor's Name & Address>

Certificate No. **001**

Date:

Project Name:

Attn:

Project No.:

Under the terms of the contract, by and between _____

<Enter Owner's Name> (Owner), and

<Enter Contractor's Name> (Contractor)

By law, the amount certified is subject to reduction by the amount of any lien of which you have received written notice. This certificate is not negotiable and is payable to the payee named in it; issuance, payment and acceptance are without prejudice to any rights of the Owner or Contractor under their contract. The issuance of this certificate for payment shall not be taken as a representation that the Consultant has made the contract price or that the Contractor has discharged the obligations imposed on him by law under the Workers' Compensation Act, or other applicable statutes, non compliance with which may render the Owner personally liable for the Contractor's default.

This is to certify that the value of *Work* performed and *Products* delivered to the *Place of the Work* as of <enter month end date> is $

(exclusive of Value Added Taxes).

Statement of Account

1	Original Contract Amount		$		
2a	Authorized Change Orders to Date	$			
2b	Authorized Change Orders That Affect Contract Value		$		
3	Contract Amount to Date (1 + 2b)		$	$	
4	Total Certified (Including this Certificate)		$		
5a	Statutory Holdback of 10%	$			
5b	Deficiency Holdback of 2%	$			
6	Holdback Previously Released	$			
7	Holdback Released this Draw	$			
8	Balance of Holdback ((5a+5b)-(6 + 7))		$		
9	Total Certified Less Balance of Holdback (4 - 8)		$	$	
10	Less Previously Approved (Item 9 from previous Certificate)		$		
11	Total Payment Recommended This Certificate (9-10)		$		$
12	Value Added Tax at 13% (13% of line 11)				$
13	**TOTAL AMOUNT PAYABLE CURRENT PERIOD INCLUDING VALUE ADDED TAX**				**$**
14	Unpaid Balance Under Contract including Holdback (3 - 9) EXCLUDING VALUE ADDED TAX			$	

The Agreement, Definitions and General Conditions of the Contract (CCDC 2-2020), are hereby amended as follows:

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

Delete Article A-6 and substitute new Article A-6:

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

DEFINITIONS

Add the following definitions:

"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."

"Proper Invoice:

A *Proper Invoice* is an invoice submitted by the *Contractor* to the *Consultant,* on or after ten (10) calendar days following submission by the *Contractor* to the *Consultant* a *Draft Proper Invoice* containing the following information to the extent applicable:

.1 all of the information and documents required of a proper invoice as defined in the *Construction Act*,

.2 an executed CCDC 9A-2018 Statutory Declaration of Progress Payment Distribution by Contractor,

.3 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.";

.4 *Contractor's* invoice number, and HST Registration Number

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

.6 a description, including quantity where appropriate, of the Work performed and Products supplied,

.7 the amount payable for the Work performed, and subtotals detailing approved *Change Orders* to date,

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

.9 a construction schedule prior to the first application for payment, and an updated construction schedule as the Work progresses,

.10 a schedule of values,

.11 backup documentation including a schedule of values to support any cash allowances included in the *Proper Invoice* pursuant to GC 4.1 – CASH ALLOWANCES"

"OHSA:
The *OHSA* means the *Ontario Health and Safety Act* (Ontario)."

"Construction Act:
The *Construction Act* means the *Construction Act* (Ontario)."

GENERAL
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.

GC1.1 CONTRACT DOCUMENTS

1. Add to the end of subparagraph 1.1.6.2
"., 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 13.1.1.*"*

2. Delete paragraphs 1.1.3 and 1.1.4 in their entirety and substitute new paragraphs 1.1.3 and 1.1.4:
"1.1.3 The *Contractor* shall review the *Contract Documents* for the purpose of facilitating and coordination and execution of the *Work* by the *Contractor*. The *Contractor* shall report promptly to the *Consultant* any ambiguity, design issue, error, inconsistency, omission or other matter requiring clarification made known to *Contractor* or that the *Contractor* may discover from such a review. Such review by the *Contractor* shall comply with the standard of care described in paragraph 3.9.1 of the *Contract*.

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

3. Add the following to the end of subparagraph 1.1.6.2:
"Except to the extent the *Consultant* is indemnified as a third party beneficiary as provided in subparagraphs 9.2.7.4 and 9.5.3.4 and in paragraph 13.1.3."

4. Add a new paragraph 1.1.12:
"1.1.12 The *Contractor*, shall include in the *Contract Price*, sufficient copies of the *Contract Documents* to perform the *Work*."

GC 2.2 ROLE OF THE CONSULTANT

1. In paragraph 2.2.3 add the following to the end:
"Without limiting the foregoing, the *Consultant* may appoint one or more authorized representatives in writing who may fulfill the obligations of the *Consultant* under this *Contract*."

2. Add the word "schedules" after the word "techniques" in paragraph 2.2.5.

3. Add to the end of the second sentence of paragraph 2.2.5.; "or to adhere to the construction schedule."

4. Add at the end of paragraph 2.2.8; "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 2.2.6, 2.2.7 and 2.2.8".

5. Add new sentence to end of paragraph 2.2.10; "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."

6. Add the words "which are provided" before the words "in accordance" in paragraph 2.2.13.

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 *Consultant*.

2.4.1.2 The *Contractor* shall prioritize the correction of any defective work which, in the sole discretion of the *Owner*, adversely affects the day-to-day operation of the *Owner*."

GC 3.1 CONTROL OF THE WORK

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

GC3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS

1. Add the following new paragraphs:
"3.2.7 At the commencement of the *Work*, the *Contractor* shall prepare for the review and acceptance of the *Owner* and the *Consultant*, a schedule indicating the times, within the construction schedule referred to in GC 3.4, that items that are specified to be *Owner* purchased and *Contractor* installed or hooked up are required at the site to avoid delaying the progress of the *Work*.

3.2.8 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*.

3.2.9 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.

3.2.10 The *Contractor* shall act as *Constructor* under the OHSA for all *Other Contractors.* The *Owner* shall ensure that its own forces and *Other Contractors* comply with all health and safety precautions and programs established by the Contractor as constructor at the *Place of the Work*."

GC3.4 CONSTRUCTION SCHEDULE

1. Amend paragraph 3.4.1.1 as follows:
"prepare and submit to the *Owner* and the *Consultant* within ten (10) days following award of *Contract*, a construction schedule ....."

GC3.6 SUBCONTRACTORS AND SUPPLIERS

1. Add new paragraph 3.6.7:
"3.6.7 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 *Subcontractors* made by the *Contractor* without proper notification and written approval from the *Owner*, may be considered a breach of the *Contract*."

GC3.7 LABOUR AND PRODUCTS

1. Add new paragraphs 3.7.4 and 3.7.5:
"3.7.4 The *Owner* shall provide the *Contractor* in a timely manner with all relevant information (including storage, protection, and installation requirements) regarding *Products* to be supplied by the *Owner* or *Other Contractors* and, prior to delivery of any such *Products* to the *Place of the Work*, the *Owner* shall obtain the *Contractor's* written approval of the delivery date and proposed storage, protection and installation requirements.
3.7.5 The *Contractor* is responsible for the safe on-site storage of *Products* and their protection (including *Products* supplied by the *Owner* and *Other Contractors* to be installed under the *Contract*) in such ways as to avoid dangerous conditions or contamination to the *Products* or other persons or property and in locations at the *Place of the Work* to the satisfaction of the *Owner* and the *Consultant*. The *Owner* shall provide all relevant information on the *Products* to be supplied by the *Owner*.
3.7.6 Where *Products* supplied by the *Owner* are to be installed under the *Contract*, the *Contractor* shall provide coverage pursuant to CCDC 41 – INSURANCE REQUIREMENTS"

GC 3.8 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 3.8.1, 3.8.2, 3.8.3, 3.8.3.1, 3.8.3.2, 3.8.5, 3.8.6, and 3.8.7.

3. Delete paragraph 3.8.2 in its entirety and replace it with new paragraph 3.8.2 as follows:
“3.8.2 Prior to the first application for payment, the *Contractor* shall prepare a schedule of the dates for submission, review and return of *Shop Drawings* and *Submittals* in an orderly sequence and submit it to the *Consultant* for review.”

4. Delete the last sentence in paragraph 3.8.5,

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

GC 3.9 PERFORMANCE BY CONTRACTOR

1. Add new General Condition 3.9 PERFORMANCE BY THE CONTRACTOR

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

3.9.2 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 direct access to 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."

GC4.1 CASH ALLOWANCES

1. Add the following sentence to the end of 4.1.4:

"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."

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

"4.1.7 At the commencement of the *Work*, the *Contractor* shall prepare for the review and acceptance of the *Owner* and the *Consultant* a schedule indicating the times within the construction schedule referred to in GC 3.4 that items called for under cash allowances are required to be delivered to the *Place of the Work* to avoid delaying the progress of the *Work*."

4. Add new paragraph 4.1.8:

"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. "

GC5.2 APPLICATIONS FOR PAYMENT

1. Add the following at the end of paragraph 5.2.7:

“The *Contractor* shall include in each application for payment, including the application for final payment, all of the documents and information required for a *Proper Invoice*.”

GC5.3 PAYMENT

1. Add the following at the end of paragraph 5.3.1.2:

“; provided that the *Owner* has not delivered to the *Contractor* a notice of non-payment under the *Construction Act*.”

GC5.4 SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK

1. Delete all of paragraph 5.4.2.

2. Add the following at the end of paragraph 5.4.3:

“; provided that the *Owner* has not delivered to the *Contractor* a notice of non-payment of holdback under the *Construction Act*. The *Owner* may deliver a notice of non-payment of

holdback if the *Contractor* has not, within forty (40) days of the date of *Substantial Performance of the Work*, delivered to the *Owner* all documents and information required to be delivered by the *Contractor* under the *Contract Documents*, or rectified all deficiencies, and the *Owner* may retain a reasonable amount to protect itself from such non-delivery or non-performance."

GC5.5 FINAL PAYMENT

1. Amend paragraph 5.5.4 as follows:
   ".... no later than twenty (20) calendar days ....."

GC6.3 CHANGE DIRECTIVES

1. Add new subparagraph 6.3.7.20 as follows:
   ".20 cost of safety measures and requirements."

GC6.4 CONCEALED OR UNKNOWN CONDITIONS

1. Add new subparagraph 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 3.9.1, given the amount of time provided between the issue of the bid documents and the actual closing of bids, the degree of access provided to the *Contractor* prior to submission of bid, and the sufficiency and completeness of the information provided by the *Owner*. The *Contractor* is not entitled to compensation or to an extension of the *Contract Time* for conditions which could reasonably have been ascertained by the *Contractor* by such 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. Add new subparagraph 6.5.6.
   "6.5.6 If the *Contractor* is delayed in the performance of the *Work* by an act or omission of the *Contractor* or anyone employed or engaged by the *Contractor* directly or indirectly, or by any cause within the *Contractor's* control, then the *Contract Time* 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 cost of the *Consultant's* services during the period between the date of *Substantial Performance of the Work* stated in Article A-1 herein as the same may be extended through the provisions of these General Conditions and any later, actual date of *Substantial Performance of the Work* achieved by the *Contractor*. "

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 reasonably 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."

GC8.1 AUTHORITY OF THE CONSULTANT

1. Amend paragraph 8.1.2 as follows:
   ".... and paragraphs 8.3.3 to 8.3.15 of GC8.3 ....."

GC8.2 ADJUDICATION

1. Add a new paragraph 8.2.2 as follows:
   "8.2.2 If a dispute has been commenced on a matter, and an adjudication is commenced in relation to the same or part of the same matter, the original dispute will not be stayed, paused or suspended, and any information provided and the resulting determination may be used in any subsequent proceeding."

GC8.3 NEGOTIATION, MEDIATION, AND ARBITRATION

1. Add the following:
   "8.3.9 Within five (5) days of receipt of the notice of arbitration by the responding party under paragraph 8.3.6 the *Owner* and the *Contractor* shall give the *Consultant* a written notice containing:
   (a) a copy of the notice of arbitration
   (b) a copy of supplementary conditions 8.3.9 to 8.3.15 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.

   8.3.10 The *Owner* and the *Contractor* agree that the *Consultant* may elect, within ten days of receipt of the notice under paragraph 8.3.9, to become a full party to the arbitration under paragraph 8.3.6. if the *Consultant*:
   (a) has a vested or contigent 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 8.3.6, and
   (d) agrees to be bound by the arbitral award made in the arbitration.

   8.3.11 If the *Consultant* is not given the written notice required under paragraph 8.3.9, both the *Owner* and the *Contractor* are estopped from pursuing an action, counter claim or other proceeding or making an application against the *Consultant* arising out of the issues in dispute in the arbitration between the *Owner* and the *Contractor* under paragraph 8.3.6.

   8.3.12 If an election is made under paragraph 8.3.10, the *Consultant* may participate in the appointment of the arbitrator and, notwithstanding the rules referred to in paragraph 8.3.6, the time period for reaching agreement on the appointment of the arbitrator shall begin to run from the date the *Owner* issues or receives a copy of the notice of arbitration.

   8.3.13 The arbitrator in the arbitration in which the *Consultant* has elected under paragraph 8.3.10 to become a full party may:
   (a) on application of the *Owner* or the *Contractor*, determine whether the *Consultant* has satisfied the requirements of paragraph 8.3.10, and;
   (b) make any procedural order considered necessary to facilitate the addition of the *Consultant* as a party to the arbitration.

8.3.14 The provisions of paragraph 8.3.9 shall apply mutatis mutandis to written notice to be given by the *Consultant* to any sub-consultant.

8.3.15 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 8.3.10, and is deemed to be bound by the arbitration proceeding."

GC9.1 PROTECTION OF WORK AND PROPERTY

1. Delete subparagraph 9.1.1.1 in its entirety and substitute new subparagraph 9.1.1.1:
".1 errors in the *Contract Documents* which the *Contractor* could not have discovered applying the standard of care described in paragraph 3.9.1;"

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 reasonably determinable from the *Contract Documents*, or that are reasonably determinable or discoverable from an inspection of the *Place of the Work* exercising the degree of care and skill described in paragraph 3.9.1."

GC 9.2 TOXIC AND HAZARDOUS SUBSTANCES

1. Add to paragraph 9.2.6 after the word "responsible", the following new words:
"or whether any toxic or hazardous substances or materials already at the *Place of the Work* (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the *Contractor* or anyone for whom the *Contractor* is responsible in a manner which does not comply with legal and regulatory requirements, or which threatens human health and safety or the environment, or material damage to the property of the *Owner* or others,"

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

3. Add to paragraph 9.2.8 after the word "responsible", the following new words:
"or that any toxic or hazardous substances or materials already at the *Place of the Work* (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the *Contractor* or anyone for whom the *Contractor* is responsible in a manner which does not comply with legal and regulatory requirements, or which threatens human health and safety or the environment, or material damage to the property of the *Owner* or others,"

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

GC9.4 CONSTRUCTION SAFETY

1. Delete paragraph 9.4.1 and replace it with the following:

"9.4.1 The *Contractor* shall be solely responsible for:

.1 establishing, initiating, maintaining, and supervising all health and safety precautions and programs in connection with the performance of the *Work* in accordance with the *OHSA*;

.2 registering the Notice of Project for the *Project* under the *OHSA*; and

.3 acting as, and carrying out the responsibilities of, *Constructor* under the *OHSA*.

.2 Add following at the end of paragraph 9.4.4:

"If requested by the *Contractor*, the *Owner* shall obtain from each *Other Contractor* performing any work or services at the *Place of the Work* an acknowledgement addressed to the Contractor confirming its agreement to comply with the health and safety precautions and programs of the Contractor."

3. Add following new paragraph 9.4.6:
"9.4.6 The *Contractor* acknowledges and is aware of the *Contractor's* responsibilities under the Occupational Health and Safety Act having jurisdiction in the *Place of the Work* and that such responsibilities have been brought to the *Contractor's* attention by the *Owner*."

GC 9.5 MOULD

1. Add “and the *Consultant*” after “*Owner*” in subparagraph 9.5.2.4.

2. Add “and the *Consultant*” after “*Contractor*” in subparagraph 9.5.3.4.

GC 10.1 TAXES AND DUTIES

1. Replace the word “accordingly” in paragraph 10.1.2 with the following text:
a. “, in accordance with and subject to paragraphs 10.1.3 through 10.1.6 below”

2. Add new paragraphs to GC 10.1 as follows:
“10.1.3 For greater clarity, changes to taxes and duties in paragraph 10.1.2 applies to: (a) any increased or decreased taxes or duties paid by the Contractor to a governmental authority after the effective date of the Contract; (b) any tariff on Products imported into Canada that comes into effect after the time of bid closing and (c) any change to any tariff on Products imported into Canada that exists at the time of bid closing. The Contractor represents that the Contract Price does not include any amount in anticipation of possible changes to taxes and duties (including tariffs) that were not imposed or did not come into effect before the date of the bid closing.

10.1.4 If any change in taxes or duties increases or decreases the costs to the Contractor, the Owner and the Contractor agree to co-operate to determine a reasonable and equitable adjustment to the Contract Price, and where the change increases the costs to the Contractor, act in good faith in considering alternatives and means of mitigating that increase and the subsequent increase in the Contract Price (including purchasing alternative Products or using alternative Subcontractors), so that the parties are, to the greatest extent possible, in no worse economic position in respect of the Contract after the change than before the change. The change to the Contract Price will be limited to the cost of such change and will not include any mark-up on those costs in respect of profit or overhead.

10.1.5 If the costs to the Contractor are increased or decreased as a result of any change in taxes and duties applicable to the Work or Products (including new tariffs, and changes to existing tariffs, on Products imported into Canada), the party proposing an adjustment to the Contract Price pursuant to paragraph 10.1.2 shall proceed in accordance with GC 6.6 – CLAIMS FOR A CHANGE IN CONTRACT PRICE, and provide documents and calculations supporting the amount of the proposed adjustment. The party claiming any increase or a decrease in the Contract Price shall not claim any amount of adjustment that exceeds the amount by which the costs to the Contractor are shown that party to be increased or decreased.

10.1.6 The Contractor shall keep and maintain full and detailed accounts and records of the amount of prices, taxes, duties, and tariffs included in the Contract Price, both before and after the time of bid closing, and of the amount of prices, taxes, duties, and tariffs actually paid by the Contractor in performing and supplying the

Work. If the Owner claims any decrease in the Contract Price as a result of the removal or reduction of any tax, duty, or tariff, then (1) the Contractor shall cooperate with the Owner in verifying the amount of any tax, duty, or tariff that was included in the Contract Price; and (2) the Owner shall be afforded reasonable access to such accounts and records (including as applicable invoices from Subcontractors) relating to such prices, taxes, duties, and tariffs. Where equipment and materials may be subject to taxes, duties and tariffs, such equipment and materials are to be identified as line items in the schedule of values to assist with evaluating changes in the cost of the Work."

GC 10.2 LAWS, NOTICES, PERMITS, AND FEES

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

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 3.9.1, the…"

GC13.1 INDEMNIFICATION

3. Add new paragraph 13.1.7 as follows:

"13.1.7 The *Contractor* shall indemnify and hold harmless the *Consultant*, its agents and employees from and against all claims, demands, losses, costs, damages, actions, suits, or proceedings by third parties that arise out of, or are attributable to the *Contractor's* performance of the *Contract*, provided such claims are:

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

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

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

4. Add "and the *Consultant*" after the words "hold harmless the other" in paragraph 13.1.1.

5. Add the words "13.1.7," after the word "paragraphs" in paragraph 13.1.3.

END OF SECTION

1 General

1.1 INSTRUCTIONS

.1 Comply with Instructions to Bidders, the General Conditions of the Contract, Supplementary Conditions and the General Requirements of Division 1.

1.2 SECTION INCLUDES

.1 Provide for all requirements related to setting out, co-ordination, administration, general construction, safety and protection of the work, workmen, Owner's personnel and the public, the ongoing and final cleaning, and any other work specified or indicated on the drawings.

1.3 NOTICE OF PROJECT

.1 Submit to the Ministry of Labour a Notice of Project indicating the Project's start date.

1.4 BUILDING LAYOUT AND COMPLIANCE SURVEYS

.1 Arrange and pay for services of an Ontario Land Surveyor to establish property lines, erect a benchmark relating to nearest geodetic bench mark and stake principal corners of the new building.

.2 Foundation Verification: Arrange and pay for services of an Ontario Land Surveyor to certify that building foundations are located in accordance with the Contract Documents. File certification with the Building Department and the Consultant immediately after the foundations are completed.

.3 Site Compliance Survey: Arrange and pay for the services of an Ontario Land Surveyor to verify all final site elevations of all graded areas, landscaped areas and asphalt areas. The results of this survey must be submitted to the Consultant for review before any topsoil or asphalt surfaces are applied.

1.5 GRADES, LINES & LEVELS

.1 Verify grades, lines and levels indicated on the Drawings, particularly with relation to road and sidewalk elevations, with the Consultant at the time of laying out the building.

.2 Make spot checks of grades shown and report any variation from the Contract Documents.

1.6 BATTER BOARDS

.1 Erect, maintain and protect against damage strongly constructed batter boards, with adequate and uniform off-set, to determine precisely all main walls of the building.

.2 Construct batter boards of new lumber with rigid supports.

.3 Erect and maintain additional lines and elevation stakes at correct locations for the guidance of various trades.

1.7 PROJECT MEETINGS

.1 Schedule and hold pre-construction, progress and pre-installation meetings throughout construction of work.

.2 Pre-Construction Meeting

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

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

.3 Contractor's representative will chair the meeting and record and distribute the minutes.

.4 Agenda will include following:

(1) Appointment of official representatives of Owner, Contractor, Subcontractors, Consultant, and sub consultants.
(2) Project communications.
(3) Contract Documents for construction purposes.
(4) Documents at the site.
(5) Contractor's use of premises.
(6) Owner-supplied Products.
(7) Work restrictions.
(8) Cash allowances.
(9) Substitution procedures.
(10) Contract modification procedures.
(11) Payment procedures.
(12) Construction progress meetings.
(13) Construction progress schedule, including long lead time items.
(14) Submittals schedule and procedures.
(15) Quality requirements, including testing and inspection procedures.
(16) Contractor's mobilization.
(17) Temporary utilities.
(18) Existing utility services.
(19) Construction facilities.
(20) Temporary barriers and enclosures
(21) Temporary controls.
(22) Site safety.
(23) Site security.
(24) Cleaning and waste management.
(25) Closeout procedures and submittals.
(26) Other items.

.3 Progress Meetings

.1 Schedule and administer bi-weekly progress meetings until Substantial Performance of the Work.

.2 Make physical arrangements, prepare agenda, and distribute notice of each meeting to participants, and to Consultant a minimum of three working days in advance of meeting date.

.3 The Contractor shall preside at meetings, record minutes, and distribute copies to participants and to entities affected by decisions at meetings within 3 working days.

.4 Locations of meetings: Project site office or other acceptable location. Meetings may be held virtually if agreed upon by all parties.

.5 Minimum Agenda:

(1) Approval of minutes of previous meetings.
(2) Review of work progress.
(3) Field observations, problems and decisions.
(4) Identification of problems which impede planned progress.
(5) Review of Submittal Schedule and status of submittals.
(6) Review of off-site fabrication and delivery schedules.
(7) Maintenance of Progress Schedule.
(8) Corrective measures to regain projected schedules.
(9) Planned progress during succeeding work period.
(10) Co-ordination of projected progress.
(11) Maintenance of quality and work standards.
(12) Effect of proposed changes on Progress Schedule and co-ordination.
(13) Other business relating to the work.

.4 Pre-installation Meetings

.1 Where required by the specifications or when deemed appropriate by the Contractor, hold pre-installation meetings with members of relevant trades involved to discuss installation of specific building products or elements.

.5 Coordination Meetings with Other Contractors

.1 From time to time, and as directed by Owner, attend and participate in coordination meetings dealing with interfacing between other contractors and Contractor.

.6 Attendance at Meetings

.1 Contractor, job superintendent, Subcontractors, and Suppliers as appropriate to agenda, and authorized to act on behalf of the entity each represents; Owner, Consultant, professional consultants and others may attend as appropriate.

1.8 PARKING

.1 Comply with local parking regulations.

.2 No parking will be allowed at the Place of the Work unless approved by Owner.

1.9 SITE ACCESS AND TRAFFIC CONTROL

.1 Reference Section 01 55 26.

.2 Consult with authority having jurisdiction in establishing public thoroughfares to be used for site access haul routes.

.3 Coordinate and comply with local authorities regarding necessary diversion of roads or sidewalks (if applicable).

.4 Do not stack materials or supplies on existing roads or sidewalks.

.5 Maintain access roads in good condition.

.6 Protect permanent site improvements to remain such as curbs, pavement and utilities.

.7 Maintain access for fire-fighting equipment and access to fire hydrants.

1.10 SECURITY

.1 Protect and secure site, building, materials and equipment from theft, vandalism and unauthorized entry.

1.11 PROTECTION OF INSTALLED WORK

.1 Refer to various sections of Specifications for specific requirements regarding protection of installed materials.

.2 Provide protective coverings at walls, projections, corners and jambs, sills and soffits of openings in and adjacent to traffic areas.

.3 Protect finished floors and stairs from dirt, wear and damage.

.4 Waterproofed and Roofed Surfaces

.1 Restrict traffic to waterproofed and roofed surfaces and restrict material storage on these surfaces.

.2 When traffic or material storage is unavoidable, follow recommendations for protection of surfaces from manufacturer of roofing or waterproofing material.

.3 Keep waterproofed and roofed surfaces free of debris at all times.

.4 Protect pre-finished work, including windows, louvers, finish hardware and doors from damage by mortar, paint, wallboard compounds and other construction materials and operations.

.5 Replace or make good, to the satisfaction of the Consultant, any building surface or installed material damaged prior to acceptance by the Owner and/or due to failure to provide suitable protection.

1.12 FIRE PROTECTION

.1 Provide and maintain, in good operating condition, adequate fire protection equipment suitable for fire hazards involved at convenient accessible locations during construction.

.2 Avoid accumulations of combustible forms, form lumber and debris within building and vicinity.

.3 Flammable Liquids

.1 Store flammable or volatile liquids in open air or in small detached structures or trailers.

.2 Closely supervise storage of paint materials and other combustible finishing and cleaning products.

.3 Do not store oily rags in closets or other tight spaces.

.4 Comply with recommendations regarding fire protection made by representatives of insurance company carrying insurance on the work or by local fire chief or fire marshal.

.5 Prohibit smoking in vicinity of hazardous operations.

1.13 SALVAGED MATERIAL

.1 Remove salvaged materials from site unless otherwise specified.

1.14 ALTERATIONS TO EXISTING WORK

.1 Where materials are to be removed for re-use or where existing finishes are to be cut out and later made good, employ qualified tradesmen skilled in the handling of each particular material. Make good to match existing adjoining construction.

.2 Make good damage to the existing building or contents due to construction work.

.3 New work in existing building shall conform to requirements of applicable trade sections.

.4 Make certain that all services affected by work are cut off and are properly capped or diverted.

.5 Do not interrupt services to or within the existing building without prior consultation with Owner.

1.15 CONSTRUCTION SAFETY

.1 The Contractor shall be liable for any costs, fines, penalties, etc., levied against the Owner or Consultant due to violations of the Construction Safety Act by construction personnel.

.2 Pursuant to the latest amendments to Ontario's Occupational Health and Safety Act, include the cost of management and non-management representatives to attend Safety Committee meetings as often as required by legislation.

1.16 SAFETY STATEMENT AND PROGRAM

.1 Post a Safety Policy Statement at the Place of the Work and submit a copy of the safety program to the Consultant.

1.17 WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM

.1 Ensure all workers are trained in WHMIS. Submit proof of training if requested by the Consultant.

.2 Arrange for a complete set of material safety data sheets (MSDS) to be available at the Place of the Work for all Products being used in the Work.

1.18 SUBSTANTIAL PERFORMANCE OF THE WORK

.1 Refer to GC 5.4 - Substantial Performance of the Work.

.2 Substantial Performance of the Work is required for Owner occupancy before July 6, 2028.

.3 Should delays occur, neither the Owner nor Consultant shall be held responsible for Contractor claims. It is the intent that the Contractor will expeditiously complete the Work, providing whatever temporary facilities, utilities and controls are necessary to keep the Work on schedule.

.4 Should the issuance of the Building Permit by the local authority having jurisdiction, for whatever reason delay the commencement of the Work, no delay claim will be entertained by the Consultant.

END OF SECTION

1 General

1.1 INSTRUCTIONS

.1 Comply with Instructions to Bidders, the General Conditions of the Contract, Supplementary Conditions and the General Requirements of Division 1.

1.2 SECTION INCLUDES

.1 Contractor's use of the Place of the Work.

1.3 INTENT

.1 The Owner has arranged for easements for construction, storage and access as shown in the Contract Documents.

.2 Make arrangements with property owners if additional areas are required. Obtain written agreements and submit copies to the Owner.

1.4 WORK AREAS

.1 Confine operations within easements for construction, storage and access as shown in the Contract Documents.

.2 Install and maintain snow fencing along working and storage areas and access routes.

.3 Do not enter upon or occupy with men, tools or materials any lands other than public streets, roadways, rights-of-way or easements indicated in the Contract Documents except after written consent has been received from property owner and a copy submitted to the Owner. Any rentals or damages paid for occupying private lands shall be at the Contractor's expense.

.4 Provide the Owner with letters from owners of adjacent property stating that the reinstatement work carried out by the Contractor was satisfactory, in any case where damage has been caused to private property or work carried out on it. A similar letter is required from the owner of utilities damaged during construction.

1.5 COORDINATION WITH OWNER

.1 Coordinate performance and sequencing of the Work with the Owner, notify the Owner two (2) weeks in advance of any interruption of building services or interruption of occupied circulation routes present in the building. Do not interrupt building services without Owner’s written permission

1.6 NOISE GENERATING OPERATIONS

.1 Notify Owner in advance of all noise-generating activities which may disrupt normal building operations.

.2 Noise generating operations are strictly prohibited during student exam times. No such operations will be allowed without the express permission of the Owner during these times. Coordinate with Owner to avoid conflicts.

1.7 HOURS OF WORK

.1 Regular business hours of 8:00 a.m. to 4:30 p.m. Monday to Friday

.2 Where required by sequencing of the work or where building service shutdowns require, portions of the work may be required to be performed outside of normal business hours, or on weekends at no additional cost to the Owner.

1.8 CRANING OPERATIONS

.1 Notify Owner in advance of all craning operations. Submit detailed crane plan and proposed schedule a minimum of four (4) weeks in advance of work.

.2 Crane plan should include:

.1 Setup location of crane and access route

.2 Which buildings (if any) will be under the path of the crane

.3 Make and model of the crane with associated weights

.3 All craning operations are to be scheduled on weekends or holidays with no additional cost to the Owner.

.4 Flagmen and barriers around the direct lifting area will be provided at no additional cost to the Owner.

1.9 CONTRACTOR PARKING

.1 Comply with local parking regulations

.2 No parking will be permitted in fire routes.

.3 No parking will be allowed at the Place of the Work unless approved by Owner.

.4 Contractors will be required to pay for parking. Costs to be included within General Conditions. Identify as a separate line item on the Schedule of Values.

.5 Contractor parking within hoarding will be limited to 2 authorized vehicles unless otherwise approved by ODR.

.6 Hoarding and temporary storage that are located within revenue generating parking spaces will also be charged at the regular daily rate.

.7 Any damage as the result of Contractor vehicles or hoarding will be the responsibility of the Contractor to repair at no cost to the Owner.

.8 Contractor will be responsible for any fines issued by Parking Services or external agencies

.9 Refer to website for parking rates and more details: https://uwaterloo.ca/parking/ and https://uwaterloo.ca/sustainable-transportation/contractors

END OF SECTION

1 General

1.1 INSTRUCTIONS

.1 Comply with Instructions to Bidders, the General Conditions of the Contract, Supplementary Conditions, and the General Requirements of Division 1.

1.2 SECTION INCLUDES

.1 Cash allowances.

.2 Contingency allowance.

1.3 CASH ALLOWANCES

.1 Refer to GC 4.1 - CASH ALLOWANCES.

.2 Cash allowances, unless otherwise specified, cover net cost to Contractor of services, products, construction machinery and equipment, freight, handling, unloading, storage installation and other authorized expenses incurred in performing Work.

.3 Contract Price, and not cash allowance, includes Contractor's overhead and profit in connection with such cash allowance.

.4 Expenditures from cash allowance stipulated sum shall be directed by Consultant in writing.

.5 Contract Price will be adjusted by written order to provide for excess or deficit to each cash allowance.

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

.7 Include progress payments on accounts of work authorized under cash allowances in Consultant's monthly certificate of payment.

.8 Prepare schedule jointly with Consultant and Contractor to show when items called for under cash allowances must be authorized by Consultant for ordering purposes so that progress of Work will not be delayed.

.9 The Owner and Consultant reserves the right to reallocate cash allowance values from one category to another at their discretion without additional cost to Owner.

.10 The following cash allowances are included in the Contractor Price:

.1 **Cash Allowance No. 1**: Installation of Owner-Supplied AV Equipment, to include but not limited to: projectors, projector screens, cameras, TV's, podiums. Equipment has been located on the contract documents, follow wiring requirements described elsewhere in project specifications.

(1) Amount of Cash Allowance for Base Scope: **$52,000**
(2) Amount of Cash Allowance for Alternate Price 01: **$4,000**
(3) Amount of Cash Allowance for Alternate Price 02: **$8,000**

.2 **Cash Allowance No. 2**: Expanded Structural Repair Scope that may be required following invasive demolition of existing fireproofing spray located beneath a roof leak in the Scope 2 ceiling.

(1) Amount of Cash Allowance for Alternate Price 01: **$40,000.00**

.3 **Cash Allowance No. 3:** Cash Allowance for services of independent inspection and testing agencies to perform inspections, field testing, materials testing, and reporting as required by the Contract Documents and as directed by the Consultant.

(1) Amount of Cash Allowance for Base Scope: **$12,500**
(2) Amount of Cash Allowance for Alternate Price 01: **$8,500**
(3) Amount of Cash Allowance for Alternate Price 02: **$7,000**
(4) Amount of Cash Allowance for Alternate Price 03: **$2,000**
(5) Amount of Cash Allowance for Alternate Price 04: **$2,000**

END OF SECTION

1 General

1.1 INSTRUCTIONS

.1 Comply with Instructions to Bidders, the General Conditions of the Contract, Supplementary Conditions and the General Requirements of Division 01.

1.2 SECTION INCLUDES

.1 Substitution procedures.

1.3 GENERAL

.1 Submit specified documentation for substitution requests.

.2 Substitution requests must be approved by Consultant and Owner before making submittals.

1.4 SUBSTITUTION PROPOSALS

.1 Substitution proposals will only be considered by the Consultant if it is shown that the substitution is proposed for one of the following reasons:

.1 Directly related to an "equivalent to" clause or similar language in Contract Documents.

.2 Specified product or method cannot be provided within Contract Time.

.3 Specified materials cannot receive approval of local governing authority.

.4 Substitute material will offer Owner substantial advantages in terms of cost, time, energy conservation or other consideration.

.5 Specified materials cannot be properly coordinated with other materials in Work.

.6 Specified product or material cannot provide warranty required by Contract Documents.

.7 Specified product or material cannot meet performance requirements specified.

.2 Substitution proposals will not be considered if proposed for one of the following reasons:

.1 Contractor or Subcontractor has neglected to place an order for materials and labour early enough to conform to construction schedule.

(1) Such failure or neglect is not grounds for extension of Contract Time under this Contract; nor will arbitrary substitutions be considered solely to expedite completion.

.2 Revision of Contract Documents is required to accommodate substitute product.

.3 Substitutions are indicated on Shop Drawing, Product Data or Sample submittals without separate formal request.

.4 Substitutions are requested directly by Subcontractor or supplier, without formal request from Contractor.

.3 Substitute proposals submitted for consideration on any one Contract element shall be limited to maximum of two with not more than one substitute proposal submittal from any one manufacturer. If two separate substitution proposals are made for a single material and are rejected, provide specified item without further delay.

.4 Substitutions for major building elements must be submitted for consideration within 90 days of Contract execution. Proposals for substitutions of major building elements after that time will not be considered.

.5 Consultant will be the judge of equality or superiority for proposed substitutions. Do not purchase or install proposed substitute products without written acceptance of Consultant. Allow minimum of 15 Working Days for Consultant's review of substitution proposals.

1.5 SUBSTITUTION REQUEST SUBMITTALS

.1 Submit separate request for each substitute proposal, supported by complete data, with drawings and samples as appropriate, including:

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

.2 Reason(s) for proposing the Substitution.

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

.4 Product samples as applicable.

.5 Itemized comparison of qualities of proposed substitution with product specified, showing proof of equality or superiority, substantiating compliance with Contract Documents, and including product identification and description, performance and test data, references and samples, where requested or applicable.

.6 Changes required in other elements of Work due to substitution.

.7 Effect on construction schedule and Contract Time.

.8 Change in cost, if any, and amount of net change to Contract Price.

.9 Availability of maintenance service, and source of replacement materials, where applicable.

.10 Identification of any consequential changes in the Work to accommodate the Substitution and any consequential effects on the performance of the Work as a whole. A later claim for an increase to the Contract Price or Contract Time for other changes in the Work attributable to the Substitution will not be considered.

.2 Furnish additional information for substitute proposals upon request. If decision on use of substitute cannot be made or obtained within a reasonable time, use product specified.

1.6 INSTALLATION OF SUBSTITUTE PRODUCTS OR MATERIALS

.1 When an accepted substitute, or "equivalent to" item of equipment or material, requires changes or additions to Project, make adjustments and changes required to coordinate Work for installation without additional cost to Owner.

1.7 CHANGES DUE TO SUBSTITUTIONS

.1 Any additional cost, loss or damage arising from substitutions are Contractor's responsibility, notwithstanding approval or acceptance of such substitution by Owner or Consultant, unless such substitution was made at written request or direction by the Owner or Consultant.

.2 Modifications to Contract Price Due to Substitutions:

.1 Owner will receive full credit for cost differential between specified item and proposed substitution.

.2 Substitution proposals that increase Contract Price will be rejected, unless proposed substitution was made at written request or direction by the Owner or Consultant.

END OF SECTION

1 GENERAL

1.1 REQUESTS FOR INTERPRETATION/INFORMATION (RFI)

.1 Refer to Section 01 26 13.

1.2 SCHEDULE OF LABOUR RATES

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

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

.1 preparing price quotations for Change Orders, and

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

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

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

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

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

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

1.3 SCHEDULE OF EQUIPMENT RATES

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

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

.1 preparing price quotations for Change Orders, and

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

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

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

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

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

1.4 VALUATION OF CHANGES BASED ON AGREED UNIT PRICES

.1 The Consultant may, at the outset of the Contract or at any other time, request the Contractor to submit unit prices anticipated to be required in valuing changes in the Work.

.2 The Contractor shall submit such unit prices promptly upon request.

.3 The unit prices shall be valid for a specified duration.

.4 The unit prices shall include all fees for overhead and profit and shall be subject to the percentage fees specified in Section 00 21 13 under Markups for Extra Work.

.5 The Consultant will evaluate the Contractor's quoted unit prices and, if accepted by the Owner in writing, the agreed unit prices shall be used to value subsequent proposed changes in the Work wherever they are applicable.

1.5 METHOD OF CONTRACT PRICE ADJUSTMENT - CHANGE ORDERS

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

If unit prices included in the stipulated price contract are applicable to the proposed change, the adjustment of the Contract Price shall be based on those unit prices, to the extent they apply.

1.6 CHANGE ORDER PROCEDURES

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

.1 Submit to the Consultant a fixed price quotation for the proposed change in the Work within 5 days after receipt of the proposed change in the Work.

.2 Include in the quotation a detailed breakdown of the quoted price, including the following to the extent applicable, with appropriate supporting documentation:

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

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

.3 Estimated Construction Equipment costs.

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

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

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

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

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

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

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

1.7 FEES FOR OVERHEAD AND PROFIT – CHANGE ORDERS

.1 Where the Contractor's price quotation for a Change Order results in a net increase to the Contract Price, the Contractor's entitlement to a fee for overhead and profit in the quotation shall be as specified in Section 00 21 13 under Markups for Extra Work.

.2 Where a Subcontractor's price quotation for a Change Order results in a net increase to the Subcontractor's contract price, the Subcontractor's entitlement to a fee for overhead and profit in the quotation shall be as specified in Section 00 21 13 under Markups for Extra Work.

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

1.8 METHOD OF CONTRACT PRICE ADJUSTMENT - CHANGE DIRECTIVES

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

1.9 CHANGE DIRECTIVE PROCEDURES

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

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

1.10 FEES FOR OVERHEAD AND PROFIT – CHANGE DIRECTIVES

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

.1 For work performed by the Contractor's own forces, 10% of the Contractor's net increase in costs.

For work performed by a Subcontractor, 5% of the sum of the Subcontractor's net increase in costs plus the Subcontractor's fee.

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

.1 For work performed by the Subcontractor's own forces, 10% of the Subcontractor's net increase in costs.

.2 For work performed by a Sub-subcontractor, 5% of the sum of the Sub-subcontractor's net increase in costs plus the Sub-subcontractor's fee.

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

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

1.11 SUPPLEMENTAL INSTRUCTIONS

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

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

END OF SECTION

1 GENERAL

1.1 REQUESTS FOR INTERPRETATION/INFORMATION (RFI)

.1 The Contractor shall review the Contract Documents and shall report promptly to the Consultant any error, inconsistency or omission the Contractor may discover.

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

.3 RFI is a formal process used during the Work to obtain information from Consultant with regards to Contract Documents.

.4 RFI does not constitute notice of claim for a delay.

.5 Submittal procedure:

.1 Submit RFI on form including the following information:

.1 Request for Information No.:

.2 Posted Date:

.3 Initiated Date:

.4 Date Required:

.5 Originated By:

.6 Specification Section:

.7 Drawing/Detail No.:

.8 Subject:

.9 Description/Question: (required)

.2 Submit necessary supporting information with RFI form.

.3 RFI Log:

.1 Maintain tracking log of RFIs sent to and responses received from Consultant complete with corresponding dates.

.6 Submit RFIs sufficiently in advance of affected parts of the Work so not to cause a delay in the Work. Any costs resulting from failure to do this will not be paid by Owner.

.7 Submit RFIs to Consultant only.

.8 Submit RFIs from Contractor only, RFIs submitted by subcontractors or suppliers will not be accepted.

.9 Number RFIs consecutively in 1 sequence in order submitted.

.10 Submit one RFI per RFI form.

.11 Allow 5 Working Days for review of RFI from time of Consultant's receipt of RFI to time of Consultant's return to Contractor. When the RFI submittal is received by the Consultant before 12:00:00pm, review period will begin that day. If it is received after 12:00:00pm the review period will begin the next Working Day.

.1 Contractor will establish a steady flow of RFIs for review and avoid accumulation of an excessive quantity of RFIs in a single submission. If, at any time, the Contractor submits a large enough number of RFIs such that the Consultant cannot process these RFIs within 5 Working Days, the Consultant, will confer with the Contractor within 1 Working Day of receipt of such RFIs, and the Consultant and the Contractor will jointly prepare an estimate of the time necessary for processing same as well as an order of priority between the RFIs submitted. The Contractor shall accommodate such necessary time at no increase in the Contract Time and at no additional cost to the Owner.

.12 Consultant's response is not considered a Change Order or Change Directive, nor does it authorize changes in the Contract Price or Contract Time or changes in the Work.

.13 Thoroughly review the Contract Documents to satisfy a claim, dispute or other matters in question relating to performance of the Work or interpretation of Contract Documents that cannot be resolved by direct reference to Contract Documents. Describe in detail this review on RFI form as part of RFI submission. RFIs lacking such detailed review description or where the detail provided is in opinion of Consultant insufficient, Consultant will not review RFI and reject it.

END OF SECTION

1 General

1.1 INSTRUCTIONS

.1 Comply with Instructions to Bidders, the General Conditions of the Contract, Supplementary Conditions and the General Requirements of Division 1.

1.2 SECTION INCLUDES

.1 Procedures for progress payments and final payments under the Contract.

.2 Proper Invoice definition

.3 Allowable mark-ups on changes.

1.3 APPLICATIONS FOR PAYMENT

.1 Refer to GC 5.2 – APPLICATIONS FOR PROGRESS PAYMENTS

1.4 SUBMISSION REQUIREMENTS

.1 The contractor is required to enroll in the University of Waterloo electronic fund transfer (EFT) system for all payment. **Refer to Appendices for enrollment forms.**

.2 Proper invoice submissions will be submitted electronically (via email) to the Owner's designated representative (ODR).

.3 Proper invoice submission is to be completed on a monthly basis at the beginning of each month.

.4 Submissions of proper invoices cannot fall on or within one calendar day of recognized statutory holidays including the University of Waterloo winter holiday break shutdown period.

1.5 PROPER INVOICE DEFINITION

.1 Proper Invoice means an application for payment containing the information that is required for the application for payment to constitute a "proper invoice" under the Construction Act and this Contract, including the following:

1. all of the information specified to be included in a proper invoice as set out in the Construction Act, namely:

    1. the Contractor's name and address;
    2. the date of the application for payment and the period during which the Work was performed;
    3. information identifying the authority, whether in the Contract or otherwise, under which the Work was performed;
    4. a description, including quantity where appropriate, of the Work performed and Products supplied;
    5. the amount payable for the Work performed, and the payment terms; and
    6. the name, title, telephone number and mailing address of the person to whom payment is to be sent;

2. the Contractor's HST Registration Number;

3. an original statutory declaration [in the form of CCDC 9A (most current version)], for all second and subsequent progress payments and holdback release (applies on all projects greater than $100,000.00);

4. a completed Schedule of Values, formatted in accordance with the Owner's required template;

5. an up to date construction schedule (applies for the first draw)

6. satisfactory evidence of good standing under the Workplace Safety and Insurance Act, 1997, as evidenced by a Certificate of Clearance issued by the Workplace Safety and Insurance Board prior to the release of any monthly progress payment;

7. any certificates, inspection reports, or data resulting from commissioning and testing required under the Contract Documents confirming the satisfactory completion of such commissioning and testing for completed portions of the Work; and

1.6 HOLDBACK RELEASE

.1 In addition to the requirements in Section 1.5, proof of publication is required for application of holdback release.

1.7 ALLOWABLE MARKUPS ON CHANGES

.1 For extra work added to the Contract, the Contractor and Subcontractors are entitled to a total markup for overhead and profit of 10% on work carried out by their own forces and 5% on work carried out by their Subcontractors.

.2 The proper interpretation of application of this markup shall be at the discretion of the Consultant.

.3 Contractors and Subcontractors who subcontract work out to separate companies who are considered by the Consultant to be under the same "corporate umbrella" will be eligible for only a single markup on extra work.

END OF SECTION

1.1 SUMMARY

.1 This Section specifies Contractor's responsibilities for preparation and submission of schedules and other documentation related to tracking construction progress.

.2 The purpose of submitting progress schedules is to:

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

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

1.2 CONSTRUCTION PROGRESS SCHEDULE

.1 Definitions

.1 Activity: An element of Work performed during course of Project. An activity normally has an expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart). A graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Derive Bar Chart from a commercially available computerized project management system.

.3 Baseline: Original approved plan (for Project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five-day workweek and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.1 Show separate sub-schedules as part of Bar (GANTT) Chart submission for noise generating work, deliveries, and paint and carpet applications at existing facilities.

.2 Where any portion of the Work is required/ requested to be execute in part outside the times indicated above, submit revised Schedule indicating times and duration to complete that Work.

.5 Duration: Number of work periods (not including holidays or other nonworking periods) required to complete an activity or other Project element. Usually expressed as workdays or workweeks.

.6 Master Plan: A summary-level schedule that identifies major activities and key milestones.

.7 Milestone: A significant event in Project, usually completion of major deliverable.

.8 Project Schedule: Refer to Section 01 10 00 – Summary of Work: Construction Progress Schedule.

.1 Project Schedule: The planned dates for performing activities and the planned dates for meeting milestones. A dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.2 Requirements

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and period.

.3 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

.3 Format and Content:

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

.2 Provide a work breakdown structure identifying key activities, work packages, and major milestones, including long delivery Products, inspection and testing activities, preparation and review of mock-ups, delivery of Owner supplied Products if any, Owner performed work if any, demonstration and training activities, and similar items, at a sufficient level of detail to effectively manage construction progress.

.3 Indicate milestone date for Ready-for-Takeover and Substantial Performance of the Work.

.4 Action and Informational Submittals

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit to Owner and Consultant within 15 working days of Award of Contract, Bar (GANTT) Chart as Master Plan for planning, monitoring, and reporting of project progress.

.3 Submit schedule via email as .pdf files.

.4 Consultant will review format and content of initial schedule and request necessary changes, if any, within 10 Working Days after receipt.

.5 Master Plan

.1 Structure schedule to allow orderly planning, organizing, and execution of Work as Bar Chart (GANTT).

.2 Consultant will review and return revised schedules within 5 working days.

.3 Revise impractical schedule and resubmit within 5 working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

.5 Submit updated progress schedule monthly to Owner and Consultant, indicating actual and projected start and finish dates with report date line and progress, activity relationships, critical path, float, and baseline comparison to current progress.

.6 Project Schedule

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows, with additional breakdowns of each if requested by Consultant:

.1 Award.

.2 Milestones.

.3 Phases.

.4 Nosie generating work.

.5 Deliveries.

.6 Painting and carpeting at existing facilities.

.7 Shop Drawings, Samples.

.8 Permits.
.9 Mobilization.
.10 Hazardous materials abatement.
.11 Selective Interior Demolition.
.12 Interior Architecture (Walls, Floors, and Ceiling).
.13 Plumbing.
.14 Lighting.
.15 Electrical.
.16 Piping.
.17 Controls.
.18 Heating, Ventilating, and Air Conditioning.
.19 Millwork.
.20 Fire Systems.
.21 VOC flush-out at Substantial Performance (air quality).
.22 Testing and Commissioning.
.23 Long delivery items.
.24 Owner-supplied / Contractor-installed equipment – schedule.
.25 Other items not mentioned above, forming part of the Work.

.7 Project Schedule Reporting

.1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.
.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays, and impact with possible mitigation.

.8 Project Meetings

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide solutions to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
.2 Weather related delays with their remedial measures will be discussed and negotiated.

1.3 SUBMITTALS SCHEDULE

.1 Format and Content:

.1 Prepare schedule identifying all required Shop Drawing, Product data, and sample submissions, including samples required for testing and including those for Owner supplied Products.
.2 Prepare schedule in electronic format.
.3 Provide a separate line for each required submittal, organized by Specifications section names and numbers, and further broken down by individual Products and systems as required.
.4 For each required submittal, show planned earliest date for initial submittal, earliest date for return of reviewed submittal by Consultant, and latest date for return of reviewed submittal without causing delay.

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

.2 Submission:

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

.2 Submit schedule via email as .pdf files.

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

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

.5 Submit updated submittals schedule monthly to Owner and Consultant.

1.4 SCHEDULE MANAGEMENT

.1 A schedule submitted as specified and accepted by Consultant shall become the baseline schedule. The Contractor shall only revise the baseline schedule with the approval of the Owner.

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

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

1.5 RECORDING ACTUAL SITE CONDITIONS ON AS-BUILT DRAWINGS

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

.1 A copy of the original contract drawings are available at the Consultant’s office.

.1 At an extra cost to the Contractor of $5/sheet.

.2 Contact Ruslan Ivanytskyy for Limitation of Liability Agreement.

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

.3 Record actual construction including:

.1 Measured locations of existing walls to remain and existing openings within those walls.

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

.3 Field changes of dimension and detail.

.4 Changes made by Change Orders and Supplemental Instructions

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

.4 Carefully record location of concealed elements required for maintenance, alteration work and building additions.

.5 Eradicate obsolete information.

.6 Conversion of Schematic Layouts:

.1 Drawings indicate mechanical and electrical conduits, circuits, piping, ducts and other similar items, in schematic form and do not indicate precise physical layout.

.2 Indicate on As-Built Drawings, by accurate dimension, centerline of each run for relevant items.

.3 Clearly identify items by accurate note such as "cast-iron drain", "galv. water pipe" or "return air duct".

.4 Indicate by symbol or note, vertical locations of items such as "under slab", "in ceiling plenum" or "exposed".

.5 Identify elements and locations with description that can be related reliably to Contract Documents.

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

.8 The Contractor must submit all as-builts (hard copy as well as AutoCAD and PDF format on a USB flash drive and via email) prior to the release of any holdback payments.

.9 Date entries with proper reference to the appropriate Change Order or approval number. Call attention to the entry by a "cloud" around the area or areas affected.

END OF SECTION

1.1 ADMINISTRATIVE

.1 Submit to Consultant submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

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

.3 Present shop drawings, product data, samples, and mock-ups in units used on Drawings. Where items or information is not produced in such units, converted values are acceptable.

.4 Review submittals prior to submission to Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated, and identified as to specific project will be returned without being examined and considered rejected.

.5 Notify Consultant, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.6 Verify field measurements and affected adjacent Work are coordinated.

.7 Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review of submittals.

.8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant review.

.9 Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 The term ‘shop drawings’ means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.3 Review Time:

- .1 Allow not less than ten working days for processing and review of any one submittal except as noted below, and except when processing must be delayed for coordination with subsequent submittals. Consultant will advise Contractor promptly of such delay.
  - .1 Allow an additional five working days for processing and review of submittals specified in Divisions 05, 09, 21, 22, 23, 25, 26, 27, and 28.
  - .2 Identify those submittals for which review is necessary urgently.
  - .3 Allow 4 weeks after submission of all samples in Division 09, for the Consultant to select finishes and prepare a colour schedule.
- .2 Review period begins on date of receipt of submittal by Consultant and extends to mailing date of return to Contractor.

.4 Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

.5 Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of revisions other than those requested.

.6 Accompany submissions with transmittal letter, in duplicate, containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.7 Submissions include:

- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.

.8 Action Following Consultant’s Review: Process submittals according to notations placed on them by Consultant.

- .1 Reviewed:
  - .1 Proceed with fabrication, purchase, or both, of items in submittal, subject to the minor revisions or clarifications if any, included in the Consultant’s review.
- .2 Reviewed as Modified:
  - .1 Proceed with fabrication, purchase, or both, only after the original drawing has been corrected. Mechanical and Electrical Contractors to include corrected drawings in Maintenance and Operating Manuals.

.3 Resubmit:

.1 Submission is rejected, therefore fabrication and work indicated cannot proceed.

.2 Correct submission and resubmit.

.4 Not Reviewed:

.1 Submission was not reviewed for one of the following reasons

.1 Completed submittal cover page was not provided.

.2 Contractor's stamp was not found on submission.

.3 In the Consultant's opinion, review was not necessary.

.9 Limitations of Consultant's Review:

.1 Consultant's review is not a complete check, but only review of general methods of construction and detailing, subject to limitations and requirements set forth in GC 3.10.5.

.2 Consultant's review does not authorize changes in Contract Amount or Contract Time unless so stated in a separate Proposed Change or Change Directive.

.3 If the Contractor feels the shop drawing have changed the Contract Price or Contract Time, he must notify the Consultant within 7 working days from date of Consultant's transmittal otherwise it will be assumed no change in Contract Price or Contract Time will be considered.

.4 Review of shop drawings is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean that the reviewer approves the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of his responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the Place of the Work, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of the Work.

.10 After the Consultant's review of a submittal or resubmittal, changes will not be considered unless accompanied by an explanation acceptable to the Consultant concerning reason substitution is necessary.

.11 After Consultant's review, distribute copies.

.12 Submit 1 electronic (pdf) copy of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.

.13 Submit 1 electronic (pdf) copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.

.14 Submit 1 electronic (pdf) copy of test reports for requirements requested in specification Sections and as requested by Consultant.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within 3 years of date of contract award for project.

.15 Submit 1 electronic (pdf) copy of certificates for requirements requested in specification Sections and as requested by Consultant.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.16 Submit 1 electronic (pdf) copy of manufacturer's instructions for requirements requested in specification Sections and as requested by Consultant.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.17 Submit 1 electronic (pdf) copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Consultant.

.1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.18 Submit 1 electronic (pdf) copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Consultant.

.19 Delete information not applicable to project.

.20 Supplement standard information to provide details applicable to project.

.21 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, copies and/or pdf will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.3 CONTRACTOR'S REVIEW OF SUBMITTALS

.1 Prior to transmitting submittal, review and approve submittal, and affix Contractor's signature and stamp to submittal cover page.

.2 Consultant will not review submittals that do not bear the Contractor's signature and in the case of mechanical and electrical, the Subcontractors' stamp and signature also. If it appears a review has not taken place, the submittal will be returned to the Contractor not reviewed.

.3 By signing and submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents that he has approved, determined and verified dimensions, quantities, field dimensions, relations to existing work, coordination with work to be installed later, coordination with information on previously accepted Shop Drawings, Product Data, Samples, or similar submittals and verification of compliance with requirements of Contract Documents.

.4 In reviewing Shop Drawings, Product Data, Samples, and similar submittals, the Consultant shall be entitled to rely upon Contractor's representation that information in submittals is correct and accurate.

.5 Submittals that are returned or rejected because of insufficient Contractor review or coordination will not be justification for a claim for extension of time.

1.4 INTEFERENCE DRAWINGS

.1 Prepare drawings indicating relationship of new and existing and unforeseen conditions prior to commencement of the Work in those areas.

.2 Before installation, prepare drawings showing relationships of ductwork, conduit, piping, sprinklers, ceiling supports and framing, communication and specialized equipment located within ceiling and shaft spaces.

.3 Indicate locations of visible items such as air handling outlets, light fixtures, smoke detectors, sprinkler heads, communication grilles and access panels occurring at these locations.

.4 Ensure interference drawings are initialed by a responsible person of each Subcontractor involved along with Contractor's signature and submitted to Consultant for review and record purposes

1.5 SAMPLES

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Consultant's business address.

.3 Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

.6 Make changes in samples which Consultant may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.6 MOCK-UPS

.1 Mock-ups, where required, are included in the individual technical sections.

.2 Erect mock-ups in accordance with 01 40 00 - Quality Requirements.

1.7 PHOTOGRAPHS: DIGITAL FORMAT

.1 Progress Photographs:

.1 Sizes: minimum 24 mega pixel image file size, jpeg image file.

.2 Format: a folder shall be created by the Consultant on their FTP website for uploading .jpg images. Access information shall be provided.

.3 Viewpoints: A minimum of four (4) photographs from three (3) different viewpoints will be required for each project scope area.

.4 Number of photo sets: one (1) set per month.

.5 Identification: referenced to photo file with name, location, purpose, and number of project and date of exposure.

.6 Viewpoints: interior and exterior locations: viewpoints determined by Consultant.

.7 Frequency: at beginning and completion of demolition, framing, and services before concealment and at completion of each discrete phase of construction.

1.8 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workplace Safety and Insurance Board status.

.2 Submit transcription of insurance immediately after award of Contract.

END OF SECTION

CONTRACTOR'S SHOP DRAWING REVIEW

SPECIFICATION SECTION NO.: _____

SECTION TITLE: _____

PROJECT LOCATION: _____

PROJECT NUMBER: _____

The affected trade contractor (fabricator/installer) and supplier(s) shall perform no portion of the Work requiring submittal and review of Shop Drawings and other submittals until the respective submittal has been reviewed by the Consultant and approved by the General Contractor.

By signing below as approved, the Contractor hereby certifies that he has reviewed the submittal in accordance with the Contract, Supplementary Conditions, and Section 01 33 00 of the Project Manual and has checked and coordinated the information contained therein with related work and has reported any errors, inconsistencies, or omissions to the Owner and the Consultant.

The Consultant's review of these submittals shall neither relieve the Contractor or affected trade contractor and supplier(s) from the responsibility to comply with the requirements of the Contract Documents nor approve any Work not complying therewith. Shop drawings and submittals are not Contract Documents and do not modify Contract Documents. The Contractor and the affected trade contractor and suppliers shall be responsible for the accuracy of measurements, elevations, line and grades of the Work.

SUBMITTAL:

Shop drawings from fabricator/installer dated:

_____.

(check the appropriate submittal and fill in date on shop drawings)

❑	Reviewed	❑	Revise and resubmit
❑	Reviewed as modified	❑	Rejected

If comments are required, attach a separate sheet.

Approved by Contractor:

Firm Name: _____

Signed by: _____ Date: _____

Return one copy to the Owner, one copy to the Consultant, and one copy each to the affected trade contractor and supplier(s).

END OF FORM

1.1 SUMMARY

.1 The requirements of this section are in general conformance with recommended '*Professional Engineering Practice',* published by Professional Engineers Ontario (PEO) with regards to duties of professionals appointed during construction period by *Contractor*.

.2 Delegated Design Submittals shall account for professional engineering responsibility for design, review and acceptance of components of Work forming a part of permanent Work in accordance with the Ontario Building Code (OBC) and that has been assigned to a design entity other than *Consultant* including, but not limited to, the following:

.1 Design requiring structural analysis of load bearing components and connections.

.2 Design requiring compliance with fire safety regulations.

.3 Design requiring compliance with life or health safety regulations.

.3 Delegated Design Submittals are not required for components of Work requiring engineering for temporary Work (e.g., crane hoisting, engineered lifts, falsework, shoring, concrete formwork, etc.) that would normally form a part of *Contractor*'s scope of Work.

.4 The requirements of this Section do not diminish responsibilities of *Consultant*'s role as registered professional of record; submittals will be used by *Consultant* to establish that Work is substantially performed in accordance with the OBC.

.5 The delegated design engineer must be a Professional Engineer (P.Eng.) licensed to practice in the jurisdiction of the Place of the Work and must provide proof of professional liability insurance in the form of a Certificate of Insurance, which must be maintained as recommended by Professional Engineers Ontario.

.6 Provide submittals for Delegated Design services or certifications by a professional engineer (P.Eng.), whose signature and seal shall appear on all drawings, calculations, specifications, certifications, *Shop Drawings*, field review reports and other submittals prepared by them.

.7 *Shop Drawings* and other submittals related to the Work, designed or certified by the professional responsible for the Delegated Design, if prepared by others, shall bear the relevant professional's written approval and signature when submitted.

.8 The *Consultant* will review Delegated Design submittals only for the limited purpose of checking for conformance with information given and the general design concept expressed in the *Contract Documents*.

.9 Where the supply and installation of a guardrail system is called for, include for all elements, including but not necessarily limited to structural steel, metal fabrications, glazing – if part of system, clips, fasteners, panels, and the engineering design of the complete assembly considered as a whole, including connections to structure, and submit *Shop Drawings* showing same. Such *Shop Drawings* to be sealed by a professional engineer experienced in such work and licensed to practice in the jurisdiction of the Place of the Work.

.10 Where glass is likely to be subjected to human impact it shall comply with applicable safety glass and OBC requirements, including design to withstand lateral guard loads where the glass in question is not protected by stand-alone guards. Include for all support steel, miscellaneous metals, glazing, clips, curtain wall or window frame, fasteners, panels, engineering of complete assembly and submission of *Shop Drawings* showing same. Such *Shop Drawings* to be sealed by a professional engineer experienced in such work and licensed to practice in the jurisdiction of the *Place of the Work*.

1.2 DELEGATED DESIGN

.1 Performance and Design Criteria: Provide products and systems complying with specific performance and design criteria indicated where professional design services or certifications by a design professional are specifically required of *Contractor* by *Contract Documents*.

.2 If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to *Consultant*.

.3 Where OBC requirements pertain to an assembly, then that entire assembly and all of its components must be designed to meet the OBC, with the assembly design bearing the seal and signature of the delegated design professional engineer (P.Eng.).

.4 Delegated design will be required for elements designed by a specialty professional, loads as determined in accordance with the OBC, which may include but are not necessarily limited to the following:

.1 Elements that require specialized fabrication equipment or a proprietary fabrication process not usually available at job site (e.g., suspension systems, wall brackets, etc.).

.2 Elements requiring engineering not normally part of scope of services performed by *Consultant*.

.3 Elements identified in the Specifications or Drawings as requiring engineered shop drawings.

.4 Section 04 22 00 – Unit Masonry: reinforcements, lintels and connections to structure

.5 Section 05 50 00 - Metal Fabrications

.6 Section 05 70 15 - Stainless Steel Fabrications

.7 Section 08 51 13.13 – Fire-Rated Glazed Aluminum Windows:

.8 Section 08 80 50 - Glazing

.9 Section 09 21 16 – Gypsum Board Assemblies including suspended ceilings and fire rated assemblies

.10 Section 10 22 19 – Demountable Partitions: bracing and anchorage.

1.3 LETTER OF COMMITMENT

.1 Submit a signed and sealed ‘Letter of Commitment’ on company letterhead addressed to *Consultant* in accordance with format in ‘Appendix A’ attached to the end of this Section prior to starting Work requiring design and seal of a professional engineer.

1.4 LETTER OF COMPLIANCE

.1 Submit a signed and sealed ‘Letter of Compliance’ on company letterhead addressed to *Consultant* in accordance with format in ‘Appendix B’ attached to the end of this Section on completion of Work requiring design and seal of a professional engineer.

1.5 IMPLEMENTATION

.1 Include summary of Work described in relevant technical specification section as a part of the required ‘Letter of Commitment’.

.2 Prepare required submittals and present to *Consultant* within sufficient time to allow for *Consultant*’s detailed review and acceptance.

END OF SECTION

APPENDIX A

LETTER OF COMMITMENT

Submit a signed and sealed letter of commitment on company letterhead in the form as follows:

[Date]

[Consultant]
[Consultant's Address]

Attention: [Consultant's Registered Professional of Record]

Re: Letter of Commitment for Delegated Design of [System of Component of Work]
University of Waterloo – Carl A. Pollock Hall (CPH)
Third and Fourth Floor Renovations
Project Number: 2024-0711-10
U of W WR # 53073
[Date of applicable tender package]

As the retained registered professional engineer for design and field review of the above named component of Work and project, I hereby give assurance I am qualified to perform the following Work as required by Contract Documents:

1. [List appropriate design services for System or Component of Work];
2. Preparation of shop and erection documents;
3. Review fabrication of [structural] [fire rated] [life and health safety] components;
4. Review erection of [structural] [fire rated] [life and health safety] components.
5. [Modify list to suit System of Component of Work.]

I hereby give assurance that I will be responsible for above noted Work as described in Section [?????] – [Name of Section] of Project Manual, including requirements of addenda, change orders and change directives.

I also undertake to be responsible for field review of fabrication and erection of [structural] [fire rated] [life and health safety] components as required to ascertain substantial compliance with the Ontario Building Code and Contract Documents.

I will notify you in writing if my responsibility is terminated at any time during the course of Work covered by this Letter of Commitment.

Retained Professional Engineer

_____
Signature

_____
Date

(Apply seal)

APPENDIX B

LETTER OF COMPLIANCE

[Date]

[Consultant]
[Consultant's Address]

Attention: [Consultant's Registered Professional of Record]

Re: Letter of Compliance for Delegated Design of [System of Component of Work]
University of Waterloo – Carl A. Pollock Hall (CPH)
Third and Fourth Floor Renovations
Project Number: 2024-0711-10
U of W WR # 53073
[Date of applicable tender package]

I hereby give assurance that I have fulfilled my obligations for field review as outlined by previously submitted Letter of Commitment.

I hereby give assurance that aspects of [structural] [life and health safety] Work as defined by previously submitted Letter of Commitment substantially comply with Contract Documents and Building Code.

Retained Professional Engineer

_____
Signature

_____
Date

(Apply seal)

1 General

1.1 INSTRUCTIONS

.1 Comply with Instructions to Bidders, the General Conditions of the Contract, Supplementary Conditions and the General Requirements of Division 01.

1.2 SECTION INCLUDES

.1 Owner safety requirements.

1.3 GENERAL

.1 Reserved

1.4 SUMMARY

.1 The control of Project Safety by the Contractor is an essential element in completing the Work at the University of Waterloo. The Contractor shall, at all times, provide adequate resources, equipment, training, and documentation to assure a safe work environment at the Project site and to instill a culture for safety in the behavior of all supervisors and workers. Every worker shall understand that safety and health issues always take precedence over all other considerations, and that identifying, reporting, and correcting unsafe acts and conditions are the responsibility of everyone at the Project site.

.2 The details of this document should be considered as supplemental requirements. The Contractor shall develop, implement, maintain, and submit to the Owner a written Project Safety Program that meets or exceeds all Federal, Provincial, and Local standards and regulations pertaining to construction activities. The Contractor/Subcontractor shall comply with the rules and guidelines outlined in this Section. In any circumstances where this Section differs with or conflicts with any standard or statutory requirement, the more stringent requirement shall apply. With expressed written permission from the Owner's Designated Representative, Contractors may use procedures set forth in their own company-wide safety program in lieu of the Owner's Safety Requirements provided it meets or exceeds the requirements described herein.

.3 The Owner reserves the right to have any manager, supervisor or worker employed by the Contractor or Subcontractor removed from the Project for disregard of Owner Safety Requirements.

.4 The Owner reserves the right to evaluate the Contractors performance and remove Contractors and/or Subcontractors from the approved or qualified bidder's list for future work at the University as a result of the Contractor's, or any Subcontractor's, disregard for Owner Safety Requirements.

.5 The Contractor shall subscribe to the Owner's preferred Contractor Compliance software "ISN".

.1 The Owner's preferred Contractor Compliance software is a dual-subscription model requiring both the Owner and the Contractor(s) to pay fees. It is the Contractor's responsibility to review and understand the subscription terms and conditions prior to submitting bids.

.2 All contractors are required to have a Company Grade of "B" or better on ISN.

.3 https://www.isnetworld.com/en/

1.5 DEFINITIONS

.1 The term “Owner’s Designated Representative” (“ODR”) as used throughout this Section, shall refer to any of the University of Waterloo Plant Operations representative(s), or campus representative(s).

.1 The assigned personnel performing the duties of ODR will be confirmed at or prior to the Project start-up meeting.

.2 The term “Contractor” for the purposes of this Section shall refer to any Contractor providing services to complete the Work and shall include Prime Contractor, General Contractor, SubContractor, Construction Manager, or Design/Build Contractor. The term “Contractor” shall be considered synonymous with “Constructor” for the purposes of Ministry of Labour regulations and construction contract obligations.

.3 The term “Subcontractor” shall refer to any on-site Subcontractor, regardless of tier or contractual relationship to the Project.

.4 The abbreviation MOL shall be understood as “Ministry of Labour”, in the Province of Ontario.

.5 The abbreviation OHSA shall be understood as “Occupational Health and Safety Act”.

.6 The abbreviation PPE shall be understood as “Personal Protective Equipment”.

1.6 EMERGENCY / IMPORTANT CONTACT INFORMATION

.1 Consult with the ODR regarding the correct emergency contact information for the facility in which you are working. Each facility may have a different emergency call procedure.

.2 All Work shall occur within normal operating hours of the University unless expressly permitted by the ODR on the specific project. For Work occurring outside of normal hours, verify the after-hours emergency contact information.

PART 2 - PRODUCTS

2.1 RESERVED

PART 3 - EXECUTION

3.1 DESIGNATED SUBSTANCES

1. Designated substances as defined under Ontario Regulation 490/09, include: Acrylonitrile, Arsenic, Asbestos, Benzene, Coke oven emissions, Ethylene oxide, Isocyanates, Lead, Mercury, Silica, Vinyl chloride.

2. The Owner will provide all available Designated Substance (dSub) Reports including annual Assessments, Reassessments and Project Specific dSub Reports where available. Contractors must review all Designated Substance Assessments, Reassessments and Asbestos Management documents prior to the start of the Work to understand the areas where designated substances are confirmed, suspected and where further project specific testing may be required to safely manage designated substances, including Asbestos Containing Materials (ACM) during construction.

3. All suspect materials shall be considered asbestos-containing material until confirmed otherwise by an Owner approved Environmental Consultant. Testing shall be coordinated by the ODR prior to active demolition.

4. Any Contractor needing to disturb suspected designated substances including asbestos containing building materials shall first contact their ODR. It is then the responsibility of the ODR to coordinate review with the University Safety Office, project specific Environmental Consultant and project specific Abatement Subcontractors to confirm the presence of Asbestos Containing Materials and designated substances.

    1. Where Contract documents do not specifically identify Type 1, Type 2, or Type 3 operations for project specific abatement, the ODR shall coordinate with the University Safety Office and project specific Environmental Consultant to issue a site instruction to define the type of operation.

5. Contractors shall complete Owner provided orientation for working with and managing designated substances within University of Waterloo buildings and property.

6. Silica: As noted above, silica is a designated substance. Construction activities that generate airborne silica-containing dust shall be conducted taking all reasonable precautions to protect the health and safety of the Contractor(s) and persons including University staff, students outside the limits of the Project site.

    1. The Owner is required to determine if silica is present on a Project. Contractors shall understand that all projects that mechanically disturb concrete or masonry in any way including; demolition, grinding, coring, cutting or chipping will generate airborne silica-containing dust.

    2. Reasonable precautions for controlling the silica hazard shall include: engineering controls, work practices, hygiene practices, and use of PPE.

    3. The Contractor is responsible for ensuring all Contractors and Workers have the appropriate training in accordance with recommendations available through the Ontario Ministry of Labour.

    4. Refer also to http://govdocs.ourontario.ca/node/8250 to review the latest edition of:
        a. Guideline – Silica on Construction Projects

3.2 CONDUCT

1. The use or consumption of alcoholic beverages or controlled substances is strictly prohibited on any University owned or controlled property.

2. Contractor shall not permit any person to operate a motor vehicle or heavy equipment while taking prescription or non-prescription medication that may impair their ability to operate safely.

3. The University prohibits smoking:

    1. In any building, bus shelter for other enclosed area;

    2. In University owned or operated vehicles;

    3. Within campus property;

    4. On or within 20 meters of sports playing fields, surfaces and spectator areas;

5. On or within 20 meters of children's playgrounds;

6. On restaurant and bar patios.

7. Refer to the University's latest published policy for clarifications: https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-29

4. Contractor personnel shall be courteous to all students, faculty, staff, visitors and any other persons part of the University campus community.

5. Unacceptable behavior on the part of the workers anywhere on campus, including parking lots, the project site, routes through the site or through the campus, may lead to the identifiable Contractors being removed from the Project.

6. Language by Contractors must be constructed in a professional manner at all times. Use of foul and/or inappropriate language will not be tolerated and can result in Contractor removal from jobsite.

7. No clothing, accessories, or hardhat stickers that display offensive, derogatory or inflammatory wording or graphics shall be worn on the worksite.

8. Radios that require the use of headphones shall not be permitted on the Project. Personnel must be able to hear alarms and warnings in the immediate area. (This does not pertain to the use of two-way hand held communication equipment or phones).

9. No tools or equipment will be loaned by Owner to Contractors to assist them in completing Projects.

3.3 CONFINED SPACES

1. Contractors shall notify the Owner (ODR) if they determine the Work to be within confined spaces as defined within the applicable regulations.

2. Contractors are responsible for ensuring all of their workers are trained in accordance with Ontario Ministry of Labour confined space entry procedures.

3. It will be the responsibility of the Contractor performing the work inside the confined space to provide the necessary equipment to assess the hazards within the space and prepare the space for entry and to meet the precautions of the entry permit.

4. Contractor shall provide all emergency rescue equipment and personnel as required by the applicable regulations.

3.4 CONSTRUCTION SAFETY SITE INSPECTIONS

1. All construction sites will be subject to periodic inspections by the ODR including the University Safety Office representative(s). The inspector(s) will be looking for life safety, environmental, construction safety, and indoor air quality deficiencies. Once noted, the inspector will notify the Contractor Representative on site.

2. All noted deficiencies shall be immediately corrected.

3. A job or activity will be suspended if an imminent danger to University staff, students, animals, visitors, Contractor personnel or facilities is observed.

3.5 CONTRACTOR INJURIES AND INCIDENTS

1. Contractors shall make prior provisions for the treatment of minor injuries.
2. Workers requiring immediate medical treatment should be taken to the nearest hospital.
3. The Contractor shall immediately notify the ODR of any incident. All “near miss” incidents, First Aid injuries, High Severity Safety Inspection Observations, and other such incidents as directed by the Owner shall be documented. All incidents shall be investigated. Contractor and involved Subcontractors shall discover all obtainable and measurable information and reach conclusions that cite both the contributing factors and the root cause(s). Contractor shall lead the efforts and follow a structured incident investigation program (Root Cause Analyst or equivalent). Contractor and involved Subcontractors shall tailor the magnitude and depth of the investigation effort to correspond to the potential, rather than the actual, outcome of the incident
4. A copy of the incident / accident report must be provided in a timely manner to your ODR and the University Safety Office.
5. All incidents that result in property damage must be reported to your ODR.

3.6 CONTRACTOR SAFETY ORIENTATION

1. All Contractors are required to complete University of Waterloo Orientation Training given by the Safety Office before beginning work at the University. This training may be in the form of videos or an in- class presentation. Videos may be available within the aforementioned Contractor Compliance software application.
2. Upon completion of orientation the Contractor is required to obtain a University hardhat sticker.
3. The Contractor may be required to attend orientation again for refresher, and review any changes if deemed necessary by the Owner.
4. It is the responsibility of the Contractor to ensure that the information given in the orientation session is understood by all workers.
5. Refer to Designated Substances under this Section for additional references to Training.

3.7 ELECTRICAL SAFETY

1. Refer to this Section for Lock Out / Tag Out requirements.
2. Contractors shall follow the latest edition of CSA-Z462 Workplace Electrical Safety standard as a minimum.
    1. Consult ODR/ESA for any temporary/construction power service connection and obtain approval prior to energization.
    2. PPE shall be required for all persons interacting with equipment in a manner that could cause an electrical arc. Report to ODR if Arc Flash/Shock Hazard warning label is not present.
3. All electrical power tools, equipment and extension cords shall be inspected daily before use. Defective items shall be immediately removed from service for repair or replacement.

4. Power provided by any Emergency Generator System shall not be used by Contractor personnel unless expressly permitted by ODR.

5. Temporary power panels shall have GFI protected circuits built into the panel.

6. The GFI shall be tested for function before plugging in any Contractor equipment.

7. Electrical power tools shall be grounded, or double insulated, or battery powered. The cord on the tool must be free of defects.

8. Battery powered portable hand tool battery charging stations are not to be plugged into hallway or exit stair outlets or other areas that may create a trip hazard.

9. Extension cord sets shall be the “heavy duty” three-wire grounded type (14 gauge or larger), and must be rated for the particular application in which it is to be used.

10. Damage to the cord jacket shall not be taped over and must be repaired per manufacturer’s recommendations.

11. Extension cords shall be routed overhead whenever possible or otherwise protected against damage or tripping hazard by being securely taped to the floor or secured by other acceptable means and approved by the ODR.

12. Running/hanging extension cords through ceiling spaces is not permitted. Special permission from the ODR and University Safety Office is required for any variation from this requirement.

13. All electrical shutdowns must be coordinated through the ODR for the specific Project with support from the University Plant Operations Maintenance department. Any such request shall be made a minimum of 2 weeks in advance of preferred shutdown date(s).

14. Contractors are not permitted to turn on/off any electrical source breakers or switches without permission from the ODR. This will be accomplished through a Utility Shutdown Memorandum coordinated by the ODR.

15. Existing and new electrical equipment must be protected at all times from humidity, liquid material splashes, activities inducing to vapor formation and condensation.

16. No liquid materials shall be handled in electrical rooms, electrical equipment areas or areas adjacent to electrical equipment locations.

17. In the event that the Contractor must handle liquid materials in the vicinity of electrical equipment locations, the Contractor must inform the Owner and seek written approval, prior to bringing those liquid materials to the above-mentioned locations.

3.8 EXCAVATIONS

1. All excavation shall have the following prerequisites:

    1. Discussion with the appropriate ODR and University personnel to review as-built locations of all underground utilities in the vicinity;

    2. Contractor is responsible to arrange for and coordinate utility “locates” in accordance with the Project schedule requirements.

    3. All excavations must follow the applicable Canadian Occupational Health and Safety

Standards and guidelines as related to design and protection of excavations. Where required, Contractor will be responsible to obtain engineered drawings stamped by Specialty Engineer licensed at place of Work.

4. Contractor shall formally issue a “Notice of Trench” where required by OHSA.
5. All trench excavations should be backfilled or plated at the end of each shift.
6. When an excavation cannot be backfilled or plated in the same day it is created, a highly visible engineered barricade / guard shall be erected. Excavation protections in areas of traffic must comply with local, provincial, or federal safety standards.
7. Work near the edge of an excavation is considered “Working at Heights” and the applicable best practices shall be followed under the applicable regulations. Refer to this Section for additional references to Working at Heights.
8. Means of access into excavations shall be removed or physically barricaded at the end of each workday.
9. Excavations and protection plans must be approved by the ODR and University Safety Office.
10. Where applicable, all required engineer stamped excavation plans must be readily available at all excavations for review by the ODR. Certificates of soil testing shall also be made available.

3.9 FALL PROTECTION AND PREVENTION (Working at Heights)

1. Work in areas that presents a fall hazard defined under the relevant Working at Heights legislation shall be protected by an engineered guardrail system or otherwise be managed by substitution, administration or engineering controls.
2. The Contractor shall ensure that all workers Working at Heights have been properly equipped with personal protective equipment by their employer and trained by a Ministry of Labour approved training provider.
3. No worker or equipment shall be allowed to perform work directly above another worker unless adequate overhead protection is provided.
4. Covers or guardrails of sufficient design shall be placed over holes, roof and floor openings or drop-offs to eliminate fall hazards wherever possible.
5. Covers or guardrails shall be physically secured and clearly marked with warning message, such as “Danger”, “Hole”, or “Cover! Do Not Remove”.
6. If a cover is too small for a warning message, it shall be painted bright orange or red.
7. All puncture and impalement exposures shall be covered or eliminated as soon as they are created. Exposed ends of rebar are to be covered with material that is designed to prevent impalement from a fall of four (4) feet.
8. Where tower cranes are employed in performing the Work, a physical barrier shall be provided around the base of the crane to prevent unauthorized access to the crane itself.

3.10 FIRE PREVENTION

1. All combustible materials shall only be stored in approved areas as designated by the ODR.

2. University of Waterloo is subject to fines by the Fire Department in the cities of Waterloo, Kitchener, Cambridge, and Stratford if they are found to negligently activate fire alarm devices. Contractors shall be back-charged for such fines.

3. For large or high dust generating work, the Contractor shall coordinate with their ODR to arrange for the replacement of smoke detectors with heat detectors. Plant Operations Design and Construction Services, and Maintenance Department must approve all changes to any fire alarm or suppression systems. Refer otherwise throughout this Section for fire alarm bypass and fire watch procedures.

4. Combustible scrap, trash, and debris shall be removed from the Project site on a daily basis, or, more frequently as required. Refer to the Construction Waste Management specification section(s).

5. Contractor shall not tape back door lock/latch mechanisms or prop open any exterior door, security door, stairwell door, or fire / smoke door. Lock cores shall not be removed. Any project requirement to do so shall be coordinated through the ODR. Coordinate changing lock cores to the designated construction core lock with your ODR.

6. Flammable products shall be limited to one day supply inside the building. Flammable products shall be stored outside the building or in approved ULC rated flammable storage cabinets. Flammable liquids shall be in approved safety cans or cans designed for their use.

7. No internal combustion engines or portable propane heating devices are allowed in any University buildings unless approved by the Owner. Coordination of how gasoline will be transported through buildings and stairwells must be coordinated with your ODR.

8. Absolutely no gasoline will be allowed inside University buildings. For temporary use outdoors, only approved metal safety cans will be permitted.

9. Compressed flammable gas cylinders (i.e acetylene) shall not remain inside the building overnight and must be removed from the premises at the conclusion of each workday.

10. The Contractor shall also have the WHMIS 2015 Safety Data Sheets (SDS) for materials and products used in the Work, available upon request.

11. Compressed flammable gas cylinders, while on the project site, shall be secured by chain or other suitable method to prevent tipping or falling over. All safety caps shall be securely installed when tanks are not in use.

12. When working in the ceiling space or on rated fire/smoke rated walls and structures, all holes and penetrations for wires, conduits, piping, etc. shall be sleeved and sealed with a ULC approved fire caulking / sealing compound at the end of each workday. Any holes that must remain overnight must be sealed with an equivalent temporary fire proofing material as approved by the ODR.

13. Work on fire sprinkler and detection systems shall continue until the system operation is fully restored. No impairments will be allowed to extend beyond approved periods of time or during times when the site is unattended.

14. Shutdown of any fire suppression or detection systems/devices shall be coordinated through the ODR. Unauthorized shutdown or disabling of life safety systems is not permitted.

15. All Contractors are required to supply and maintain a minimum of one currently tagged ABC fire extinguisher, 10 pound (Class 2-A) or greater. The use of University owned fire extinguishers will not be permitted.

16. All workers shall be trained on the proper use and handling of fire extinguishers.

17. If a Project involves multiple locations on a single floor or on multiple floors, additional multi-purpose fire extinguishers are required.

18. The Owner may require additional extinguishers as dictated by the risk of each project or project area.

19. All temporary hoarding to secure the Project site within buildings shall be of non-combustible construction unless otherwise approved by the ODR.

3.11 FIRE REPORTING AND EVACUATION PLAN

1. Contractor shall establish a designated emergency evacuation assembly area for all Projects prior to starting work. Contractor shall train all workers on assembly area locations and how to get to each area.

2. For areas that do not provide a readily identifiable egress route, the Contractor must post easy to understand maps, that are clearly visible to all workers, of the proper egress routes and access to exits in accordance with the Ontario Building Code and Ontario Fire Code.

3. Where construction hoarding impacts access to exit and means of egress for building occupants, the Contractor must coordinate and obtain approval from the ODR for the location of site hoarding.

4. In the event of a fire alarm, all work is to stop, all sources of ignition or hazardous work shall be immediately halted.

5. All workers shall report to their designated assembly area immediately. Contractor must coordinate the Designated Assembly Area with their ODR prior to the beginning of the project.

6. In the event of a fire, the University Central Plant shall be notified:

    1. The caller should provide their name, the location of the fire, and a brief description of the incident. The caller should not hang up until emergency services personnel instruct them to do so.

    2. The caller should be prepared to guide the University Central Plant personnel and Emergency Responders to the fire location.

3.12 FIRE WATCH

1. Overview: Throughout all construction activities, Fire Alarm and Life Safety Systems shall remain operational. If any portion of a Fire Alarm System including zones or devices needs to be deactivated to complete the Work, the contractor shall implement a fire watch. Fire Watch procedures are to be conducted in accordance with latest edition of the Ontario Fire Code. Where interpretations are required, coordinate with the ODR and Authorities Having Jurisdiction (AHJ). Refer to the Ontario Fire Code, including but not limited to, Div B Section 5.11.2.5 & 8.1.2.2.

2. Initiate fire alarm bypass/fire watch: To facilitate the procedures required by the Ontario Fire

Code the University of Waterloo has developed the following outline procedure:

1. Contact the ODR, 1 week prior to initiation of fire watch. University Construction Coordinator will reserve a radio from University Central Plant for the Contractor performing the Work.

2. Contractor shall subcontract an Owner approved fire alarm contractor to put the device(s) or zone(s) affected on bypass. If the building fire alarm devices are addressable, the devices can be bypassed individually. If a building has a “conventional” fire alarm system, the entire zone affected must be bypassed. Under no circumstances is an entire panel to be bypassed.

3. If devices are covered during the Work the contractor shall follow the manufacturer’s recommended procedures. Covers shall be removed at the end of each working day. Refer also to “responsibilities” under Hot Work Permits in this Section.

4. Note: Other activities that generate dust or airborne particulate including spray painting may disturb or actuate fire alarm devices. Such activities may warrant fire alarm bypass and fire watch procedures.

5. Prior to the start of fire watch, post Fire Watch Notices:

    a. In dorms / apartments, post notices on exterior doors

    b. In academic / staff halls, post notices in lobby, elevators, on bulletin boards, and on bathroom doors throughout the building

6. During fire watch, fire watch personnel shall obtain an air horn and cell phone (2-way radio) from building supervisor.

7. During fire watch, fire watch personnel shall conduct a continuous patrol of the entire building, including corridors, hallways, laundry rooms, basement, lobby, stairwells, recreation rooms, lounges and any other common areas. Remain alert to signs of smoke and/or fire.

8. The Fire Watch Log must be updated every thirty (30) minutes by Fire Watch personnel.

9. Fire watch procedures

    a. Patrol designated area at least every thirty (30) minutes

    b. Listen for in-room smoke detectors sounding (within residence buildings)

    c. Look for observable signs of smoke and/or fire

    d. Entre all stairwells – open door and look into each stairwell.

    e. Enter all common areas including basement, lounges, laundry room and dining areas.

10. At first sign of smoke or fire, fire watch personnel must:

    a. Call 911

    b. Use the supplied air horn to notify as many of the occupants as possible

    c. Exit the building, calling UW Special Constables at (519) 888-4911

d. Do not put yourself in jeopardy – if you suspect smoke and/or fire, exit the building

3. Once the fire watch has ended;

    1. Owner approved fire alarm contractor to verify the fire alarm system including all devices affected are back online and ensure all “trouble signals” at the fire alarm panel are cleared.

    2. Return the radio(s) to Central Plant.

    3. Once the Work is completed, all devices that were covered are to be re-verified.

    4. Notify Central Plant and the ODR the fire watch is over.

3.13 HOT WORK

1. A valid and signed Hot Work Permit must be obtained 1 week prior to commencing hot work;

    1. In accordance with the latest edition of the Ontario Fire Code, Hot Work is defined as: activities that use open flames or produce heat or sparks, including cutting, welding, soldering, brazing, grinding, adhesive bonding, thermal spraying or thawing of pipes.

2. Review of the current version of the Owner’s Hot Work Permit Application shall be completed prior to submitting bids and shall be reviewed at the Project Start-up meeting with ODR prior to commencing the Work.

3. Fees or fines levied by the local Fire Department in response to false alarms caused by the Hot Work shall be paid by the Contractor.

4. Permits are valid for day of work only. Contractors are encouraged to plan work to minimize number of hot work permits.

5. The signed permit shall be posted at the Work site.

6. Responsibilities:

    1. It is the responsibility of the Contractor to read, understand, and acknowledge the requirements of the Hot Work Permit.

    2. Contractor is responsible for the covering and uncovering of smoke/heat detectors to the satisfaction of the ODR and University Maintenance Representatives/Supervisor, prior to starting work or upon discovery of such devices as work progresses. Covering smoke detectors with tape, rubber gloves, or any other method that may damage a detector is prohibited.

    3. Fire watch personnel shall be posted at every operation that is defined as “Hot Work”. Upon request by the ODR fire watch personnel shall provide verification of competency in performing Fire watch duties.

    4. Heaters for welding electrodes shall have a manufacturer's label that certifies the purpose of the unit. Job-built heaters shall be prohibited.

    5. The remains of welding electrodes shall be picked up and disposed of as soon as each electrode is expended. No welding electrode shall be permitted to fall and remain in the work area.

6. All temporary fabrication areas shall be approved by the ODR prior to starting work.

3.14 HAZARDOUS WASTE AND WORK IN HAZARDOUS LOCATIONS

1. Chemical, biological or radioactive materials (hazardous substances and equipment) must be moved or secured prior to beginning work in any area. Contractor shall coordinate the removal of these items with their ODR.

    1. Safe disposal and tracking of PCB containing ballasts shall be coordinated with ODR and University Safety Office/ChemStores representative.

2. Where applicable, the Contractor and ODR shall convene a pre-Work assessment with the University Safety Office, the laboratory principal investigator, or laboratory manager to prevent disturbing experiments and /or animals during the Work.

3. Absolutely no chemicals, trash, paint, paint brush rinse, shop vacuum contents, excess materials, sand, dirt, etc. may be disposed of in storm sewers/drains or sanitary drains.

4. Contractor must prevent dirt from entering exterior storm drains by adding appropriate silt protection screen material to all exterior drains that may be impacted by the project.

5. All hazardous waste, fuel, oils, and chemicals stored outdoors must have adequate secondary containment to prevent discharge onto the ground or in storm or sanitary sewer drains. All containers must be stored to prevent theft or unauthorized access. All containers outdoors must also be protected from weather elements and secured from public access.

6. Contractor shall ensure that adequate spill protection equipment and supplies are readily available during all equipment refueling activities.

3.15 LADDER SAFETY

1. Ladders must be inspected prior to each use. Defective ladders shall be immediately removed from service and removed from the job site.

2. Ladders shall be used only in accordance with the manufacturer’s labeled instructions.

3. Ladders should only be used where the worker is able to maintain three-point contact at all times.

4. Stepladders shall be used only in the fully open position with spreaders locked in place. Using a folded stepladder leaned against a support is prohibited.

5. Workers shall not stand on the top platform, the step below the top platform or the back stretchers.

6. Do not sit on, or straddle the top platform.

7. Extension ladders must be properly positioned and locked in place.

8. Extension ladders used for access to elevated areas shall extend at least three feet beyond the supporting structure.

9. Job built ladders shall conform to applicable Ministry of Labour regulations and ANSI Standards’ best practices where available and shall be limited to use in excavations or concrete form work only. These types of ladders must be inspected daily.

10. At the end of each workday, remove and store, or secure from use all portable and job-built ladders that provide ground access to any elevated platform or structure so as to prevent unauthorized access.

11. Chaining ladders to equipment or mechanical, electrical, or plumbing fixtures or piping is prohibited. Ladders must be stored in a manner to prevent blocked fire exits or means of egress routes. Ladders must not block access to equipment or facilities.

12. Use of ladders shall conform at a minimum to the Ontario Ministry of Labour, Ladder Safety in Construction recommendations.

3.16 LOCK OUT / TAG OUT

1. It is the policy of University of Waterloo that its employees and Contractors are protected from all energy sources during maintenance and repair activities.

2. Contractors whose work will involve the Lock Out/Tag Out process shall comply with the provisions of the University procedures at a minimum. If there are discrepancies between the Contractor's program and the University's program, the more stringent procedure shall prevail.

3. Lock Out/Tag Out procedures may be specific to each type of equipment or device. Consult with the ODR for specific procedures.

4. Contractors are responsible for ensuring all of their authorized and affected workers are trained on the significance of Lock Out/Tag Out procedures and must follow these requirements.

5. Only the authorized employee or Contractor who applied a device is allowed to remove his/her lock out or tag out device from each energy-isolating device so energy can be restored to the equipment. University personnel may add locks or tags to tagged-out devices – Contractors are not permitted to remove these locks or tags.

6. Never remove another person's tag/lock. Unauthorized removal of tags/locks will be grounds for immediate and permanent removal from the jobsite.

7. If tags/locks remain on equipment, contact the appropriate personnel or department for resolution to the removal process.

3.17 MAINTAINING INDOOR AIR QUALITY (IAQ) DURING CONSTRUCTION AND RENOVATION ACTIVITIES

1. Contractor to ensure that proper controls are in place to maintain indoor air quality during construction and renovation activities.

2. The guideline covers all Contractors involved in building maintenance, construction, renovation and/or repair and applies to all areas of the University.

3. The ODR and University Safety Office will perform periodic inspections, verify that the proper controls are in place and will periodically monitor sites with instruments used to measure applicable indoor air quality (IAQ) parameters.

4. Project hoarding shall employ dust barriers to suit the nature of the Work.

3.18 PERSONAL PROTECTIVE EQUIPMENT (PPE)

1. Personal Protective Equipment (PPE) shall be required for all persons on the Project site. Each Contractor shall provide their workers with all required PPE. The Contractor is responsible to ensure that PPE is inspected and maintained in proper condition.

2. Safety Hard Hats: When required, every person in the Project shall wear a hard hat that meets the minimum OHSA requirements.

3. When required, hardhats are to be worn and maintained in accordance with the manufacturer's recommendations. Hard hats that display noticeable wear or damage shall be replaced or repaired per manufacturer's specifications.

4. Eye Protection: When required, every person on the Project shall wear eye protection. Additional face protection may be required when work operations create airborne particles, chips, or sparks. Eye protection and face protection shall meet the minimum OHSA requirements.

5. Foot protection: Every worker on the Project shall wear shoes/footwear that have soles resistant to punctures, leather or leather equivalent uppers that cover the entire foot and ankle and offer resistance to scrapes and cuts. All footwear at a minimum shall bear the Canadian Standards Association (CSA) "green triangle" tag. Contractors shall ensure Workers are equipped with additional safety features where required by the Work. (e.g. electrical shock resistance, anti-static resistance, protection against chain saws etc.)

6. When required, exterior toe and metatarsal protection shall be used when activities involve impact exposures to the feet (ie; jackhammering, water blasting, concrete demolition etc), unless the shoe has this protection built into the footwear.

7. Clothing: When required, sleeve length shall cover the ball of the shoulder. Shirts shall not have noticeable holes, be long enough to be tucked into pants and be free of political messages, profanity, objectionable, or obscene messages. Pants shall be full length and without excessive holes.

8. Hearing Protection: When required, employees shall be provided with hearing protection against the effects of noise exposures from machines, equipment or surrounding operations generating sound levels that exceed MOL regulations and OHSA hearing protection recommendations. Workers required to use hearing protection shall be tested and trained in the use and limitations of such protection.

9. Hand Protection: When required, workers handling materials or equipment with potential hand injury hazards shall be provided with appropriate hand protection.

10. Harnesses, Lifelines, and Lanyards: When required, follow the requirements set forth under the MOL with respect to Working at Heights. Refer to Working at Heights references throughout this Section.

11. Respiratory Protection: When required, workers shall be provided with respirators when it is necessary to protect them from inhalation of toxic or harmful gases, vapors, mists, fumes, and dust.

    1. Workers required to use respiratory protective equipment shall be qualified and adequately trained in the use and limitations of such equipment.

12. Other PPE: Where exposure to risk is identified, additional PPE not listed above shall be employed to suit the nature of the Work.

3.19 ROOF WORK

1. All roof work including patch and repair around minor roof openings for building services must be approved by the ODR and applicable Plant Operations Maintenance Department representative at the campus prior to project start.

2. Contractor is responsible for ensuring that they are able to immediately contact emergency forces during an emergency event by providing cell phones, radios, or access to working phones within University buildings or property. Contractor shall ensure workers on the jobsite know the address of the building.

3. Some areas of roofs may be restricted due to potentially hazardous exhaust from laboratories or processes. Contractor must obtain approval from the ODR before entering any roof areas.

4. Contractors are required to comply with all applicable Working at Heights requirements. Refer to this Section for further details.

5. Review with the ODR and applicable Plant Operations Maintenance Department representative regarding proper davit use and tie-off areas.

6. All roof work involving heated materials or open flames must have a valid Hot Work Permit.

7. All fire extinguishers must have current annual certification tags and in working order.

8. All open flames must be continuously supervised.

9. Refer to this Section for Fire Watch operating procedures.

10. All roofing materials shall be secured at the end of each workday to prevent disruption by wind and rain.

3.20 SANITATION AND HOUSEKEEPING

1. Contractors are responsible for ensuring that Project sites are effectively cleaned.

2. “Effectively Cleaned” shall address all of the following issues:

    1. Place all construction waste, trash, and debris in a designated receptacle. Glass bottles shall not be permitted in the Project site. Trash must be removed on a daily basis as to prevent accumulation and attraction for pests. Contractor must have an approved method for removing trash from the jobsite (i.e., dumpsters, trucks, etc.) before starting work.

    2. Eating is not allowed on the jobsite. Limited amounts of soft drinks and water will be allowed but must be removed on a daily basis as to prevent attraction of insects or rodents.

    3. Project service water: non-potable water including water storage containers, hose bibs, and faucets shall be labelled “Danger – Non-potable water, Do not drink”.

    4. Contractor may only use public restroom facilities assigned by the ODR. Contractors may not use staff restrooms.

    5. Any waste, trash, and/or debris created by the Contractor shall be cleaned (ie; sweeping, vacuuming, dust mopping, large debris removal etc.) at the end of the day to prevent

accumulation of dirt and combustibles on the jobsite.

6. Contractors are not allowed to use sinks or drains to clean materials or paint brushes.

7. All holes and penetrations to the outside of the building must be sealed with an appropriate material as to prevent water, insects and rodents from entering the building.

8. All windows must remain closed unless permission is granted by the ODR. All windows or penetrations used for ventilation purposes shall be protected from water, insect/rodent, and dust intrusion by use of protective covers and screen wire materials.

9. Pedestrian pathways including corridors and means of egress within buildings and all exterior pathways, sidewalks and the like shall not be obstructed by any construction activity including storage or stockpiling of materials or waste. Review site staging plan with ODR prior to start of the Work.

10. Place all hoses, cords, cables, and wires in locations that prevent them from damage and do not create tripping hazards.

11. Restore all signs, barricades, fire extinguishers, guardrails, gates, etc. to proper locations and condition.

12. Properly store and secure all flammable and combustible liquids and gases in proper containment or flammable storage cabinets.

13. Collect and place all cut-off or waste pieces of rolling stock, as they are created, into waste or scrap containers. No rolling stock shall be permitted to fall and remain in the work area.

14. Used shot strips from powder-actuated tools shall be properly maintained and disposed of in accordance with manufacturer's recommendations.

15. All work surfaces shall be maintained in level and smooth condition as to prevent rolling carts from catching and possibly falling over while in transit. Appropriate temporary fill materials shall be installed as warranted.

16. All wheeled equipment shall have non-marking wheels or tape shall be used over wheels when moving through non-project areas to prevent marking and damage to floor surfaces. Tape should be removed if adequate traction is required to perform a task. Tape can be removed once in job-site area.

17. Contractors shall only use their trash dumpsters or dumpsters designated by the ODR Representative.

18. Cleaning of concrete trucks shall be done off University premises unless expressed written permission provided by ODR.

3.21 SCAFFOLDING, ELEVATING WORK PLATFORMS AND SUSPENDED ACCESS EQUIPMENT

1. All scaffold systems, including temporary elevated platforms (supported or suspended) and its supporting structure (including points of anchorage), as well as powered elevating work platforms (scissor lifts, skyjacks etc.) used for supporting employees or materials or both - shall follow the manufacturer instructions and adhere to all applicable Ministry of Labour regulations and OHSA recommendations for each type of scaffolding or elevating device.

2. Contractor shall be required to receive permission from ODR and Plant Operations Maintenance Department representative before erecting any suspension or stationary scaffolding system on roofs or attaching lines to roof davits.

3. Contractor shall be required to obtain an up-to-date anchor testing certificate from ODR prior to mobilizing a swing stage or boatswain's (bosun's) chair connected to any existing anchor.

4. Contractor is responsible to retain the services of a specialty engineer to design scaffolding where project site conditions dictate.

5. Training and documentation shall be required for all workers on the Project who will erect, maintain, dismantle, or use the scaffolding. A designated competent person must ensure scaffold use requirements are maintained and inspected at the beginning of each work shift. Contractor shall maintain documentation to support this requirement.

6. Contractor to ensure training is provided for employees in accordance with Ministry of Labour regulations and OHSA recommendations when using scaffolding and elevating work platforms as defined in the Ontario Ministry of Labour regulations. Refer to Fall Protection and Prevention, described elsewhere in this Section.

7. Mudsills and surrounding areas at the base of ground-supported scaffolds shall be maintained in a well-dressed and level condition. Scaffold feet shall be installed on all legs and the maximum number of diagonal braces shall be included in every scaffold section.

8. Every work level shall be fully planked and toe board shall be included along open sides. Overhead protection shall be constructed where walk-through passages are allowed.

9. Brakes shall be secure at all times on rolling scaffolds, except when being moved. Workers shall not be allowed on the platform when the scaffold is being moved.

10. Rolling scaffolds shall not be used on uneven or unstable surfaces. Wheels shall be non-marking or temporarily covered with tape to prevent damage to floor surfaces when being moved through non-project areas.

3.22 SERVICE TUNNELS

1. The University campus has a network of underground tunnels. For all deliveries of heavy equipment, or materials travelling on internal campus roadways, review with the ODR to ensure route will not structurally compromise underground tunnels.

2. The ODR will coordinate and arrange for Owner approved structural engineer to review temporary shoring of tunnel(s).

3. Cost of tunnel repair due to damage caused by unauthorized traffic will be back-charged to the Contractor.

4. Refer to Confined Spaces, this Section where applicable.

3.23 SEVERE WEATHER PLANS FOR CONSTRUCTION SITES

1. Construction sites for large capital projects may be required to have a Severe Weather Plan specific to that site. Consult with your ODR and University Safety Office for applicability.

2. Where required, a copy of the Severe Weather Plan must be submitted to your ODR prior to starting work.

3.24 SITE POSTINGS

1. Contractor shall securely post the required warning signs for the Project area(s).
2. All signs must be approved by your ODR. Consult your ODR regarding facility specific informational signs.
    1. Signs that warn of potential hazards (i.e., CONSTRUCTION AREA – DO NOT ENTER)
    2. Signs that communicate the level of personal protective equipment that is required (i.e., HARD HATS AND SAFETY GLASSES REQUIRED)
    3. All necessary permits (i.e., Hot Work Permits, and/or other Provincial/Local Regulatory Agency Permits as required by law).
3. Signs must be made from a sturdy material that resists tearing and fading. Laminated signs are acceptable for indoor postings.
4. All exterior Projects must contain the above noted required postings in all locations that warrant these warning signs and postings.
5. A single location such as a plywood Project board is acceptable for posting required permits and project information signage. Any required permits should be protected from the elements by covering them in a laminate or waterproof material.
6. Contractor shall install and maintain any additional signs, barricades, warning devices, and traffic warnings.

3.25 TRAFFIC MANAGEMENT

1. Conduct construction activities and operations along roads and in a manner that minimizes inconvenience and hazards to vehicular traffic and pedestrians.
2. Provide flag persons trained in accordance with and properly equipped as specified in the Manual of Uniform Traffic Control Devices for Canada (MUTCDC) in the following situations:
    1. When traffic is required to pass construction vehicles or equipment blocking all or part of a pedestrian or vehicular thoroughfare.
    2. Where construction vehicles including delivery trucks, concrete trucks etc. are travelling in reverse to maneuver within the site.
    3. Where is it necessary to institute one-way traffic through the construction area or where existing travel patterns or conditions are modified from the usual. Coordinate with the ODR and University Campus Police if assistance is required in establishing and maintaining detours.
    4. When workers or equipment are employed on travelled way over crest of hills, around sharp corners or at other locations where oncoming traffic may not have adequate warning.
    5. In situations where complete protection for workers is not provided by other traffic control devices.
3. Where requirement for traffic control is outside of University owned or controlled property, Contractor is required to obtain all necessary permits from the local Authority Having Jurisdiction.

END OF SECTION

1.1 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.

.2 Tests and mix designs.

.3 Mock-ups.

.4 Mill tests.

.5 Equipment and system adjust and balance.

1.2 REFERENCE STANDARDS

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

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

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

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

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

.1 AA - Aluminum Association
.2 ACI - American Concrete Institute
.3 AISC - American Institute of Steel Construction
.4 ANSI - American National Standards Institute
.5 ASME - American Society of Mechanical Engineers
.6 ASTM - American Society for Testing and Materials
.7 AWMAC - Architectural Woodwork Manufacturers Association of Canada
.8 AWPA - American Wire Producers Association
.9 CGSB - Canadian General Standards Board
.10 CISC - Canadian Institute of Steel Construction
.11 CPCI - Canadian Prestressed Concrete Institute
.12 CSA - Canadian Standards Association
.13 CSSBI - Canadian Sheet Steel Building Institute
.14 CWB – Canadian Welding Bureau
.15 ICEA - Insulated Cable Engineers Association
.16 IEEE - Institute of Electrical and Electronics Engineers
.17 IGMAC – Insulating Glass Manufacturers Association of Canada
.18 MPP – Master Painters Institute
.19 MSS - Manufacturers Standardization Society of the Valve and Fittings Industry
.20 NAAMM - National Association of Architectural Metal Manufacturers

.21 NEMA - National Electrical Manufacturers Association
.22 NFPA - National Fire Protection Association
.23 NHLA - National Hardwood Lumber Association
.24 NLGA - National Lumber Grades Authority
.25 SSPC – The Society for Protective Coatings
.26 ULC - Underwriters' Laboratories of Canada

1.3 CERTIFICATES

.1 Definition: Notarized certification of type specified.

.2 Do not construe certification as relieving Contractor from furnishing satisfactory materials if, after tests are performed on selected samples, material does not meet specified requirements.

.3 Professional Certification:

.1 When professional certification of performance criteria of materials, systems or equipment is required by Contract Documents, Owner and Consultant are entitled to rely on such certifications.

.2 Neither Owner nor Consultant shall be expected to make independent examination or verification of professional certifications.

1.4 CODES, FEES, PERMITS AND CERTIFICATES

.1 Refer to GC 10.2.

.2 Execute the Work in accordance with the laws, rules, and regulations of the local and provincial codes and other authorities having jurisdiction.

.3 In the event that specified Products do not meet these conditions, notify Consultant in writing before ordering or installing same.

.4 If any Contractor chooses to carry out work in contravention of any Code or By-law, he shall be responsible for all changes required to obtain Code acceptance.

.5 Expedite obtaining the building permit from the municipality.

.6 Obtain necessary permits and notices, pay all fees in order that the work hereinafter specified may be carried out and he shall furnish any certificates necessary as evidence that the work installed conforms with the laws and regulations of all authorities having jurisdiction before final certificates are issued.

.7 All changes and alterations required by an authorized inspector of any authority having jurisdiction shall be carried out in accordance with the General Conditions of the Contract.

.8 All equipment supplied must have approval of CSA, ULC, NFPA, IAO, FM, or FIA and any other authority having jurisdiction.

1.5 MANUFACTURER'S FIELD SERVICES

.1 When required by Contract Documents, have manufacturer provide qualified representative to observe field conditions, conditions of surfaces and installation, quality of work to start-up equipment and to test, adjust and balance equipment as applicable.

1.6 CONTRACTOR'S QUALITY MANAGEMENT SYSTEM

.1 The Contractor shall establish, document, implement and maintain a Quality Management System in a manner consistent with the ISO 9001:2015 Quality Management Systems - Requirements, using a Process approach.

.2 The Contractor shall provide a Quality Plan describing the Quality Management System as it applies to this Contract. The Contractor shall attach, at minimum, the following procedures to the Quality Plan:

.1 Control of documents: A documented procedure shall be established to define the controls needed:

.1 To approve documents for adequacy prior to issue.

.2 To review and update as necessary and re-approve documents.

.3 To ensure that changes and the current revision status of documents are identified.

.4 To ensure that relevant versions of applicable documents are available at points of use.

.5 To ensure that documents remain legible and are readily identifiable.

.6 To ensure that documents of external origin necessary for the planning and operation of the QMS are identified and distribution controlled.

.7 To prevent the unintended use of obsolete documents, and to apply suitable identification to them if they are retained for any purpose.

.2 Control of records: A documented procedure to define the controls needed for the identification, storage, protection, retrieval, retention and disposition of records. Records shall remain legible, readily identifiable and retrievable.

.3 Internal audit: A documented procedure to define the responsibilities and requirements for planning and conducting audits, establishing and maintaining records, and reporting results.

.4 Control of Non-Conforming Product: A documented procedure to define the controls and related responsibilities and authorities for dealing with Non-Conforming Product.

.5 Corrective Actions: Establish a documented procedure to define requirements for:

.1 Reviewing non-conformities (including client complaints).

.2 Determining the causes of non-conformities.

.3 Evaluating the need for action to ensure that non-conformities do not recur.

.4 Determining and implementing the actions needed.

.5 Recording the results of the actions taken.

.6 Reviewing the effectiveness of the Corrective Actions taken.

.6 Preventive Actions: Establish a documented procedure to define requirements for:

.1 Determining potential non-conformities and their causes.

.2 Evaluating the need for action to prevent occurrence of

.3 non-conformities.

.4 Determining and implementing the actions needed.

.5 Recording the results of the actions taken.

.6 Reviewing the effectiveness of the Preventative Actions taken

1.7 INSPECTION

.1 Allow Consultants access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Consultant instructions, or law of Place of Work.

.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.4 Consultant may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

1.8 INDEPENDENT INSPECTION AND TESTING AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Owner for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Owner.

.2 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.3 Retain and pay for inspection and testing that is for Contractor's own quality control or is required by regulatory requirements.

.4 For inspection and testing required by Contract Documents or by authorities having jurisdiction, provide Consultant and inspection and testing agencies with timely notification in advance of required inspection and testing.

.5 Submit test samples required for testing in accordance with submittals schedule specified in Section 01 32 00 – Construction Progress Documentation.

.6 Provide labour, Construction Equipment and temporary facilities to obtain and handle test samples on site.

.7 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Consultant at no cost to Owner. Pay costs for retesting and re-inspection.

1.9 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Cooperate to provide reasonable facilities for such access.

1.10 INSPECTION AND TESTING PROCEDURES

.1 Start-up Meeting

.1 Conduct an initial start-up meeting with the Inspection and Testing Company, scheduled at least one week in advance of work commencing at the Place of the Work.

.2 Ensure an up-to-date construction schedule is available such that the Inspection and Testing Company and Consultant can develop a testing program.

.2 Notify appropriate agency and Consultant in advance of requirement for tests, in order that attendance arrangements can be made.

.3 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.

.4 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.11 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 Re-inspection

.1 Any re-inspections that are required due to deficiencies uncovered at the initial inspection shall be at the expense of the Contractor.

.2 Payment for Inspection and Testing Services

.3 Re-inspection costs are not included in the cash Allowance, and are to be paid directly by the Contractor outside of the Contract.

.4 If in opinion of Consultant it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Consultant.

1.12 INSPECTION AND TESTING AGENCY REPORTS

.1 For inspection and testing required by Contract Documents or by regulatory requirements, and performed by Contractor retained inspection and testing agencies, submit to Consultant and Owner copies of reports. Submit within 5 days after completion of inspection and testing.

.2 For inspection and testing performed by Owner retained inspection and testing agencies, copies of inspection and testing agency reports will be provided to Contractor.

.3 Submit 1 (one) electronic copy of inspection and test reports to Consultant.

.4 Provide copies to Subcontractor of work being inspected or tested, or manufacturer or fabricator of material being inspected or tested.

.5 If, in the opinion of the Inspection and Testing Company, the specified materials are not being used or the required results are not being achieved, the Inspection and Testing Company shall verbally inform the Contractor of the deficiencies and promptly confirm the deficiencies in writing to the Contractor and the Consultant. Note in the written report corrective action taken by the Contractor and the results thereof.

.6 Accompanying each report shall be a key plan of the Project, clearly indicating the areas to which the report refers. These plans shall also be submitted with and keyed into the invoices for the inspection and testing.

1.13 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as may be requested.

.2 The cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work shall be appraised by Consultant and may be authorized as recoverable.

1.14 INSPECTION AND TESTING RESPONSIBILITIES

.1 The following indicates the minimum responsibilities for each of the parties to ensure the quality of construction is maintained.

.2 Contractor:

.1 Ensure the quality of the Work meets the requirements of the Contract Documents.

.2 Once the testing program has been developed, notify the Testing Company and the Consultant in advance, to request the required inspection or test.

.3 Consult with the testing company on construction techniques, but retain responsibility for construction means, methods and techniques in accordance with the General Conditions of the Contract.

.4 Changes in construction means, methods and techniques required to meet quality requirements of the Contract Documents shall not be considered as cause for an extra to the Contract.

.5 Defective materials or quality of work whenever found at any time prior to the final acceptance of the Work shall be rejected, regardless of previous inspection.

.6 Inspection does not relieve Contractor of responsibility, but is a precaution against oversight and error.

.7 Remove and replace defective work at own expense, and be responsible for additional costs incurred by other Sections affected by this replacement.

.3 Inspection & Testing Company:

.1 Provide the level of inspection, testing and reporting as described in the Contract Documents.

.2 Inform the Contractor and the Consultant immediately of any material, procedure or test that does not meet the Contract Documents.

.3 Advise the Contractor of any construction procedure that is likely to fail to meet the Contract Documents. Promptly inform the Consultant of questionable construction practices and submit a written report to the Consultant.

.4 Consultant:

.1 As the Owner's representative, make the final decision on changes that may increase or decrease the Contract Price or Contract Time.

.2 Upon notification by the Testing and Inspection Company of defective work, respond expediently to resolve the issue.

1.15 MOCK-UPS

.1 Provide field or shop erected example of work complete with specified materials and workmanship.

.2 Prepare mock-ups for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.

.3 Do not proceed with work for which mock-ups are required prior to *Consultant's* review of mock-ups.

.4 Construct in all locations acceptable to Consultant and as specified in specific Section.

.5 Prepare mock-ups for Consultant's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

.1 Allow 7 working days in construction schedule for the review of mock-ups after they have been prepared.

.2 Provide 2 weeks' notice for mock-up review to Consultant in advance of preferred review date(s).

.6 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.7 Modify mock-up as required until Consultant approval is obtained.

.8 Reviewed and accepted mock-ups shall be the standard of workmanship and material against which installed work will be compared.

.9 Protect mock-ups from damage and maintain mock-up until the Work they represent is complete.

.10 Commence work demonstrated in mock-up only after review and acceptance of workmanship.

.11 Remove and replace materials or assemblies appearing in the finished work that do not match reviewed and accepted mock-ups.

.12 Mock-Ups Required by Specific Technical Specification Sections:

.1 If noted in the technical section, remove mock-up at conclusion of Work, or when acceptable to Consultant.

.2 Mock-up(s) may remain as part of Work if so stated in the technical specification section.

.3 Specification sections identify whether mock-up may remain as part of Work or if it is to be removed and when.

.4 Unless otherwise specified in the technical Specifications, approved mock-ups forming part of the Work may remain as part of the Work.

1.16 MILL TESTS

.1 Submit mill test certificates as required of specification Sections.

1.17 EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical, electrical, and building equipment systems.

.2 Refer to technical Sections for requirements.

1.18 INSTALLATION TOLERANCES

.1 Unless otherwise specified on Drawings or in individual specification sections, the following minimum requirements are part of Contract:

.1 Plumb and Level: means plumb or level to 1/8" in 10'-0" (3 mm in 3048 mm).

.2 Square: means not in excess of ±1° variance from 90°.

.3 Straight: means variations in flat not exceeding 1/8” in 10’0” (3 mm in 3048 mm).

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with Instructions to Bidders, the General Conditions of the Contract, Supplementary Conditions and the General Requirements of Division 1.

1.2 SECTION INCLUDES

.1 Temporary facilities.

1.3 GENERAL

.1 Provide temporary facilities as required throughout progress of the work.

.2 Pay for installation and maintenance of temporary service, energy used, utility costs, filters and restoration of permanent systems.

.3 Provide temporary meters. Pay for connect and disconnect charges, and costs of maintenance and operation.

.4 Relocate temporary facilities and equipment as required by the progress of the Work.

.5 Remove temporary materials, equipment and construction at completion of Work.

1.4 TEMPORARY LIGHT AND POWER:

.1 Connect to and use Owner's existing electrical supply for temporary use during construction.

.2 Existing maximum power supply is available for temporary use during construction.

.3 Arrange and pay for necessary connections and disconnections of temporary power and lighting in accordance with regulatory requirements.

.4 Materials in temporary construction:

.1 Do not use materials of temporary service in permanent installation.

.2 Materials used for temporary lighting and power shall meet the Electric Safety Code and Ontario Hydro Inspection standards.

.5 Pay all permits required.

1.5 TEMPORARY HEAT AND VENTILATION

.1 Carry out the work with all possible speed throughout all months from the date of commencement of the Work until Owner occupancy.

.2 Provide temporary ventilation for comfort and protection of workers and for proper drying of wet Work.

.3 Arrange and pay for temporary heating and ventilation required during construction.

.4 Vent construction heaters in enclosed spaces to the outside or use flameless type of construction heaters.

.5 Provide temporary heat for the Work as required to:

.1 Facilitate progress of Work.

.2 Protect the Work against dampness and cold.

.3 Prevent moisture condensation on surfaces, freezing, or other damage to finishes or stored Products.

.4 Maintain specified minimum ambient temperatures and humidity levels for storage, installation and curing of Products.

.5 After building is enclosed, maintain interior temperature of minimum 15 degrees C.

.6 Provide temporary ventilation for the Work as required to:

.1 Prevent accumulations of fumes, exhaust, vapours, gases and other hazardous, noxious, or volatile substances in enclosed spaces, as required to maintain a safe work environment meeting applicable regulatory requirements.

.2 Ensure that hazardous, noxious, or volatile substances do not migrate to Owner occupied spaces.

.3 Ventilate temporary sanitary facilities.

.7 Do not use permanent building heating and ventilation systems during construction.

.8 Comply with codes, rules and regulations concerning operations of temporary heating units and with requirements of Owner's insurer.

.9 Do not permit temperature to reach a level that will cause damage to the Work.

.10 Replace interior or exterior surfaces damaged by the use of space heaters with new materials or refinish at no cost to Owner.

.11 As soon as practical after permanent heating and air circulation system is in place and operable, provide heat from permanent building heating system, under operation and supervision of heating Subcontractor, until building is complete. Use permanent building heating system only after the majority of dust (including drywall dust) is thoroughly vacuumed.

1.6 TEMPORARY WEATHER PROTECTION

.1 Provide protection at all times against weather, rain, wind, storms, frost or excessive heat. At the end of the day's work, cover new work liable to be damaged.

.2 Remove snow and ice from any part of the structure (other than finished roofs) as soon as possible.

.3 Make good Products and portions of the Work damaged as a result of improper weather protection.

1.7 TEMPORARY WATER

.1 Provide temporary connections, valves, piping and hoses required for construction operations.

.2 Connect to and use Owner's existing water supply for temporary use during construction, subject to existing available volume and pressure.

.3 Arrange and pay for necessary water supply connections and disconnections.

1.8 USE OF PERMANENT SYSTEMS

.1 Heating System: Permanent heating equipment may not be used to supply temporary heat unless approved by the Consultant. If approval for use is granted, all equipment and ductwork shall be thoroughly cleaned before turn over to the Owner. Temporary filters must be used in any fan equipment and replaced with the permanent filters before Substantial Performance of the Work.

.2 Correct damaged or malfunctioning parts of permanent systems, balance, change filters, clean and restore systems to good working condition before date of Substantial Performance of the Work and acceptance by the Owner.

.3 Commencement of warranties for permanent systems will be date of Substantial Performance of the Work regardless of Contractor's use of such systems during construction period.

1.9 TEMPORARY SANITARY FACILITIES

.1 Supply and maintain in sanitary condition sufficient temporary toilets that meet the latest edition of the Occupational Health and Safety Act for use of construction personnel for duration of Contract.

.2 Do not use permanent sanitary facilities for temporary purposes.

.3 Locate temporary toilets so that they are secluded from public view.

.4 Remove temporary fixtures upon completion of Project.

1.10 PROTECTION AND COORDINATION OF EXISTING UTILITIES:

.1 Do not interrupt utilities located in or near Project which are providing services to general area without approval of Owner and coordination with local utility companies.

.1 Provide Owner and local utility companies with at least 10 working days written notice for outages or connections to utilities.

.2 Send proper notices, make necessary arrangements and perform other services required for care, protection and maintenance of public utilities, including mail boxes, fire plugs, telephone poles and wires, and other items of this character on or around building site.

.3 Permit entrance of public utilities or other parties to Project so that they may perform their necessary Work.

1.11 TEMPORARY BARRIERS AND ENCLOSURES:

.1 Site:

.1 Provide and maintain covered walkways to maintain pedestrian access along public rights-of-way.

.2 Provide and maintain barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

.3 Construction fence: Provide and maintain fence around construction site, to design indicated on Drawings; equip with gates and locks.

.4 All fencing shall be removed at the completion of the Work.

.2 Building Exterior: Provide and maintain temporary weather-tight closures at exterior openings to maintain suitable conditions and protection for interior Work.

.3 Building Interior: Provide and maintain temporary enclosures to separate Work areas from areas occupied by Owner or tenants to prevent penetration of dust, moisture and noise into occupied areas.

.4 Construct temporary barriers with adequate framing and surface with plywood or gypsum board, and polyethylene vapour barrier having closed joints and sealed edges at intersections with existing surfaces.

1.12 PROJECT IDENTIFICATION

.1 No construction signs will be allowed to be displayed on the premises without the approval and acceptance by the Owner.

1.13 FIELD OFFICES

.1 Provide field office(s) and storage shed(s) of approved design and appropriate size within the hoarded worksite area only.

.2 Provide a facility for on-site meetings appropriate to the size of the project.

.3 Provide and maintain telephone service, including facsimile service, to field office for duration of construction.

1.14 TEMPORARY STORAGE

.1 Provide and maintain upon premises in an approved location suitable sheds or trailers for protection and storage of materials to be incorporated in Project.

.2 Keep clean and tidy.

.3 Provide light and heat as required.

.4 Store combustible materials apart from building materials.

1.15 TEMPORARY STATIONARY CONVEYANCES

.1 Furnish and maintain temporary construction lifts, hoists, chutes, scaffolds, staging, stairs, ramps, runways, ladders, platforms, railings and similar items required for proper execution of Work and in accordance with the latest edition of the Occupational Heath and Safety Act.

.2 Coordinate use of temporary conveyances with Subcontractors, and provide necessary temporary protections to surrounding assemblies.

.3 Upon removal of such temporary conveyances, remove temporary protections and complete the Work.

1.16 DUST CONTROL

.1 Execute work by methods to minimize raising dust from construction operations.

.2 Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.17 WATER CONTROL

.1 Provide methods to control surface and ground water to prevent damage to site or adjoining properties.

.2 Control fill, grading and ditching to direct surface drainage away from excavations, pits, tunnels and other construction areas, and to direct drainage to proper runoff.

.3 Maintain excavations free of water. Provide, operate and maintain pumping equipment.

1.18 SNOW AND ICE CONTROL

.1 Keep access to building and work areas clear of snow while work is in progress.

.2 Do not allow snow or ice to accumulate over surfaces that can be damaged upon thawing.

.3 Do not allow snow or ice accumulation to overload or otherwise endanger any part of work.

.4 Take precautions against damage to materials stored and work installed in freezing weather.

1.19 EROSION AND SEDIMENT CONTROL

.1 Plan and execute construction by methods to control surface drainage from cut and fill and from borrow and waste disposal areas.

.2 Prevent erosion and sedimentation.

.3 Minimize amount of bare soil exposed at one time.

.4 Provide temporary measures to prevent water flow.

.5 Locate fill and waste areas to avoid erosive surface silts or clays.

1.20 RODENT AND VERMIN CONTROL

.1 Retain an exterminator to protect premises from rodent and vermin infestation if deemed necessary by the Consultant.

.2 Use extermination materials approved by local Health Department or other agency having jurisdiction.

1.21 FIRE PROTECTION

.1 Provide and maintain temporary fire protection in the form of fire extinguishers, in accordance with the authorities having jurisdiction, including the local Fire Department and the insurance companies.

.2 Protect the Work, adjacent properties, Owner’s equipment and Contractor’s equipment against fire hazards.

.3 Adjust and modify temporary fire protection facilities to accommodate the progress of the Work.

.4 Provide and maintain access routes to exits, clean and visibly identified.

.5 Fire Watch

.1 A fire watch is required for each of the following activities, regardless of the number in a single area:

(1) Any open flame activity, including soldering and welding.
(2) Shut down of the fire detection system.
(3) Shut down of the sprinkler system.

.6 Temporary Buildings

.1 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 10 metres away from buildings.

.2 If constructed of combustible materials separate these structures into small detached units.

.7 Access To Fire Extinguishing Equipment and Exits

.1 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 3 metres of hydrants or connection, nor between them and centre line of the street.

.2 Maintain free access at all times to control valves and hose on fire lines within building and to all portable extinguishers.

.3 Maintain free access at all times to existing exit stairs in the building.

.8 Fire Doors

.1 Install fire doors and put into operating condition at the earliest possible time.

.9 Rubbish

.1 Remove flammable rubbish promptly from the premises. If removal is unavoidably delayed reduce fire hazards by wetting down. Disposal of waste material by burning on or near the premises is not permitted.

.2 Clean up and remove rubbish into containers. Removal of containers and disposal off the site including all dumping fees will be the responsibility of the Contractor.

.10 Cutting and Torching

.1 Where electric or gas welding or cutting is to be done within 3 metres of, or above space that may be occupied by persons, or combustible material interpose shields of incombustible material.

.2 Maintain appropriate fire extinguishing equipment near all welding and cutting operations.

.11 Storage of Paints, Oils and Gasoline

.1 Store paints and volatile liquids in a separate shed, and inspect frequently. Place fire extinguisher at the door of paint storage shed.

.2 Store gasoline outside under lock and key, well away from the structure.

.12 Temporary Wiring

.1 Inspect temporary wiring, drop cords or temporary extension cables frequently for defective insulation or connections.

END OF SECTION

1 General

1.1 INSTRUCTIONS

.1 Comply with Instructions to Bidders, the General Conditions of the Contract, Supplementary Conditions and the General Requirements of Division 1.

1.2 SECTION INCLUDES

.1 Control of traffic during construction operations.

1.3 INTENT

.1 Conduct operations along roads and highways in a manner that inconvenience and hazards to traffic are minimized.

.2 Maintain roadways safe for traffic.

.3 Confine operations so that only a minimum length of trench is open at any time.

.4 Backfill a length each day equivalent to that opened.

.5 Provide and maintain pedestrian access to all properties.

.6 Provide and maintain emergency access to all properties.

.7 Provide and maintain emergency access for fire trucks, ambulances and other vehicles for emergency services.

1.4 APPROVALS AND NOTICES

.1 Obtain approval from the authority having jurisdiction for closing any road to traffic.

.2 Notify Fire Department, Police Department, Works Department and any other necessary authority of approximate times roads will be closed for.

1.5 TRAFFIC CONTROL

.1 Provide all flagmen necessary to direct flow of traffic.

.2 Provide and maintain traffic signals and warning signs as required.

.3 Provide and maintain detours for traffic where required. Mark detours as directed by Police Department, Works Department.

.4 Make arrangements with appropriate authorities if single lane conditions continue past normal working hours.

.5 Supply and plane crushed stone on road shoulder to maintain traffic on road shoulders as required.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Provide Products that are not damaged or defective, and suitable for purpose intended, subject to specified requirements. If requested by Consultant, furnish evidence as to type, source and quality of Products provided.

.2 Unless otherwise specified, maintain uniformity of manufacture for like items throughout.

1.2 PRODUCT OPTIONS

.1 Subject to the provisions of Section 01 25 00:

.1 Wherever a Product or manufacturer is specified by a single proprietary name, provide the named Product only.

.2 Wherever more than one Product or manufacturer is specified by proprietary name for a single application, provide any one of the named Products.

.2 Wherever a Product is specified by reference to a standard only, provide any Product that meets or exceeds the specified standard. If requested by Consultant, submit information verifying that the proposed Product meets or exceeds the specified standard.

.3 Wherever a Product is specified by descriptive or performance requirements only, provide any Product that meets or exceeds the specified requirements. If requested by Consultant, submit information verifying that the proposed Product meets or exceeds the specified requirements.

1.3 PRODUCT AVAILABILITY AND DELIVERY TIMES

.1 Promptly upon Contract award and periodically during construction, review and confirm Product availability and delivery times. Order Products in sufficient time to meet the construction progress schedule and the Contract Time.

.2 If a specified Product is no longer available, promptly notify Consultant. Consultant will take action as required.

.3 If delivery delays are foreseeable, for any reason, promptly notify Consultant.

.1 If a delivery delay is beyond Contractor’s control, Consultant will provide direction.

.2 If a delivery delay is caused by something that was or is within Contractor’s control, Contractor shall propose actions to maintain the construction progress schedule for Consultant’s review and acceptance.

1.4 STORAGE, HANDLING, AND PROTECTION

.1 Store, handle, and protect Products during transportation to Place of the Work and before, during, and after installation in a manner to prevent damage, adulteration, deterioration, and soiling.

.2 Comply with manufacturer's instructions for storage, handling, and protection.

.3 Store packaged or bundled Products in original and undamaged condition with manufacturer's seals and labels intact. Do not remove from packaging or bundling until required in Work.

.4 Comply with the requirements of the workplace hazardous materials information system (WHMIS) regarding use, handling, storage, and disposal of hazardous materials, including requirements for labeling and the provision of material safety data sheets (MSDS).

.5 Store Products subject to damage from weather in weatherproof enclosures.

.6 Store sheet Products on flat, solid, supports and keep clear of ground. Slope to shed moisture.

.7 Remove and replace damaged Products.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Contractor shall coordinate Owner supplied products with the Construction Schedule for delivery dates.

.2 Contractor shall coordinate with the Owner for installation of Owner installed items, blocking and servicing requirements and confirm dimensional requirements for items being built-in or attached to Contractor's work.

.3 Contractor shall coordinate Owner supplied products, installed by the Contractor for installation requirements, blocking and servicing requirements and confirm dimensional requirements for items being built-in or attached to Contractor's work.

.4 Contractor is responsible for Owner supplied items once delivered to site.

Part 2 Products

2.1 PRE-PURCHASED MATERIALS

.1 The Owner has ordered and purchased, the following listed items of equipment, to be delivered to the Work site by the equipment manufacturer/vendor. The Contractor shall install the equipment. List as follows:

.1 Projectors
.2 Projection Screens: Manual and power-operated units.
.3 TV's
.4 Height-adjustable Presenter Podiums
.5 Refer to Drawings, and FF&E Schedule.

Part 3 Execution

3.1 PREPARATION

.1 Contractor shall provide all necessary framing, support and blocking built into walls (or ceiling) to receive pre-purchased equipment and furniture, all services roughing-in, in accordance with reviewed shop drawings which will be later supplied by the Owner.

.2 Owner Supplied, Contractor Installed Materials: Contractor shall receive and unload each item, transport it to its designated place of installation and unpack, assemble and install, and connect to building services, and as follows:

.1 Owner's Responsibilities:

.1 Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to Contractor.
.2 Deliver supplier's bill of materials to Contractor.
.3 Arrange and pay for delivery to site in accordance with Progress Schedule.
.4 Inspect deliveries jointly with Contractor.
.5 Submit claims for transportation damage.

.6 Arrange for replacement of damaged, defective or missing items.

.7 Arrange for manufacturer's field services; arrange for and deliver manufacturer's warranties and bonds to Contractor.

.2 Contractor’s Responsibilities:

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

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

.3 Receive and unload products at site.

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

.5 Handle products at site including un-crating and storage.

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

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

.8 Provide installation inspections required by public authorities.

.9 Repair or replace items damaged by Contractor or Subcontractor on site (under their control).

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Reserved

.2 Any others

1.2 REFERENCES

.1 Ontario. Environmental Protection Act. Ontario Regulation 102/94: Waste Audits and Waste Reduction Workplans.

.2 Ontario. Ministry of the Environment (MOE). A Guide to Waste Audits and Reduction Workplans for Construction and Demolition Projects as Required Under Ontario Regulation 102/94.

.3 Ontario. Environmental Protection Act. Ontario Regulation 103/94: Industrial, Commercial and Institutional Source Separation Programs.

.4 Ontario. Ministry of the Environment (MOE). A Guide to Source Separation of Recyclable Materials for Industrial, Commercial and Institutional Sectors and Multi-Unit Residential Buildings as Required Under Ontario Regulation 103/94.

.5 Canadian Construction Association. Standard Construction Document CCA 27-1997: A Guide on Construction ENVIRONMENTAL Management Planning.

.6 Canadian Construction Association. Standard Construction Document CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.

.7 Canada. Public Works and Government Services Canada. 2002 National Construction Renovation and Demolition Non-Hazardous Solid Waste Management Protocol.

.8 Ontario Environmental Protection Act and Applicable Regulations

1.3 QUALITY ASSURANCE

.1 The Contractor shall minimize the amount of solid waste (including land-clearing debris) generated by construction, renovation and demolition (CRD) activities.

.2 The Contractor shall divert at least 40% of solid waste (include land-clearing debris) from landfill (through reuse and recycling) to ensure Construction Waste Management requirements are met.

.3 The Contractor shall comply with all applicable provincial and municipal regulations related to construction waste management, including the Ontario Environmental Protection Act Regulation 102/94 and Regulation 103/94.

1.4 DEFINITIONS

.1 Comingled Waste: a mix of various types of recyclable materials such as wood, metals and cardboard.

.2 Mixed Waste: constitutes a mix of recyclable materials and waste materials for landfill.

1.5 DESCRIPTION OF WORK

.1 The Contractor shall be responsible for all aspects of Construction Waste Management.

.2 The Contractor shall identify, implement and document measures to achieve the waste management objectives listed in this Section.

.3 Waste Management and Disposal activities shall include:

.1 Arrangement of waste management service agreements with waste haulers and receiving facilities.

.2 Supervision of on-site waste management activities on a daily basis.

.3 Coordination of waste management tasks with subcontractors and trades to ensure timely and orderly progress of the work.

.4 Preparation of waste management documentation and submittals for all shipments of waste materials from the project site.

.5 Reporting of waste management progress to the Owner and/or consultant

1.6 SUBMITTALS

.1 Within 14 calendar days after receipt of Notice of Awards of Contract, and prior to any waste removal, whichever occurs sooner, the Contractor shall submit a Construction Waste Management Plan to the Owner and/or Consultant containing the following information:

.1 An analysis of job site waste to be generated, including the types and estimated quantities of recyclable and waste materials that will be generated.

.2 A list of the proposed receiving facilities for waste materials indicating the type of materials that will be disposed of at each facility and whether the material will be reused, recycled, or sent to landfill.

.2 The Contractor shall complete the Construction Waste Reporting Form attached in Schedule 1 for each waste shipment as follows:

.1 Attach copies of associated waybills, invoices, and other supporting documentation to the Construction Waste Reporting Form, indicating the date of disposal, quantity of material by weight, name of waste hauler, and name of receiving facility for each waste shipment generated on site.

.2 Following mobilization, submit completed Construction Waste Reporting Forms and supporting documentation to the Owner and/or Consultant on a monthly basis and a final summary of construction waste disposal upon project completion.

1.7 PRE-CONSTRUCTION MEETING

.1 The Contractor shall schedule and conduct a pre-construction meeting with the Owner and/or Consultant and construction team to review the Construction Waste Management Plan, waste management procedures, and documentation and submittal requirements.

2 Execution

2.1 GENERAL

.1 The Contractor shall distribute copies of the Construction Waste Management Plan to the Site Superintendent and each Subcontractor.

.2 The Contractor shall provide on-site instruction of appropriate separation, handling, and recycling procedures to be used by all parties at the appropriate stages of the Project.

2.2 WASTE DIVERSION

.1 The Contractor shall make arrangements with local salvaging/recycling facilities and arrange for disposal and recycling/reuse services. The sorting of recyclables may be done on or off site depending on site area constraints, at the discretion of the Contractor. As a minimum, the proposed facilities must recycle/reuse the following waste materials generated by construction activities:

.1 Land clearing debris

.2 Asphalt

.3 Concrete / masonry / stone

.4 Steel and other metals

.5 Wood (see note below)

.6 Gypsum

.7 Cardboard & Paper

.8 Plastic

.9 Glass

.2 The Contractor shall provide recycling bins near the construction site for recycling waste generated by site workers. As a minimum, bins shall be provided for the following materials:

.1 Metal food and beverage cans

.2 Glass bottles and jars for food and beverage

.3 Plastic/PET bottles for food and beverage

.4 Cardboard and Paper products

2.3 ON-SITE WASTE SORTING

.1 The Contractor shall designate and label a specific area to facilitate separation of materials for recycling and salvage. Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials. Containers shall be sized to accommodate the separation and storage of expected waste types and quantities and shall clearly indicate the material type being stored in each container using appropriate signage.

2.4 OFF-SITE WASTE SORTING

.1 The Contractor may arrange for off-site sorting of mixed waste and comingled materials if the following requirements are met:

The sorting facility must provide actual weights and volumes of mixed/comingled construction waste loads but can estimate the load's material composition (amount of each type of waste) by weight or volume. Average waste densities can then be applied to estimated volumes to determine weight of each type of material in mixed/comingled waste loads.

.1 The sorting facility must confirm the destination and end use for each material diverted from landfill. Signed attestations from the waste hauler are acceptable. Separate reports from end-use facilities are not required.

2.5 WASTE TRACKING

.1 The Contractor shall coordinate delivery of separated materials to approved facilities for recycling, reuse or disposal.

.2 The Contractor shall retain all waybills, invoices, and other documentation for submission to the Owner and record all waste shipments using the Construction Waste Reporting Form as per this Section.

SCHEDULE 1: CONSTRUCTION WASTE REPORTING FORM

CONSTRUCTION WASTE REPORTING FORM

Date: .....

Project Name: .....

Type of Material:

Work Request:

Total Weight (metric tonnes):

Weight Recycled/ Reused/ Diverted:

Weight to Landfill:

Receiving Facility:

Waybill/ Invoice #:

Contact Name:

Contact Signature:

Company Name:

END OF SECTION

1 GENERAL

1.1 GENERAL TAKE-OVER PROCEDURES

.1 The procedures for completing Contract and acceptance by the Owner shall be in accordance with the methods described in OAA/OGCA Document 100 (July 1, 2018, and reissued January 8, 2019) and any additional requirements described below.

.2 Stages will be reviewed at the Contract start-up meeting to ensure that parties understand their responsibilities. Refer to Section 01 10 00 - Summary for procedures and requirements for Contract start-up meeting.

.3 Within 4 weeks of commencement of the Work, submit to the Consultant a list of closeout submittals required by the Contract Documents.

.4 Provided below, for the Contractor and their Subcontractors' benefit, is a list of minimum requirements for this Contract closeout.

.1 Substantial Performance as per OAA/OGCA Document 100 and 1.3 of this Section.

.2 Ready-for-Takeover as per 1.4 and 1.5 of this Section.

.3 Provide closeout submittals as per Section 01 78 00 - Closeout Submittals.

1.2 DEFICIENCY

.1 A Deficiency Holdback will be retained by the Owner until all applicable certificates, warranties (including extended warranties), tax rebates, balancing report, demonstrations of systems, final cleaning and deficiencies have been received or completed to the satisfaction of the Consultant.

.2 Percentage Deficiency Holdback:

.1 Upon determination of the defect and deficiency list, submit to the Consultant and Owner within 5 Working days written notification of any items, which may not be corrected within 28 calendar days.

.2 The Owner 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 Owner reserves the right to correct defects and deficiencies and deduct the cost thereof from any payments due the Contractor.

.3 When all deficiencies have been completed and verified by the Contractor, notify the Consultant for further review. Upon becoming satisfied that all deficiencies have been corrected and upon receiving all certificates, warranties, balancing reports and tax rebates and upon verifying completeness of all final cleaning and demonstrations and upon receiving the Contractor's final invoice, a Final Payment Certificate" will be issued by the Consultant.

.4 If the Contractor notifies the Consultant to re-review deficiencies, and upon visiting the project, the Consultant finds less than 75% completion of the outstanding listed deficiency items, it will be judged that the Contractor has not verified the deficiencies prior to notifying the Consultant. If this occurs, all future re-review hours will be charged to the Contractor on an hourly basis. The hourly rate charged will be $120.00/hour plus Value Added Taxes and plus travel costs.

.5 If all deficiencies are not completed within a reasonable period of time, the Consultant will invoke the requirements of GC 7.1 - OWNERS RIGHT TO PERFORM WORK OR STOP THE WORK OR TERMINATE CONTRACT.

1.3 SUBSTANTIAL PERFORMANCE OF THE WORK

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

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

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

.2 Provided below, for the Contractor and their Subcontractors' benefit, is a list of minimum requirements for Substantial Performance.

.1 Contractor to notify Consultant, in writing, when Contractor feels they meet the requirements of Substantial Performance as set out in OAA/OGCA Document 100.

.2 The Contractor and required Subcontractors, in consultation with the Consultant, shall prepare a list of incomplete and unsatisfactory work.

.3 Contractor shall make written application to the Consultant for Substantial Performance which must include all of the following:

.1 Statement that the contract is substantially performed in compliance with the Contract Documents.

.2 An invoice showing the amount of holdback owing accompanied by a Statutory Declaration and WSIB Certificate of Clearance.

.3 Submission of closeout requirements.

.4 A statement of completion with cost values as described in 3.2 (c) of OAA/OGCA Document 100.

.4 If the Consultant finds the Contractor's application complete, the Consultant will visit the Place of the Work and verify the validity of the application.

.5 If the application is approved by the Consultant, the Consultant will issue a Certificate of Substantial Performance of the Work to the Owner and the Contractor.

.6 The Contractor shall publish a copy of the Certificate of Substantial Performance of the Work in the "Daily Commercial News" and provide a copy to the Consultant.

.7 The 60-day lien period begins on the date of publication with the holdback monies due, if no liens exist, on the sixtieth (60th) day.

1.4 READY-FOR-TAKEOVER

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

1.5 INSPECTION AND REVIEW BEFORE READY-FOR-TAKEOVER

.1 Contractor's Inspection: Before applying for the Consultant's review to establish Ready-for-Takeover of the Work:

.1 Ensure that the specified prerequisites to Ready-for-Takeover of the Work are completed.

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

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

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

.2 Consultant's Review: Upon receipt of the Contractor's application for review, together with the Contractor's list of items to be completed or corrected, the Consultant and the Contractor shall arrange a mutually satisfactory agreed date and time to jointly review the Work. The Consultant will advise the Contractor whether or not the Work is Ready-for-Takeover. Add additional items, if any, to the Contractor's list of items to be completed or corrected. Provide the Consultant with a copy of the revised list.

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

.4 When the Consultant determines that the Work is Ready-for-Takeover, the Consultant will notify the Contractor and the Owner in writing to that effect.

1.6 PREREQUISITES TO FINAL PAYMENT

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

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

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

.3 Perform final cleaning and waste removal necessitated by the Contractor's work performed after Ready-for-Takeover, as specified in Division 01 – General Requirements and Section 01 74 19 – Construction Waste Management.

1.7 FINAL INSPECTION FOR COMPLETION OF THE CONTRACT

.1 Deficiencies and defects shall be made good before the Contractor submits a written request for final review of the Work and before the Contract is considered complete.

.2 When Contractor is satisfied that the Work is complete, and after the Contractor has reviewed the Work to verify its completion in accordance with the requirements of the Contract Documents, the Contractor shall submit a written request for a final review by the Consultant, who in turn will notify the Owner.

.3 If there are any deficiencies identified as a result of this review, they shall be listed by the Consultant and submitted to the Contractor. This list shall be recognized as the final deficiency list for purposes of acceptance of the Work under the Contract.

.4 Such deficiencies shall be corrected by a date mutually agreed upon between Consultant and the Contractor, unless a specific date is required by Contract, and a further review by the Consultant shall be called for by the Contractor following his own review to take place within 7 days from date of request.

.5 Contractor shall thereafter submit invoice for final payment.

.6 Money withheld for deficiency work shall be released only when all deficiencies have been completed. No partial payment to be recognized until all work is completed

END OF SECTION

1 GENERAL

1.1 OPERATION AND MAINTENANCE MANUAL

.1 Prepare a comprehensive operation and maintenance manual, in the language of the Contract, using personnel qualified and experienced for this task.

.2 Submit one initial draft of the operation and maintenance manual for Consultant's review. If required by Consultant's review comments, revise manual contents and resubmit for Consultant's review. If required, repeat this process until Consultant accepts the draft manual in writing.

.3 Submit final version to Owner in hard copy and electronic format. Provide two hard copies.

1.2 OPERATION AND MAINTENANCE MANUAL FORMAT

.1 Organize data in the form of an instructional manual.

.2 Cover Page: Identify each binder with typed or printed title "Operation and Maintenance Manual", name of Project or facility, and subject matter of contents.

.3 Arrange content by systems, under Section numbers and sequence of Table of Contents.

.4 Text: Manufacturer's printed data, or typewritten data.

.5 Binders: vinyl, hard covered, three D-rings, loose leaf, 216 x 279 mm, with spine and face pockets.

.6 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

.7 Provide tabbed fly leaf for each separate Product or system, with typed description of Product and major component parts of equipment.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.9 Provide electronic copy of manual in PDF format.

.10 Provide electronic copy of Shop Drawings in manual as 1:1 scaled CAD files in .dwg format electronic media acceptable to Owner.

1.3 OPERATION AND MAINTENANCE MANUAL – GENERAL CONTENT

.1 Table of contents for each volume.

.2 Introductory information including:

.1 Date of manual submission.

.2 Complete contact information for Consultant, subconsultants, other consultants, and Contractor, including: names of responsible parties, addresses, and phone and fax numbers.

.3 Schedule of Products and systems indexed to content of volume.

.3 For each Product or system, include complete contact information for Subcontractors, Suppliers and manufacturers, including local sources for supplies and replacement parts.

.4 Product Data: mark each sheet to clearly identify specific products, options, and component parts, and data applicable to installation. Delete or strike out inapplicable information. Supplement with additional information as required.

.5 Reviewed Shop Drawings.

.6 Final hardware and finish schedules.

.7 Permits, certificates, letters of assurance and other relevant documents issued by or required by authorities having jurisdiction.

.8 Warranties.

.9 Operating and maintenance procedures, incorporating manufacturer's operating and maintenance instructions, in a logical sequence.

.10 Training materials as specified in Section 01 79 00 - Demonstration and Training.

1.4 OPERATION AND MAINTENANCE MANUAL - EQUIPMENT AND SYSTEMS CONTENT

.1 Each Item of Equipment and Each System: include description of unit or system and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Roofing and waterproofing systems:

.1 List manufacturer, installer, material properties and composition and details of installation.

.2 List every component of system including insulation and flashings.

.3 Provide manufacturer and installer recommendations for inspections, maintenance and repair.

.3 Panel Board Circuit Directories: provide electrical service characteristics, controls, and communications.

.4 Include installed colour coded wiring diagrams.

.5 Operating Procedures: include start up, break in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut down, and emergency instructions. Include summer, winter, and any special operating instructions.

.6 Maintenance Requirements: include routine procedures and guide for trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.7 Provide servicing and lubrication schedule, and list of lubricants required.

.8 Include manufacturer's printed operation and maintenance instructions.

.9 Include sequence of operation by controls manufacturer.

.10 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.11 Provide installed control diagrams by controls manufacturer.

.12 Provide Contractor's coordination drawings, with installed colour coded piping diagrams.

.13 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.14 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.15 Include testing and balancing reports.

.16 Include additional content as specified in technical Specifications sections.

1.5 OPERATION AND MAINTENANCE MANUAL - PRODUCTS AND FINISHES CONTENT

.1 Include Product data, with catalogue number, options selected, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured Products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Include an outline of requirements for routine and special inspections and for regular maintenance to ensure that on-going performance of the building envelope will meet the initial building envelope criteria.

.4 Include additional content as specified in technical Specifications sections.

1.6 OPERATION AND MAINTENANCE MANUAL - WARRANTIES CONTENT

.1 Separate each warranty with index tab sheets keyed to Table of Contents listing.

.2 List each warrantor with complete contact information.

.3 Verify that documents are in proper form and contain full information. Ensure that warranties are for the correct duration and are in Owner’s name.

.4 The warranty period(s) shall commence on the date Ready-for-Takeover is achieved.

1.7 PROJECT RECORD DOCUMENTS

.1 The Project record documents consist of as-built drawings and specifications, and the accepted Shop Drawings, product data sheets, and samples.

.2 Submit final as-built drawings in the form specified in Section 01 32 00 – Construction Progress Documentation to Consultant.

1.8 SPARE PARTS, MAINTENANCE MATERIALS, AND SPECIAL TOOLS

.1 Supply spare parts, maintenance materials, and special tools in quantities specified in technical Specifications sections.

.2 Ensure spare parts and maintenance materials are new, not damaged nor defective, and of same quality, manufacturer, and batch or production run as installed Products.

.3 Provide tags for special tools identifying their function and associated Product.

.4 Deliver to and store items at location directed by Owner at Place of the Work. Store in original packaging with manufacturer’s labels intact and in a manner to prevent damage or deterioration.

.5 Store neatly in the storage locations as predetermined by Owner.

.6 Catalogue all items and submit to Consultant an inventory listing organized by Specifications section. Include Consultant reviewed inventory listing in operation and maintenance manual.

END OF SECTION

1 GENERAL

1.1 SUMMARY

.1 Demonstrate and provide training to Owner's personnel, during regular work hours, on the care, operation, and maintenance of equipment and systems prior to scheduled date of Ready-for-Takeover of the Work.

.2 Owner will provide list of personnel to receive training and will coordinate their attendance at agreed upon times.

.3 Coordinate and schedule demonstration and training provided by Subcontractors and Suppliers.

1.2 SUBMITTALS

.1 Submit proposed dates, times, durations, and locations for demonstration and training of each item of equipment and each system for which demonstration and training is required. Allow sufficient time for training and demonstration for each item of equipment or system, or time as may be specified in technical Specifications.

.2 Consultant and Owner will review submittal and advise Contractor of any necessary revisions.

.3 Submit report(s) within 5 Working Days after completion of demonstration and training:

.1 identifying time and date of each demonstration and training session,

.2 summarizing the demonstration and training performed, and

.3 including a list of attendees.

1.3 PREREQUISITES TO DEMONSTRATION AND TRAINING

.1 Testing, adjusting, and balancing has been performed in accordance with Contract Documents.

.2 Equipment and systems are fully operational.

.3 Copy of completed operation and maintenance manual is available for use in demonstration and training.

.4 Conditions for demonstration and training comply with requirements specified in technical Specifications.

1.4 DEMONSTRATION AND TRAINING

.1 Demonstrate start up, operation, control, adjustment, troubleshooting, servicing, and maintenance of each item of equipment and system at equipment location.

.2 Review operation and maintenance manual in detail to explain all aspects of operation and maintenance.

.3 For equipment requiring seasonal operation, perform instructions for other seasons within six months.

.4 Prepare and insert additional information in operation and maintenance manual if required.

.5 Refer to individual Sections for additional requirements.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 09 21 16 – Gypsum Board Assemblies.

.3 Electrical and mechanical drawings and specifications.

1.2 DEFINITIONS

.1 Cutting: Removal of existing construction necessary to permit installation or performance of other Work.

.2 Patching: Fitting and repair work required to restore surfaces and substrates to original conditions after installation of other Work.

1.3 SPECIAL CONSTRAINTS

.1 Noise Generating Work:

.1 Notify Owner in advance of all noise-generating activities which may disrupt normal building operations.

.2 Noise generating operations are strictly prohibited during student exam times. No such operations will be allowed without the express permission of the Owner during these times. Coordinate with Owner to avoid conflicts.

.2 Work of this Section shall comply with Section 01 14 00 - Work Restrictions.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Cutting and Patching Proposal: Submit a proposal describing procedures at least 7-days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

.1 Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.

.2 Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.

.3 Products: List products to be used and firms or entities that will perform the Work.

.4 Dates: Indicate when cutting and patching will be performed.

.5 Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.

.6 Consultant's Acceptance: Obtain acceptance of cutting and patching proposal before cutting and patching. Review and acceptance of cutting and patching proposal does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

.1 Structural Elements: Do not cut and patch structural elements in a manner that could change their load carrying capacity or load deflection ratio.

.2 Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety, including the following:

.1 Primary operational systems and equipment.

.2 Air or smoke barriers.

.3 Fire protection systems.

.4 Control systems.

.5 Communication systems.

.6 Electrical wiring systems.

.3 Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety, including the following:

.1 Water, moisture, or vapour barriers.

.2 Membranes and flashings.

.3 Exterior wall construction.

.4 Equipment supports.

.5 Piping, ductwork, vessels, and equipment.

.6 Noise and vibration control elements and systems.

.4 Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Consultant's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner. If possible, retain original Installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specialized firm.

.5 Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

.6 Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

Part 2 Products

2.1 MATERIALS

.1 General: Comply with requirements specified in other Sections of the Contract Specifications.

.2 Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible:

.1 If identical materials are unavailable or cannot be used, use materials that, when installed, will match the appearance and functional performance of existing materials.

Part 3 Execution

3.1 EXAMINATION

.1 Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed:

.1 Provide X-ray, ultrasound or other approved methods to determine locations of existing services and reinforcing steel in existing concrete slabs and block walls before cutting and renovations. Advise Consultant of findings before proceeding with the Work and revise penetration locations as required and directed by Consultant. Existing concrete slab thickness is to be confirmed by Contractor.

.2 Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

.3 Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 AIR QUALITY MANAGEMENT

.1 Contractor's Site Tests and Inspections:

.1 Indoor Air Quality Control Requirements: Perform work in accordance with IAQ requirements specified in Division 01 – General Requirements, and as follows:

.1 Protect building materials from damage by:

.1 fully covering stored materials,

.2 elevating stored materials off ground, and

.3 disposing of materials with evidence of moisture damage.

3.3 PREPARATION

.1 Temporary Support: Provide temporary support of Work to be cut as required.

.2 Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

.3 Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

.4 Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to minimize interruption of services to occupied areas.

3.4 PERFORMANCE

.1 General: employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay:

.1 Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

.2 Cutting: cut existing construction by sawing, drilling, coring, breaking, chipping, grinding, and similar operations, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations:

.1 In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Core, and cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

.2 Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

.3 Concrete or Concrete Unit Masonry: Cut using a cutting or coring machine, such as an abrasive saw or a diamond core coring drill.

.4 Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.

.5 Proceed with patching after construction operations requiring cutting are complete.

.3 Patching: patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications:

.1 Inspection: where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

.2 Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

.3 Floors and Walls: where walls or partitions that are removed extend from one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, colour, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform colour and appearance.

.1 Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

.4 Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

.5 Ceilings: patch, repair, or re-hang existing ceilings as necessary to provide an even plane surface of uniform appearance.

.6 Exterior Building Enclosure: patch components in a manner that restores enclosure to a weather tight condition.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This Section includes requirements for selective demolition Work, including salvage of identified components, and related repairs.

.2 Retain a structural engineer as required by the Ontario Building Code, 2024.

.3 Ensure that the safety of the occupants and visitors to the existing facility is not affected, as required by Code.

.4 Coordinate with Drawings as required.

1.2 RELATED SECTIONS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 02 07 50 – Cutting and Patching

.3 Section 07 84 00 – Firestopping and Smoke Seals

.4 Section 09 21 16 – Gypsum Board Assemblies

1.3 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI A10.8-2019, Scaffolding Safety Requirements.

.2 Canadian Federal Legislation

.1 Canadian Environmental Assessment Act (CEAA), 2012.

.2 Canadian Environmental Protection Act (CEPA), 2012.

.3 Hazardous Materials Information Review Act, 1985

.4 Transportation of Dangerous Goods Act, 1992 (S.C. 1992, c. 34).

.3 CSA Group (CSA)

.1 CAN/CSA A371-14 (R2024), Masonry Construction for Buildings.

.2 CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

.3 CSA Z783:12(R2021), Deconstruction of buildings and their related parts.

.4 National Fire Protection Association (NFPA)

.1 NFPA (Fire) 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations, 2027 Edition.

.5 Provincial Legislation

.1 Legislation specific to Authorities Having Jurisdiction for work governed by this Section.

1.4 DEFINITIONS

.1 Construction Waste Management Plan (CWM Plan): Written plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19 and as follows:

.1 Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project.

.2 Construction Waste Management Report (CWM Report): Written report identifying actual materials that formed CWM Plan for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19 – Construction Waste Management.

.3 Deconstruction: systematic dismantling of structure in a manner that achieves safe removal/disposal of hazardous materials and maximum salvage/recycling of materials.

.1 Ultimate objective is to recover potentially valuable resources while diverting from landfill what has traditionally been significant portion of waste system.

.4 Demolish: Detach items from existing construction and legally dispose of them off site, unless indicated to be removed and salvaged or removed and reinstalled.

.5 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed, removed and salvaged, or removed and reinstalled.

.6 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by the Federal Hazardous Products Act (RSC 1985) including latest amendments.

.7 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.8 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form.

.1 Recycling does not include burning, incinerating, or thermally destroying waste.

.9 Remove and Salvage: Detach items from existing construction and deliver them to Owner.

.10 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

.11 Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

.12 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from remodelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors.

.13 Waste Management Coordinator (WMC): Contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

1.5 PRE-EXISTING CONDITIONS – HAZARDOUS MATERIALS

.1 Any work that involves contact with pre-existing hazardous materials shall meet Province of Ontario and Government of Canada requirements, and conform to the directions of authorities having jurisdiction and Owner's environmental consultant.

.2 Collection and transport of hazardous materials, if required, shall comply with The Transportation of Dangerous Goods (TDG) Act 1992.

.3 Any action (e.g., avoidance, containment, and/or some level of remedial response) required of the Contractor related to pre-existing hazardous materials in the building are the sole responsibility of Owner's environmental consultant to specify, review and accept.

.4 Lines of Communication and Authority:

.1 All correspondence, communication and requests for information pertaining to hazardous materials work pertaining to pre-existing hazardous building materials shall go directly to Owner's environmental cosultant, or such other qualified individual or firm appointed by the Owner, for specifications, processing, review and response.

.5 Definition:

.1 The term 'Consultant' as and when used in "Asbestos Management Plan", means Owner's environmental consultant, or such other qualified individual or firm appointed by the Owner, to specify and review work related to pre-existing hazardous materials present in the building.

.6 Scope of Work: refer to the Designated Substances and Hazardous Building Materials Assessment (Appendix), engage the services of a qualified hazardous materials abatement Subcontractor, and perform the recommended Work as part of this Contract. Remedial Work shall be completed prior to other Work in compliance with governing laws and regulations. Schedule time accordingly.

1.6 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Demolition Meeting: Conduct a pre-demolition meeting at Project site in accordance with requirements listed in Section 01 10 00 – Summary, to:

.1 Confirm extent of salvaged and demolished materials.

.2 Review Contractor's demolition plan

.1 Verify existing site conditions adjacent to demolition work

.2 Coordination with other construction sub trades.

.2 Coordination:

.1 Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

.2 Coordinate selective demolition work so that work of this Section adheres to aesthetic criteria established by the Drawings and specified dimensions with all elements in planes as drawn, maintaining their relationships with all other building elements.

.3 Coordinate with Owner's ongoing site operations, and limit the number of interruptions during regular business hours.

.4 Coordination with Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

.5 Coordination for shutoff, capping, and continuation of utility services.

1.7 TEMPORARY SUPPORT STRUCTURES

.1 For all instances when temporary structural support is required, provide engineered shop drawings, designed, stamped and signed by Delegated Design Engineer, and include with the shop drawings submitted for review all relevant engineering calculations pertaining to the design of the temporary works.

.2 Demolition in locations requiring advance installation of temporary support structures shall not proceed until:

.1 Engineered shop drawings have been submitted, as specified, for review.

.2 All changes to submitted shop drawings recommended by the Consultant have been executed and re-submitted for review.

.3 Final review of submitted shop drawings after corrections and amendments have been performed by the Consultant.

.4 The relevant structural trades have been contacted and consulted regarding the timing and design of the temporary support structure work, and all hand-off and other coordination details have been agreed amongst the affected trades.

.5 A memorandum of understanding stipulating the timing, hand-off and other coordination details, and the design of the temporary structures, and their eventual removal from the works, has been reviewed and signed by all affected trades and submitted to the Owner and Consultant.

.3 It is the Contractor and Delegated Design Engineer's responsibility to determine when temporary supports are required so that the work can be executed safely without compromising the structural integrity of the existing building to remain.

.4 All shoring and temporary works, and their subsequent removal, are part of Contract Price and shall be executed without additional charges to Contract.

1.8 ACTION AND INFORMATION SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.1 Schedule of Selective Demolition Activities – coordinate with project schedule per Section 01 32 00 – Construction Progress Documentation and indicate the following:

.1 Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.

.2 Coordinate with Owner's ongoing site operations, and limit the number of interruptions during regular business hours.

.3 Interruption of utility services.

.4 Coordination for shutoff, capping, and continuation of utility services.

.5 Use of elevator and stairs.

.6 Locations of temporary partitions and means of egress, including for others affected by selective demolition operations.

.7 Coordination with Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

.2 Demolition Plan: Submit a plan of demolition area indicating extent of temporary facilities and supports, methods of removal and demolition prepared by a professional engineer in accordance with requirements of Authority Having Jurisdiction, and as follows:

.1 Submit a detailed Waste Reduction Workplan in accordance with the requirements of Section 01 33 00 and Section 01 74 19.

.2 Submit list of items to be salvaged, and reused in project or provided to Owner for review.

.3 Prepare and submit a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of removal and dismantling work, including protection of surrounding and substrate materials and site.

.4 Proposed Noise Control and Dust Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Owner reserves the right to make modifications where proposed methods interfere with the Owner's ongoing operations.

.5 Inventory: Submit a list of items that have been removed and salvaged after selective demolition is complete.

.6 Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

.7 Pre-demolition Videotape and Photographs: Submit photographs and videotape indicating existing conditions of adjoining construction and site improvements prior to starting Work. Include finish surfaces that may be misconstrued as damage caused by selective demolition operations.

.8 Ensure all services, whether buried, built-in or exposed are properly identified as to position, type of service, size, and direction of flow as applicable. Slabs must be scanned or x-rayed for embedded services at repair locations prior to undertaking the repair work so that these services can be relocated.

.2 Informational Submittals: Provide the following submittals when requested by the Owner:

.1 Qualification Data: Submit information for companies and personnel indicating their capabilities and experience to perform work of this Section including; but not limited to, lists of completed projects with project names and addresses, names and addresses of completer projects, for work of similar complexity and extent.

.2 Inventory: Submit a list of items that have been removed and salvaged after demolition is complete. Note their condition and advise Owner and Consultant in writing of any defects or conditions that would affect their removal and reuse.

.3 Shop Drawings:

.1 Submit for review and approval demolition drawings, diagrams or details showing sequence of demolition work and supporting structures.

.2 Submit demolition drawings stamped and signed by professional engineer (P.Eng.) licensed to practice in province of work, and include all relevant engineering calculations.

.3 Submit engineered shoring and temporary structural support shop drawings, stamped and signed by a professional engineer (P.Eng.) licensed to practice in Ontario, including all relevant engineering calculations.

.4 Hazardous Materials: Provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.

.5 Refer to article **1.7 TEMPORARY SUPPORT STRUCTURES** of this section for special requirements.

.1 Submit shop drawings as specified.

.2 Submit the memorandum of understanding specified, signed by all affected trades.

.4 Proposed Dust-Control and Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed period for their operation. Owner reserves the right to make modifications where proposed methods interfere with the Owner's ongoing operations.

1.9 QUALITY ASSURANCE

.1 Meet or exceed the requirements of CSA S350 and OBC 2024, as amended.

.2 Delegated Design Engineer: retain the services of a professional structural engineer (P.Eng.) licensed to practice in province of work. The delegated design engineer shall design all required shop drawings, and stamp and sign them prior to submittal for review. The engineering calculations pertaining to the engineered shop drawings shall be submitted along with the shop drawings. The delegated design engineer shall perform site reviews of designed work in accordance with governing codes and regulations.

.3 Regulatory Requirements: Perform work as follows; use most restrictive requirements where differences occur between the municipal, provincial, and federal jurisdictions:

.1 Provincial and Federal Requirements: Perform work in accordance with governing environmental notification requirements and regulations of the Authority Having Jurisdiction.

.2 Municipal Requirements: Perform hauling and disposal operations in accordance with regulations of Authority Having Jurisdiction.

.4 Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project:

.1 Conform to the Ontario's Occupational Health and Safety Act (OHSA) and Regulations.

.2 Conform to Workplace Safety and Insurance Board regulations.

.3 Conform to City of Waterloo by-laws, regulations and ordinances governing this type of work.

1.10 SITE CONDITIONS

.1 Visit and examine the site and note all characteristics and irregularities affecting the work of this Section.

.2 Owner will occupy portions of building immediately adjacent to selective demolition area:

.1 Conduct selective demolition so that Owner's operations will not be disrupted.

.2 Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations

.3 Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities:

.1 Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.

.2 Should material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous as defined in the Ontario Environment Act and Regulation 347: General Waste Management, be encountered, stop work, take preventative measures, and notify Consultant and Owner immediately.

.4 Environmental protection:

.1 Ensure Work does not adversely contribute to excess air and noise pollution.

.2 Ensure proper disposal procedures are maintained throughout project.

.5 Prevent extraneous materials from contaminating air beyond work area by providing temporary enclosures during demolition work.

.6 Cover or dampen down dry materials and waste to prevent blowing dust and debris.

.7 Execute work as quietly as possible in and around existing building where Owner is occupying the space. Schedule noisy operations in consultation with Owner to achieve the least disturbance to Owner.

.8 Maintain continuation of fire protection in existing building during the Work.

.9 Maintain security of existing building during the work.

.10 Do not encumber, endanger, create nuisances, or interfere with the daily operations of the facility portions to remain, or the normal activities of the Owner's personnel and/or public in the building portions to remain, caused by temporary shoring and/or demolition work.

.11 Make good damage to structures to remain resulting from Work at no additional cost to Contract. Make good adjacent building surfaces and finishes to remain damaged by the Work at no additional cost to Contract.

Part 2 Products

2.1 TEMPORARY SUPPORT STRUCTURES

.1 Design temporary support structures required for demolition work and other supports necessary for the project using a qualified professional engineer registered or licensed in Ontario.

2.2 DEBRIS

.1 Make all arrangements for transport and disposal of all demolished materials from the site.

2.3 EQUIPMENT

.1 Provide equipment required for safe and proper demolition operations, and as required to prevent damage to existing adjacent materials, and substrates and finishes to remain.

.2 Pneumatic Hammers:

.1 For removal of surface concrete to depth of embedded steel:

.1 Maximum 14 kg (30 pound) total weight.

.2 For removal of concrete at and beyond embedded steel:

.1 Maximum 7 kg (15 pound) total weight.

.3 Rivet Busters not permitted.

2.4 REPAIR MATERIALS

.1 Supply all materials and products as required to restore construction to remain that has been damaged by the work of this Section. All restoration work shall be executed by the relevant trade; coordinate as required and pay all costs associated with repair of damage to existing construction to remain caused by the work of this Section.

.2 Use repair materials identical to existing materials:

.1 If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.

.2 Use material whose installed performance equals or surpasses that of existing materials.

.3 Comply with material and installation requirements specified in individual Specification Sections.

.3 Unit Masonry:

.1 Identify where conduit and services are location in walls before any cutting.

.2 Clean salvaged brick ready for rebricking, store on pallets and protect from weather.

.4 Floor Patching and Levelling Compounds: Cement based, trowel-able, self levelling compounds compatible with specified floor finishes; gypsum based products are not acceptable for work of this Section.

.5 Gypsum Board Patching Compounds: to Section 09 21 16 – Gypsum Board Assemblies; joint compound to ASTM C475/C475M Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board, bedding and finishing types thinned to provide skim coat consistency to patch and prepare existing gypsum board walls ready for new finishes.

.6 Hoarding and Dust Screens: to Section 01 35 25 – Owner Safety Requirements and Section 01 14 00 – Work Restrictions.

2.5 EXISTING MATERIALS

.1 Items to be salvaged and turned over to University: refer to related Drawings and Specification Sections for scope of items to be turned over and/or reused.

Part 3 Execution

3.1 EXAMINATION

.1 Inspect building with Consultant and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Locate and protect utilities. Verify that utilities have been disconnected and capped as required.

.3 Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

.4 Notify the Consultant where existing mechanical, electrical, or structural elements conflict with intended function or design:

.1 Investigate and measure the nature and extent of conflict and submit a written report to Consultant.

.2 Consultant will issue additional instructions or revise drawings as required to correct conflict.

.5 Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

.1 Coordinate existing services indicated to remain and protect them against damage during selective demolition operations.

.2 Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.

.1 Arrange to shut off affected utilities with utility companies.

.2 If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.

.3 Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

.4 If any pipe or conduit is found imbedded in concrete floor slab after removals, cut off pipe or conduit to a minimum of 25 mm (1") below slab, and remove any concrete mound if present. Patch concrete.

.3 Coordinate with mechanical and electrical sections for shutting off, disconnecting, removing, and sealing or capping utilities.

.4 Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

.1 Identify and mark all equipment and materials identified to be retained by Owner or to be re-used in subsequent construction. Separate and store items to be retained in an area away from area of demolition and protect from accidental disposal.

.2 Post warning signs on electrical lines and equipment that must remain energized to serve other areas during period of demolition.

.3 Confirm that all electrical and telephone service lines entering building are not disconnected.

.4 Do not disrupt active or energized utilities crossing the demolition site.

.5 Provide and maintain barricades, warning signs, protection for workers, and the public during the full extent of the Work. Read drawings carefully to ascertain extent of protection required.

.6 Mark all materials required to be re-used, store in a safe place until ready for re-installation.

.7 Adjust all junction boxes, receptacles and switch boxes flush with new wall construction where additional layers to existing construction are indicated.

3.4 PROTECTION

.1 Take precautions to guard against damage to adjacent work. Be liable for any damage or injury caused.

.2 Cease operations and notify Consultant if safety or any adjacent work appears to be endangered. Do not resume operations until reviewed with Consultant.

.3 Ensure safe passage of building occupants around and through area of demolition.

.4 Keep noise, dust, and inconvenience to occupants to minimum.

.5 Protect building systems, services, and equipment.

.6 Provide temporary dust screens, covers, railings, supports and other protection as required.

.7 Provide and maintain fire prevention equipment and alarms accessible during demolition.

.8 Do Work in accordance with Section 01 35 25 – Owner Safety Requirements.

3.5 HAZARDOUS MATERIALS

.1 Comply with the precautions and recommendations presented in the Pocket Ontario OH&S Act & Regulations 2026 (Consolidated Edition), “The Green Book”’, and governing federal and provincial regulations.

.2 Comply with Section 01 35 25 – Owner Safety Requirements.

.3 Take health and safety precautions as required; health and safety are priorities and precautions mandatory.

.4 Hazardous material abatement and remedial measures shall occur in advance of demolition work in the areas effected.

3.6 CONCRETE SLAB REINFORCING

.1 Locate location of reinforcing steel in concrete slabs prior to cutting or coring, using non-destructive, non-ionizing radio frequency locators.

.2 Core or cut concrete slabs to avoid reinforcing steel, electrical conduit or water pipes; adjust core location and coordinate with structural Engineer (P.Eng.) where slab features interfere with core drilling.

.3 Notify the structural Engineer (P.Eng.) immediately for further instructions where coring or cutting will damage existing slab features.

3.7 SELECTIVE DEMOLITION AND DECONSTRUCTION

.1 Restrict operations to elements designated for demolition as indicated.

.2 Refer to 1.5 PRE-EXISTING CONDITIONS – HAZARDOUS MATERIALS. Perform the recommended Work as part of this Contract. Remedial Work shall be completed prior to other Work

.3 Demolish and dismantle work in a neat and orderly manner, and in accordance with governing regulations.

.4 At end of each day’s work, leave Work in safe condition so that no part is in danger of toppling or falling.

.5 Demolish in a manner to minimize dusting and to prevent migration of dust.

.6 Selling or burning of materials on the site is not permitted.

.7 Remove concrete bases by cutting and chipping, take precautions against slab cracking and degradation. Grind edges smooth, fill, and make level with self-levelling grout.

.8 Fill openings in masonry walls with matching masonry units, coursing to match existing, prepare ready to receive new finishes.

.9 Fill all openings in gypsum board walls with gypsum board and steel framing to match existing, skim coat to make wall smooth and even.

.10 Refer to

.11 Demolish existing flooring and adhesive remnants where indicated, as follows:

- .1 Apply fine mist water spray to floors to minimize dust generation during removal. Avoid spraying near electrical outlets.
- .2 Demolish existing residual floor finishes, remove and dispose of offsite.
- .3 Remove adhesive to the greatest extent possible using scrapping tools, and as follows:
  - .1 Do not use solvent-based cleaners to remove adhesive remnants.
  - .2 Lightly shot blast or grind floor, using machine designed for purpose to remove adhesive remnants.
  - .3 Vacuum floor ready for application of skim coating.
- .4 Contractor to remove tiles and mortar and create level plane flush with adjacent ground surfaces.
- .5 Floor substrate shall be smooth, free from ridges and depressions, and adhesive remnants. Refer to Section 09 05 13 and Section 09 05 23.

.12 Removed and Salvaged Items:

- .1 Document condition of salvaged items and removal location with photographs, text labels, and room labels in a spreadsheet organized by room.
- .2 Clean salvaged items
- .3 Pack or crate items after cleaning
- .4 Identify contents of containers
- .5 Store items in a secure area.
- .6 Protect items from damage during transport and storage

.13 Masonry demolition:

- .1 Demolish in small sections
- .2 400mm from existing walls to be removed by hand
- .3 Cut masonry at junctures with construction to remain in small sections of not more than 2 m^2, using power driven saw, then remove masonry between saw cuts.
- .4 Agree with Consultant on the location of the saw cut and cut neatly, plumb and straight.
- .5 Where only part of a wall to be demolished, install adequate temporary support for adjacent part to remain.
- .6 Do not allow masonry to fall from from one level to another

.14 Demolish fireproofing spray as required to facilitate installation of proposed elements, including but not limited to: partition walls, bracing, suspended ceiling supports, structural steel and concrete, projector support, mechanical equipment, ductwork, and fixtures, piping, electrical wiring and equipment, armoured cable, fire alarm components, etc. Patch and repair openings in fireproofing spray with equivalent rated fireproofing spray that is compatible with existing substrates and adjacent surfaces.

.15 Demolish ceiling finishes where indicated.

.16 Demolish gypsum board partitions and finishes where indicated.

.17 Remove all wall coverings scheduled for demolition. Patch and repair wall surfaces with skim coat of gypsum board joint compound leaving wall surfaces smooth and even ready for new wall finishes.

.18 Reinstate existing fire-rated enclosure removed as part of the demolition work.

.19 Patch and repair all walls, floors, and ceilings damaged during demolition with material matching adjacent walls, prepare ready for new finishes.

.20 Repair mechanical equipment and electrical fixtures damaged or exposed during demolition as required and to the satisfaction of the Consultant; replace damaged units at the direction of the Consultant if extent of damaged impairs safety of function or aesthetic.

3.8 PATCHING AND REPAIRING

.1 Comply with the requirements of Section 02 07 50 – Cutting and Patching.

.2 Make good floor, wall, and ceiling finishes to remain that have been damaged by demolition operations. Repair materials shall be of highest quality and finished work shall match appearance of adjacent finishes. Repair substrates to full structural integrity, level and flush with adjacent substrate surfaces.

.3 Make good fire separations in compliance with Code requirements, to Section 07 84 00 – Firestopping and Smoke Seals. Firestop holes to maintain required fire separation rating.

.4 Floors and Walls:

.1 Where walls or partitions that are demolished extend from one finished area into another, patch and repair floor and wall surfaces in the new space.

.2 Provide a level and smooth surface having uniform finish colour, texture, and appearance.

.3 Remove existing wall coverings and replace with new materials, if necessary, to achieve uniform colour and appearance.

.4 Patch with durable seams that are as invisible as possible.

.5 Provide materials and comply with installation requirements specified in other Sections of these Specifications.

.6 Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.

.7 When requested, test and inspect patched areas after completion to demonstrate integrity of installation.

.5 Ceilings: Patch, repair, or re-hang existing ceilings as necessary to provide and even-plane surface of uniform appearance.

3.9 CLEANUP

.1 Promptly as the Work progresses, and on completion, clean up and remove from the site all rubbish and surplus material. Remove rubbish resulting from demolition work daily.

.2 Maintain access to exits clean and free of obstruction during removal of debris.

.3 Keep surrounding and adjoining roads, lanes, sidewalks, municipal rights-of-way clean and free of dirt, soil, or debris that may be a hazard to vehicles or persons.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 02 07 50 – Cutting and Patching.

.3 Section 07 92 00 - Joint Sealants.

.4 Section 09 05 13 – Mechanical Preparation of Flooring Substrates.

.5 Section 09 05 23 – Common Work Results for Flooring Preparation.

1.2 REFERENCES

.1 American Concrete Institute (ACI):

.1 ACI 117-10 (R2015), Specification for Tolerances for Concrete Construction and Materials (ACI 117-10) and Commentary-Reapproved 2015.

.2 ACI SPEC-301-20, Specifications for Concrete Construction.

.3 ACI 302.1R-15, Guide for Concrete Floor and Slab Construction.

.4 ACI PRC 302.2.-22, Concrete Slabs that Receive Moisture-Sensitive Flooring Materials-Guide.

.2 ASTM International (ASTM)

.1 ASTM C309-25, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.2 ASTM C1107/C1107M-20, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

.3 ASTM D1751-23, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types).

.4 ASTM D1752-18(2023), Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

.5 ASTM E1155/E1155M-23, Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers.

.6 ASTM E1486-14(2022), Standard Test Method for Determining Floor Tolerances Using Waviness, Wheel Path and Levelness Criteria.

.7 ASTM F710-22, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

.8 ASTM F1869-23, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

.9 ASTM F2170-19a, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

.3 CSA Group (CSA)

.1 CSA A23.1:24/A23.2:24, Concrete materials and methods of concrete construction/Test methods and Standard Practices for concrete.

.4 International Concrete Repair Institute (ICRI)

.1 ICRI 310.2R-2013, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.

.5 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1113-16, Architectural Coatings.

1.3 CONCRETE FLOOR FINISHING CONFERENCE

.1 Schedule this meeting before concreting processes commence.

.2 Where concrete floor areas will receive flooring materials, such as epoxy coatings, hard tile, resilient flooring, and so on, arrange a meeting between the affected Division 09 trades and the concrete finishing trade to ensure requirements for flatness and smoothness are communicated, coordinated and met.

.3 Meeting shall address and propose procedures to address surface irregularities such as protrusions and depressions so that floor flatness and smoothness meet the requirements of the Division 09 flooring trades.

.4 Record the meeting outcomes and recommended procedures, and submit an electronic copy to the Owner and Consultant within 3 days after the meeting.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures.

.1 Submit manufacturer's printed product literature, specifications, and data sheet for each product specified.

.2 Include application instructions for concrete floor treatments.

.2 Submit written declaration that components used are compatible and will not adversely affect finished flooring products and their installation adhesives.

.3 Mix designs shall be prepared by a Professional Engineer (P.Eng.) licenced to practice in Ontario, and engaged for those purposes by the Contractor. Mix designs shall be stamped and signed by Contractor’s P.Eng..

.4 Submit closeout data in accordance with Section 01 33 00 – Submittal Procedures.

.1 Provide manufacturer’s printed recommendations for general maintenance, including cleaning instructions and submit a complete list of floor care products that will be required for on-going maintenance.

1.5 QUALITY ASSURANCE

.1 Produce good concrete underlayment throughout by correct and precise production methods on site; use skilled workmen experienced in this type of Work.

.2 Concrete work shall conform to CSA A23.1/CSA A23.2.

.3 Work that is assessed by the Consultant to be below an acceptable standard shall be demolished, removed and rebuilt as directed by the Consultant.

.1 Make necessary arrangements for initial installation of self-levelling material shall be supervised by the material manufacturer's representative.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Temporary lighting:

.1 Minimum 1200 W light source, placed 2.5 m above floor surface, for each 40 sq.m. of floor being treated.

.2 Electrical power:

.1 Provide sufficient electrical power to operate equipment normally used during construction.

.3 Work area:

.1 Make the work area water tight protected against rain and detrimental weather conditions.

.4 Temperature:

.1 Maintain ambient temperature of not less than 10 degrees C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period.

.5 Moisture:

.1 Ensure concrete substrate is within moisture limits prescribed by flooring manufacturer.

.6 Safety:

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

.7 Ventilation:

.1 Arrange for ventilation system to be operated during installation of concrete floor treatment materials by use of approved portable supply and exhaust fans.

.2 Ventilate enclosed spaces in accordance with Division 01 – General Requirements.

.3 Provide continuous ventilation during and after coating application.

1.7 WARRANTY

.1 Contractor agrees to correct any deficiencies found in Work performed for a period of 2-years from date of Substantial Performance.

Part 2 Products

2.1 PERFORMANCE AND FINISHING REQUIREMENTS

.1 Product quality and quality of work in accordance with Division 01 – General Requirements.

.2 Submit written declaration components used compatible and not adversely affect finished flooring products and their installation adhesives.

.3 Concrete finishing: to CSA A23.1/A23.2, and as follows:

.1 Flat slab-on-grade and elevated floors or surfaces:

.1 Required Floor Finish - General: F3-Finishing to ASTM E1155, Floors having an overall F number of F_F 30 x F_L 25.

2.2 LEVELLING, SLOPING, PATCHING AND REPAIRING MATERIALS

.1 Self-Leveling Underlayment: Cementitious, self-levelling, single component, polymer modified underlayment and manufacturer's low VOC recommended primer, for application thicknesses to a minimum feather edge to 13 mm; acceptable materials as follows:

.1 Ardex K 15, Ardex Americas, Delta BC.

.2 TechLevel XP-1, Custom Building Products Canada Ltd.

.3 (For 3 to 12 mm Thickness) 59 Flex-Flo, Flextile Ltd., Burnaby BC.

.4 (For 6 to 48 mm) 5900 Flex-Flo Plus, Flextile Ltd., Burnaby BC.

.5 Sika® Level-125^{CA}, Sika Canada Ltd.

.6 Ultraplan 1 Plus, MAPEI Canada Inc., Delta BC.

.2 Underlayment / Topping: rapid setting, rapid hardening, polymer modified, pre-blended, cement based mortar bed and sloping mortar for leveling and ramping up to 3" on horizontal substrates; up to 5" thick in confined areas such as trenches. Product shall be designed to set to a walkable hardness within 1 to 2 hours after application.

.1 Standard of Acceptance:

.1 CUSTOM® SpeedSlope® - Rapid Setting Sloping Mortar, by Custom® Building Products, or approved equivalent sloping cementitious underlayment.

.3 Patching and Flash Patching Materials: Cementitious based, polymer modified, fine aggregate, single component, rapid curing, early strength floor patching compounds having high adhesion with manufacturer's recommended primer and surface profile; for application in thicknesses to a minimum of 0.1575 in. to 1 in. (4 mm to 25 mm), and as follows:

.1 Acceptable Materials:

.1 SD-P, Ardex
.2 Mapicem 101, MAPEI
.3 SikaQuick 1000, Sika
.4 Sealtight Meadow-Crete H, W.R. Meadows.

.4 Concrete Repair Mortar - Vertical and Overhead Locations: polymer-modified, cementitious, two-component, fast-setting mortar with migrating corrosion inhibitor added. Formulated for trowel application, designed especially for repair of overhead and vertical surfaces at temperatures between -5 and 10°C (23 and 50°F).

.1 Minimum bond strength at 28 days shall be 17 MPa; minimum compressive strength at 28 days shall be 50 MPa; minimum tensile splitting strength at 21 days shall be 5 MPa.

.2 Standard of Acceptance:

.1 SikaTop®-123 PLUS.

.5 Concrete Repair Mortar - Vertical and Horizontal Locations: polymer-modified, cementitious, two-component, fast-setting mortar with migrating corrosion inhibitor added. Formulated for trowel application, designed for use as structural repair material at deck structures at vertical and horizontal surfaces at temperatures between -5 and 10°C (23 and 50°F).

.1 Minimum bond strength at 28 days shall be 19 MPa; minimum compressive strength at 28 days shall be 50 MPa; minimum tensile splitting strength at 21 days shall be 5.5 MPa.

.2 Standard of Acceptance:

.1 SikaTop®-122 PLUS.

.6 Featheredging Materials: polymer-modified, with migrating corrosion inhibitor added, cementitious, two-component, fast-setting, trowel or rub applied, thin-coat mortar for concrete repairs, for skin coats, filling bugholes, honeycombing and for feather edging.

.1 Minimum bond strength at 28 days shall be greater than concrete; minimum compressive strength at 28 days shall be 35 MPa.

.2 Standard of Acceptance:

.1 SikaTop®-121 PLUS.

.7 Structural Grout: high-performance, non-shrink, fluid, cementitious grout with silica fume and two-stage shrinkage mechanism; compensating for shrinkage in both the plastic and the hardened states. It shall be non-metallic, contain no chlorides and able to be placed at various consistencies ranging from flowable to fluid by adjusting quantity of mix water.

.1 Minimum compressive strength to CAN/CSA A23.2at 28 days shall be 62 MPa; Bond to steel: > 0.2 MPa; Meets ASTM C1107, Grade C type grouts; NS Ministry of Transportation approval for use in grouting bridge bearings as well as anchor bars.

.2 Standard of Acceptance:

.1 SikaGrout®-212 HP.

.8 Supply fast-set structural grout, including type 304 stainless steel drop-in anchors and threaded rod to anchor furniture and other fixed equipment. Confirm acceptability of selections prior to ordering and distribution.

2.3 CURING-SEALING COMPOUNDS

.1 Interior grade curing-sealing compound; water-based: transparent, to ASTM C309, Type 1, Class B, VOC-compliant, in a true-water based carrier, with a solvent content less than 90 g/L (0.75 lb/gal).

.1 Acceptable Products:

.1 VOCOMP-30, by W.R. Meadows Inc.

.2 Florseal WB, by Sika Canada Inc.

.3 or approved alternate

2.4 MIXES

.1 Mixing, ratios and application in accordance with manufacturer's instructions and approved mix designs.

2.5 ACCESSORIES

.1 Water: potable.

.2 Isolation and Expansion Joint Filler:

.1 SAKRETE Concrete Expansion Joint, by KPM Industries Ltd., or similar of same type of material to same effect with same or better physical properties and performance characteristics. Product shall exceed the requirements of ASTM D4819 and ASTM D3575.

.3 Control Joint Filler:

.1 Two component, epoxy-urethane, load bearing, self-levelling sealant.

.1 Acceptable Material:

.1 Euco Qwikjoint UVR, by Euclid Chemicals.

.2 Loadflex, Sika Canada.

.3 Planiseal Rapidjoint 15, by Mapei.

.4 ReziWeld FLEX, W. R. Meadows of Canada.

Part 3 Execution

3.1 SAFETY

.1 Comply with Ontario's Occupational Health and Safety Act, OBC, CSA S350, and NFPA 241.

.2 Comply with the requirements of Section 02 07 50 – Cutting and Patching.

.3 Saw cutting, if required at all, shall be carefully managed with strict location and depth control, in consultation with structural engineer (P.Eng.). Use non-destructive means to locate structural members, reinforcement bars, conduits and pipe before considering or planning any saw cutting or coring operations. Do not saw cut near columns and beams. Confirm cutting locations with structural engineer (P.Eng.) before cutting (provide minimum 72 hours for engineer's review).

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Work shall comply with product manufacturer's printed preparation, mixing and application instructions and illustrations, technical datasheets, and specifications.

3.3 GENERAL CONCRETING PROCEDURES

.1 Comply with the requirements listed on S001 on the Structural Drawings, and as follows:

.1 Avoid over troweling.

.2 Do not finish concrete surfaces when bleed water is present.

.3 Keep concrete continuously moist for at least 24 hours.

.4 Never add water on site to plant-supplied concrete during placement or finishing.

.5 Maintain concrete above 10°C during and for three days after concrete placement.

.6 Protect fresh concrete from rapid drying, direct sun and wind.

.7 Never place concrete on frozen substrate.

.8 Locate mesh no more than 2" (50 mm) below surface of slab. Lap mesh at least one square. Use chairs to support mesh at the correct height during concrete placement (do not use the hook and pull method).

.9 Ensure the minimum concrete cover over reinforcing steel is at least 3" (76 mm).

.10 Lap steel at least 24 bar diameters, but not less than 12" (300 mm).

.11 Install wing insulation at perimeter of grade beams, and insulate exterior vertical.

3.4 EXAMINATION

.1 Prepare floor surface in accordance with CSA A23.1.

.2 Verification of Conditions: verify that conditions are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Check and verify that no irregularities exist that would affect quality of execution of work specified.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.5 CONCRETE SLAB SURFACE FINISHING TOLERANCES

.1 Comply with tolerances required by the Ontario Building Code (OBC) 2024.

.2 Concrete tolerances: Straightedge in accordance with CAN/CSA A23.1/A23.2.

1. Class A: Place and steel trowel finish concrete floor surface of concrete floors to within ±8 mm in 3000 mm (±5/16 in 10 ft) as described in ACI 117 and ASTM F710.

2. Class B: For exposed concrete or concrete floor scheduled or indicated to receive floor finishes: Place and steel trowel finish surface of concrete floors to within ±3 mm in 3050 mm (±1/8 in 10 ft) as described in ACI 117 and ASTM F710. Floor finish shall be smooth and free of trowel marks or other defects which telegraph through to finished flooring when viewed from a distance range of within 1800 to 3000 mm (8 ft to 10 ft").

.1 Surface of concrete floors shall be flat when tested to Waviness Index ASTM E1486, (SWI2-10) of 2.5 mm (0.10"), as described to ASTM F710 appendix.

3. Independent testing company may measure for straightedge tolerances in accordance with CAN/CSA A23.1/A23.2, in accordance with Section 01 45 00.

.3 Concrete tolerances: F-number in accordance with CAN/CSA A23.1/A23.2.

1. Float finish; for areas to receive asphaltic traffic topping, roofing and waterproofing: check and level surfaces plane to tolerances of FF 18 - FL 15. Immediately after leveling; refloat surface to a uniform, smooth surface.

2. Coordinate required FF and FL values at Ground Floor slab and other areas where floor slab is to receive floor finishes.

3. Measure f-number finish tolerance requirements in accordance with CAN/CSA A23.1/A23.2 and submit log records of measurements.

.4 Concrete to receive epoxy flooring finish materials: moisture-cured, steel trowelled finish.

3.6 GENERAL

.1 Apply repair materials as required to result in a sold, uniform, smooth, flat concrete surface, with cracks, grooves and other damage repaired. Fill in hollows, low spots, and grooves, and grind high spots, bumps and peaks to produce smooth, level floors. Smooth out rough areas. Finish floor patches and repairs to a magnesium trowel finish.

.2 Floor level tolerances:

.1 Apply repair materials as required to achieve a smooth, level floor having a straightedge value of ±3 mm over 3050 mm. Straight edge testing on site will be performed by Consultant to verify compliance.

.3 Prepare concrete in compliance with ICRI Technical Guideline No. 310.2R recommendations.

.4 Prepare substrates according to manufacturer's printed instructions as required to meet warranty requirements.

.5 Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

.6 Remove substrate paint, coatings and other substances that are incompatible with adhesives or contain soap, wax, oil, solvents, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

.7 Mechanically remove contamination on the substrate that may cause damage to flooring materials. Permanent and non-permanent markers, pens, crayons, paint, etc., shall not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and stain the flooring material.

.8 Prepare substrates according to ASTM F710 including the following:

.1 Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

.2 Perform anhydrous calcium chloride test, ASTM F1869. Results shall not exceed 5 lbs. Moisture Vapor Emission Rate per 1,000 sq. ft. in 24-hours.

- or -

.1 Perform relative humidity test using in situ probes, ASTM F2170. Shall not exceed 80%.

.3 A pH test for alkalinity shall be conducted. Results shall range between 7 and 9. If the test results are not within the acceptable range of 7 to 9, the installation shall not proceed until the problem has been corrected.

.4 Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.

.9 Fill cracks, holes, depressions and irregularities in the substrate with good quality Portland cement-based underlayment leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

.10 Floor covering shall not be installed over expansion joints; install expansion joint at locations of expansion joints in substrate.

.11 Do not install flooring products until they are same temperature as the space where they are to be installed.

.12 Move floor covering materials and products and installation materials into spaces where they will be installed at least 48-hours in advance of installation.

.13 Vacuum clean substrates to be covered by products immediately before installation. Comply with requirements of Division 01 – General Requirements.

3.7 REPAIR OF CAST-IN-PLACE CONCRETE

.1 Examine all concrete surfaces and clearly mark out defective areas to be repaired. Repair exposed cast-in-place concrete only where structurally required. Obtain the Consultant's authorization of the delineated repair areas and the proposed method and equipment to be used for the repairs prior to commencing with the work.

.2 Upon Consultant's authorization, completely remove all damaged, deteriorated, loosened, or unbonded concrete down to sound concrete. Remove micro-fractured surfaces resulting from the initial concrete removal process.

.3 Sawcut the perimeter of areas requiring concrete removal and replacement perpendicular to the surface to a depth of 10 mm ±1 mm; precision depth control of cutting is required. Do not use replacement repair methods that produce a featheredge.

.1 Perform X-ray, ultrasound, or other approved scanning procedures to determine locations of existing reinforcing, piping or conduit in existing concrete elements before cutting concrete. Advise Consultant of findings before proceeding with the Work, and await instructions.

.2 Do not cut existing reinforcing steel.

.1 If reinforcing steel is cut, stop work in area and notify the Consultant immediately, and await instructions. If shoring and other remedial and emergency actions are required, all costs shall be borne by Contractor..

.4 Prior to filling, provide a repair area that is clean and saturated surface dry except where the repair technique requires a dry surface.

.5 Use dry-pack mortar for filling holes left by the removal of form ties, for narrow grooves cut for repair of cracks, and for repair of small honeycombed areas where lateral restraint can be obtained. Pre-soak the repair area, allow the area to attain a saturated surface dry condition, and apply a cement paste bond coat prior to filling with mortar. Dry-pack mortar shall consist of 1 part Portland cement to 2.5 parts sand, by mass.

.6 Mortar filling with a polymerized mortar placed under pressure by use of a mortar gun or head box may be used for repairing defects that are too wide for dry-pack filling, too shallow for concrete placement, and no deeper than the far side of the reinforcement that is nearest the surface. Treat the surface of the concrete to be repaired with a compatible acrylic bonding agent as authorized by the Consultant prior to mortar filling.

.7 Completely remove honeycombed areas down to sound concrete or to the required depth behind the reinforcing steel, whichever is greater. The depth required beyond the reinforcing steel is 1.5 times the maximum aggregate size of the replacement concrete or 25 mm, whichever is greater. Treat the surface of the concrete to be repaired with a high percentage solids epoxy bonding agent or acrylic bonding agent as authorized by the Consultant prior to concrete replacement. Construct the repair area slightly proud of the general surface and then grind it to match within the specified tolerances.

.8 Repair abrupt and gradual irregularities that exceed the specified tolerances by no more than 10 mm by grinding. Limit the depth of grinding such that no aggregate particles are exposed more than 3 mm in cross section at the finished surface.

.9 Where surface grinding results or will result in exposure of aggregate particles that exceed the specified limits, or where the abrupt and gradual irregularities exceed the specified tolerances by more than 10 mm, repair the irregularities by removing the concrete to a depth below the reinforcing steel of 1.5 times the maximum aggregate size of the replacement concrete or 25 mm, whichever is greater. Treat and construct the repair area as specified for honeycombed areas.

.10 Provide replacement concrete that has the same strength and durability characteristics as the adjacent specified concrete. Use cement that provides a finish colour that matches the surrounding concrete surfaces in areas that are permanently exposed.

.11 Following repairs, promptly initiate curing. Provide completed repair areas that are tightly bonded.

3.8 MEASURING

.1 Classification of Surface Irregularities:

.1 Local surface irregularities are classified as abrupt or gradual.

.2 Abrupt irregularities mean offsets or fins caused by displaced or misplaced form sheeting, lining, or form sections or by defective form lumber, or improper screeding or trowelling. Abrupt irregularities also include any isolated irregularity in which the maximum dimension of the irregularity perpendicular to the surface is greater than the maximum dimension of the irregularity in the plane of the surface.

.3 Gradual irregularities mean bulges or depressions resulting in gradual changes in the concrete surface.

.2 Measuring Surface Irregularities:

.1 Measure irregularities as deviations from a surface, with a straightedge or shaped template authorized by the Consultant. Move the position of the straightedge about the irregularity as necessary to locate the point where the maximum height and slope exists. Provide 3 m long straightedges for taking measurements.

.2 For irregularities protruding above the surface, place 1 end of the straightedge on top of the irregularity. The height of the irregularity is determined by measuring the gap perpendicular to the straightedge. The length of the irregularity is determined by measuring the distance along the straightedge from the gap to the point of contact at the top of the irregularity.

.3 For irregularities extending below the surface, place the straightedge across the irregularity. The height of the irregularity is determined by measuring the gap between the straightedge and the surface. The length of the irregularity is the distance along the straightedge from the gap to the point of contact with the surface.

.3 Check finished concrete surfaces immediately after final working, and again at the end of the curing period and verify their compliance with the specified tolerances.

3.9 FINISHING FORMED SURFACES

.1 Requirements listed below apply to normal structural concrete; refer to Division 03: Cast-in-Place Concrete for additional requirements for formed exposed architectural concrete.

.2 Unspecified Finishes: Provide following finishes as applicable when finish of formed surface is not specifically indicated:

.1 Unexposed Surfaces:

.1 ‘Rough Form Finish’ for concrete not exposed to view.

.2 ‘Smooth Form Finish’ for concrete to receive membrane waterproofing.

.2 Exposed Surfaces:

.1 ‘Sack Rubbed Finish’ for concrete surfaces exposed to view or to be painted.

.3 Rough Form Finish: Leave surfaces with texture imparted by forms; patch tie holes and defects; remove fins longer than ¼” (6 mm) high.

.4 Smooth Form Finish: Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces with number of seams kept to a minimum, uniformly spaced in an orderly pattern; patch tie holes and defects; completely remove fins.

.5 Sack Rubbed Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes; add white hydraulic cement in amounts determined by trial patches so colour of dry grout will match adjacent surfaces; rub surfaces with clean burlap and keep damp by fog spray for a minimum of 36 hours after grout whitens.

.6 Related Unformed Finish: Strike-off concrete smooth and finish with using texture matching adjacent formed surfaces at tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces; continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces.

3.10 FINISHING FLOORS AND SLABS

.1 Finish floors and slabs in accordance with CSA A23.1 and ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces; do not wet concrete surfaces.

.2 Float (Initial) Finishing:

.1 Consolidate surface with power driven floats or by hand floating if area is small or inaccessible to power driven floats.

.2 Re-straighten, cut down high spots, and fill low spots.

.3 Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.

.4 Apply float finishing to surfaces receiving trowel finishing and receiving sheet waterproofing and floor finishes.

.3 Trowel (Final) Finishing:

.1 Commence trowel finishing after all bleed water has disappeared and when the concrete has stiffened sufficiently to prevent the working of excess mortar to the surface.

.2 Apply first trowelling and consolidate concrete by hand or power-driven trowel after applying float finishing; continue trowelling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance; repair or smooth any surface defects that would telegraph through applied coatings or floor covering.

.3 Apply a trowel finishing to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

.4 Finish surfaces to the tolerances indicated above.

.4 Trowel and Fine Broom Finishing:

.1 Finish surfaces to the tolerances indicated above.

.2 Apply trowel finishing to surfaces where ceramic or quarry tile is scheduled for installation by either thickset or thin-set method.

.3 Slightly scarify surface with a fine broom while concrete is still plastic.

.5 Broom Finishing:

.1 Apply a broom finishing to exterior concrete platforms, steps, sidewalks, and ramps, and elsewhere as indicated.

.2 Slightly roughen trafficked surface by brooming with fibre bristle broom perpendicular to main traffic route immediately after float finishing.

.3 Coordinate required final finishing with Consultant before application.

3.11 FILLING

.1 Level floors as required per flooring finish manufacturer's requirements.

.2 Apply thick bed mortar or self-levelling and smoothing underlayment (Contractor's discretion at approval of Consultant) working into all nooks, cracks and spaces to fill flush with top of floor slab. Trowel to a smooth polished surface.

.3 Use featheredging method to fill and level depressions up to 19 mm (5/8") in thickness, to fill cracks, holes, chips etc. where topping must be finished to a featheredge. Apply in strict accordance to manufacturer's instructions.

.4 At juncture of resilient flooring and exposed concrete to provide feather edging for a distance of 150 mm (6") from + 3 mm to 0 mm (+ 1/8" to 0"), as indicated.

.5 Prepare substrate and install as per manufacturers recommendations, smooth finish.

3.12 PATCHING

.1 Patch all core holes, or chipped or gouged concrete surfaces using specified materials.

.2 Mix and install materials in compliance with manufacturer's instruction.

3.13 ANCHORING AND CORING

.1 Perform non-destructive, non-ionizing radio frequency scanning or other approved scanning procedures to determine locations of existing reinforcing or conduit in existing concrete elements before installing anchor systems or coring concrete. Advise Consultant of findings before proceeding with the Work, and revise penetration and anchor locations as required and directed by Consultant. Core holes and set anchors in fast-set grout as required. Install per grout manufacturer's specifications.

3.14 REPAIR OF DAMAGED CONCRETE

.1 At exterior locations indicated, remove defective, cracked and/or damaged concrete and replace with appropriate repair mortar. Refer to Drawings for locations.

.2 Square-cut perimeter of removal area before removing damaged concrete.

.3 Remove damaged and defective concrete to sound concrete.

.4 Clean all bonding surfaces, wash out with clean potable water, apply a cement slurry to bonding surfaces, and apply repair mortar materials in accordance with manufacture's technical datasheets and installation instructions.

.5 For deep repairs of at least 3 inches, install ¼" diameter stainless steel threaded rod in fast-set grout at perimeter edge of cavity at 304 mm on centre to provide a mechanical key. Locate threaded rods mid-depth of cavity at full perimeter; for example, if patch is to be 3 inches deep, then place the threaded rods at a distance of 1-1/2-inches in from the outside edge of the cavity area.

.6 Fill and patch prepared holes and cavities with the appropriate repair mortar and finish to match texture of existing adjacent surface to remain, flush, plumb and true.

3.15 UNDERLAYMENT / TOPPING INSTALLATION

.1 Purpose: to level concrete floor substrate as required after removal of existing flooring; coordinate and cooperate with flooring trades as required to ensure levelling work meets flooring requirements.

.2 Surface Preparation:

.1 Surfaces must be structurally sound, clean, dry and free from grease, oil, dirt, curing compounds, efflorescence, sealers, adhesives or any other contaminant that would prevent a good bond. Glossy or painted surfaces must be sanded, stripped and cleaned of waxes, dirt or any contaminants. Concrete must be cured 28 days and accept water penetration. Concrete must not be subject to hydrostatic pressure. Concrete slabs should have a broomed or brushed finish or be mechanically prepared to enhance the bond. Expansion joints should never be bridged with setting or mortar bed materials. Do not sand flooring materials containing asbestos. Ambient temperature, surfaces and materials should be maintained at a temperature above 50° F (10° C) or below 90° F (32° C) for 72 hours.

.3 Bonding to Concrete Surfaces:

.1 For sloping or patching over rough profiled concrete, mix to a plastic consistency up to 4qts water with 50lbs mortar. Scrub coat mixture onto clean, dry concrete surface and apply mortar while scrub coat is still wet. Apply mortar uniformly with pressure to key into the substrate before applying to final finished thickness. Float and/or screed material to appropriate thickness. DO NOT SPONGE OR SPRAY WATER TO SLICK SURFACE AS THIS WILL WEAKEN THE MORTAR SURFACE.

.4 Movement Joint Placement:

.1 Expansion joints and cold joints, as described in ANSI A108.01, should never be bridged with setting material. They must be brought through the tile work and filled with an appropriate elastomeric sealant, to Section 07 92 00.

.5 Mixing Procedures:

.1 Plastic Sloping Mortar – Combine 50lbs of product powder with 3.5-4.0 quarts of water in a clean mixing vessel and mix to a uniform lump free consistency. Mix with a Hole Hawg with a square cage mixing paddle until lump free - approximately 2 minutes. High gear is needed to properly mix dry-pack and plastic consistencies. Alternatively, a mortar mixer may be used with typical mix times of 2-3 minutes, but do not over mix. Rinse paddle between batches.

.6 Product Application:

.1 Prior to application to absorptive substrates, damp sponge the area to prevent excessive moisture loss to the substrate. Do not saturate the surface or leave standing water. Alternatively, porous substrates may be primed using manufacturer’s approved primer according to published directions.

.7 Curing Times:

.1 Allow for 4 hours in project schedule after installing underlayment before permitting foot or trade traffic and work.

3.16 CURING

.1 Comply with the requirements of Division 03: Cast-in-Place Concrete.

.2 Cure surfaces of concrete repairs in accordance with manufacturer’s published installation and application requirements, and data sheets.

.3 Employ wet cure methods or apply curing compound. If used, ensure curing compound is compatible with finish materials scheduled for installation.

3.17 CLEAR SEALER

.1 Apply floor treatment in accordance with sealer manufacturer's written instructions.

.2 Mask as required. Clean overspray. Clean sealant from adjacent surfaces.

3.18 JOINT FILLERS

.1 After floor treatments are dry, seal isolation, expansion and control joints with appropriate filler as specified.

3.19 SLAB CLEANING

.1 Scarify concrete surfaces to receive new concrete installations or toppings.

.2 Scarify concrete slab to ICRI 310.2R recommendations.

.3 Vacuum clean and remove all dust and debris. Leave slab clean, ready for new applications. Do not use power wash equipment.

3.20 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.21 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.22 MAINTENANCE

.1 Provide training to Owner’s representative based on manufacturer’s written instructions as indicated in Section 01 79 00 – Demonstration and Training.

3.23 CONCRETE FLOOR FINISHING SCHEDULE

.1 Concrete to be left exposed where a smooth finish is required: smooth steel power trowel finish with sealing compound.

.2 Concrete to receive finish flooring materials: smooth steel power trowel finish.

.3 Concrete to receive traffic topping, roofing and waterproofing materials: single pass light steel power trowel finish.

.4 Provide level scratched finish at concrete surfaces scheduled to receive concrete topping.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 05 50 00 – Metal Fabrications.

.3 Section 06 10 00 – Rough Carpentry.

.4 Section 07 84 00 – Firestopping and Smoke Seals

.5 Section 07 92 00 – Joint Sealants.

.6 Section 08 11 14 – Metal Doors and Frames.

.7 Section 09 21 16 – Gypsum Board Assemblies.

.8 Section 09 91 00 – Painting.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM A116-22, Standard Specification for Metallic-Coated, Steel Woven Wire Fence Fabric.

.2 ASTM A123/A123M-24, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.3 ASTM A153/A153M-23, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.4 ASTM A307-21, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.

.5 ASTM A641/A641M-19, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

.6 ASTM A653/A653M-23, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.7 ASTM A1011/A1011M-23, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

.8 ASTM A1064/A1064M-22, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

.9 ASTM C67/C67M-23a, Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.

.10 ASTM C73-23, Standard Specification for Calcium Silicate Brick (Sand-Lime Brick).

.11 ASTM C140/C140M-23, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.

.12 ASTM C144-18, Standard Specification for Aggregate for Masonry Mortar.

.13 ASTM C207-18, Standard Specification for Hydrated Lime for Masonry Purposes.

.14 ASTM C216-22, Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).

.15 ASTM C270-19ae1, Standard Specification for Mortar for Unit Masonry

.2 CSA Group (CSA)

.1 CSA A23.1:19/A23.2:19, Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.

.2 CAN/CSA A82.1-M87 (R2003), Burned Clay Brick (Solid Masonry Units Made From Clay or Shale).

.3 CSA A165 SERIES-14 (R2019), CSA Standards on Concrete Masonry Units (Consists of A165.1, A165.2 and A165.3).

.4 CAN/CSA A179-14 (R2019), Mortar and Grout for Unit Masonry.

.5 CSA A370-14 (R2018), Connectors for Masonry.

.6 CAN/CSA A371-14 (R2019), Masonry Construction for Buildings.

.7 CSA A3000-18, Cementitious materials compendium, Includes Update No. 1 and Errata (2021).

.8 CSA S304-14 (R2019), Design of Masonry Structures, Includes Update No. 1 (2015).

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate lines, levels and coursing with work of other Sections.

.2 Obtain built-in items prior to start of this work.

.2 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section and on-site installation, with Contractor's representative, trade contractor, material supplier and Consultant in accordance with Division 01 – General Requirements to:

.1 Verify project requirements including specification and details for project.

.2 Confirm required mortar, grout and concrete testing; review batch control and grouting procedures.

.3 Coordination with related Work including.

.4 Coordinate crack control measures.

.5 Review requirements for reinforcement at corners and wall intersections.

.6 Confirm trowelled or tooled joints to concealed and exposed masonry faces.

.7 Review methods for controlling efflorescence during construction.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit Product Data:

.1 Provide manufacturer's printed product literature, specifications and data sheet. Indicate masonry types, shapes, sizes, and textures.

.2 Cementitious Materials:

.1 Include brand, type, and name of manufacturer for site mixed mortar materials.

.2 Submit proposed mix proportions and sand analysis reports and compressive strength reports on the proposed mortar mix(es).

.3 Submit Shop Drawings:

.1 Submit shop drawings showing plans, elevations, sections and details.

.2 Show the details of construction, and connection to structure.

.3 Structural load-bearing walls, and connections to structure, including to masonry veneer and non-loadbearing walls, shall be designed by a Professional Engineer (P.Eng.) licenced to practice in Ontario, to Section 01 35 01– Delegated Design.

.4 Submit samples:

.1 Provide three replacement brick units if salvaged brick unit is not available in sufficient quantities for all required work

.2 Provide three 2" thick, U-Shaped Concrete Block Units w/ beveled edges to match existing column encapsulation blocks

.3 Provide three concrete masonry units (face only) to show texture and colour variance of finish.

.4 Provide samples of masonry connectors, joint reinforcement.

.5 Provide two grout samples indicating colours to be used with each brick type.

.6 Obtain review comments from Consultant prior to ordering.

.5 Submit Mill Certificates certifying that the Portland cement supplied to the job meets the low-alkali criteria specified.

1.5 QUALITY ASSURANCE

.1 Sole Source: obtain brick masonry from a single manufacturer for entire project. Obtain concrete masonry units from a single supplier for entire project.

.2 Conform to CSA A371, except as modified by this specification.

.3 The masonry contractor shall be a member in good standing of the Canadian Masonry Contractors' Association (CMCA) through a registered Chapter.

.4 The masonry contractor shall have a minimum of 5 years of experience on projects of similar size and magnitude and shall provide continuous active supervision by a journeyman mason while masonry work is in progress.

.5 Masonry work shall be performed by experienced, qualified journeyman masons under the direct and continual full-time supervision of certified masons.

.6 Before starting masonry work, establish mix proportions based on the limitations set out in Table 2 of CAN/CSA A179.

.7 Test laboratory prepared samples of the proposed mortar(s) for compressive strength in accordance with CAN/CSA A179, by a laboratory approved by the Owner. The Owner will pay for the initial cost of mortar testing. Any re-testing required as a result of the original test failing will be borne by the Contractor.

.8 Connectors and joint reinforcement shall conform to CSA A370.

.9 Miscellaneous masonry accessories and their use where not otherwise specified but shown or required for proper completion of the Work, shall conform to CSA A371.

.10 Regulatory Requirements: Provide fire resistance rated materials and construction identical to those of assemblies with fire resistance ratings determined by ULC Listings.

1.6 MOCK-UPS

.1 Construct mock-up in accordance with Section 01 40 00 – Quality Requirements.

.2 Construct two mock-up panels of unit masonry construction, 1200 mm wide x 1800 mm high, and 600mm high for the column enclosure in a location accepted by Consultant.

.1 Mock-up panel No. 1: Salvaged Face brick (interior).

.2 Mock-up panel No. 2: Concrete masonry Column Encapsulation.

.3 Construct mock-up to establish a standard of construction, workmanship, and appearance. Show reinforcement, masonry connectors, jointing, coursing, mortar, and masonry pattern, unit face alignment, texture, and colour.

.4 Do not continue with work of this Section until Consultant has reviewed mock-up.

.5 Accepted mock-up may form part of Work.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Deliver masonry units on pallets or cubes, suitably protected from road grime and moisture absorption due to exposure to rain or melting snow.

.2 Unload and store on dry, level areas.

.3 Remove plastic wrappings from concrete masonry units and cover with waterproof coverings that will provide protection from the elements but allow for air circulation.

.4 Deliver cement, lime, and mortar in dry condition with manufacturer's label intact and store under waterproof cover and protected from elements.

1.8 SITE CONDITIONS

.1 Ambient Conditions: maintain materials and surrounding air temperature to:

.1 Minimum 5 degrees C prior to, during, and 48 hours after completion of masonry work.

.2 Maximum 32 degrees C prior to, during, and 48 hours after completion of masonry work.

.2 Provide adequate bracing for masonry during construction and until permanent lateral supports are in place.

1.9 WARRANTY

.1 Contractor agrees to correct any deficiencies of labour or material found in the work performed for a period of 5 years from the date of Substantial Performance.

Part 2 Products

2.1 BRICK MASONRY UNITS

.1 Brick units:

.1 Use hard, sound, and clean salvaged bricks only. Use only bricks without evidence of soluble salts, compatible in appearance, size, and performance with existing.

.2 Contractor to inform Consultant if the required quantities of sound salvaged brick is not available from within the areas indicated.

.1 If salvaged brick is not available in sufficient quantities for all required work, new brick that matches the existing closely in colour, size, texture and compressive strength, may be used. Consultant to approve a sample prior to commencement of Work.

.2 Replacement Brick Masonry Units, to CSA A82.1, ASTM C 216 Grade: Salvaged brick and new to match existing, and as follows:

.1 New face brick: Provide only if salvaged brick quantity is not sufficient for the scope of work.

.1 Size: to match existing.

.2 Texture/Finish: to match existing.

.3 Colour: to match existing.

.2 Coursing: to match existing.

.3 Grout colour: to match brick. Submit colour samples for Consultant's review and acceptance.

2.2 CONCRETE MASONRY UNITS

.1 Standard Concrete Masonry Units: to CSA A165.1 and as follows:

.1 Standard Weight Block: H/15/A/M, 80% solid.

.2 Semi-Lightweight Block: H/15/B/M, 80% solid.

.3 Solid Block: S/15/A/M or S/15/B/M to match adjacent units, 80% solid: provide only where indicated on Drawings, and where required for bearing, anchorage, or fire resistance rating (examples of typical locations requiring solid units include those load bearing under lintels/plates and anchorage zones).

.4 Size: 2" Thick Block, U shaped to encapsulate existing steel column. Measure and match existing encapsulated column block size; and as required to meet coursing requirements.

.5 Special shapes: provide bull-nosed units for exposed corners as indicated on Drawings. Lintels and bond beams are constructed using knock-out lintel units. Provide additional special shapes as indicated.

.6 Refer to Drawings for indication of where standard weight and semi-lightweight block is required; if not indicated, use standard weight. If clarification is required, ask Consultant for clarification in writing and wait for written response. If the term 'lightweight block' is used, this shall mean 'semi-lightweight block' for the purposes of this Contract.

.2 Fire-rated concrete block units: to CSA A165 Series (CSA A165.1) and as follows:

.1 Classification: H/15/B/M, except as modified by fire resistance requirements, 80% solid.

.2 Concrete Composition: Type L220S concrete, as defined in OBC 2020.

.3 Fire Rating: as indicated on Drawings.

.4 Size: as indicated on Drawings. 2" Thick Block, U shaped to encapsulate existing steel column. Measure and match existing encapsulated column block size.

.5 Special shapes: provide chamfered/bullnose units for exposed corners to match existing blocks. Lintels and bond beams constructed using knock-out lintel units. Provide additional special shapes as indicated.

.3 Material tests shall be supplied to the Consultant, and certified as representative of materials supplied to the job site. Such tests shall have been made within previous three months.

.4 Protect concrete block against wetting prior to laying in walls. Cover tops of walls after erection to prevent rainwater or snow from entering wall system prior to closing-in of building.

2.3 CONCRETE

.1 Concrete used in masonry work shall have a minimum compressive strength of 20 MPa in 28 days, to Division 03: Cast-in-Place Concrete.

2.4 MORTAR AND GROUT MATERIALS

.1 Mortar colour at Concrete Masonry Units, Face brick to be selected by Consultant.

.2 Use same brands of materials and source of aggregate for entire project.

.3 Cement:

.1 Portland Cement: to CSA A3000, “Type GU-LA” (Portland cement with a low-alkali content), gray colour.

.1 Use low VOC products in compliance with SCAQMD Rule 1168.

.2 Use Portland cement with a total content of alkalis not above 0.6 percent.

.4 Aggregate: supplied by one supplier.

.1 “Mortar Sand”, by The Shaw Group Ltd., to CAN/CSA A179; manufactured sand, washed, clean, sharp particles.

.2 Course Aggregate: to CAN/CSA A179.

.5 Water: clean and potable.

.6 Lime:

.1 Hydrated Lime: to CAN/CSA A179, Type SA.

.7 Mortar Mixes

.1 Mortar for exterior masonry above grade:

.1 Loadbearing: type S based on proportion specifications.

.2 Non-Loadbearing (e.g., brick veneer at cavity wall applications): type N based on proportion specifications (1 / 1 / 6 mix of cement / lime / sand).

.2 Mortar for interior masonry:

.1 Loadbearing: type S based on proportion specifications (1 / 1 / 6 mix of cement / lime / sand).

.2 Non-Loadbearing: type N based on proportion specifications (1 / 1 / 6 mix of cement / lime / sand).

.3 Mortar for parapet walls, chimneys, unprotected walls: type N based on proportion specifications (1 / 1 / 6 mix of cement / lime / sand).

.4 Pointing Mortar: type N based on proportion specifications (1 / 1 / 6 mix of cement / lime / sand).

.5 Parging mortar: type N to CAN/CSA A179.

.6 Mortar for foundation walls, manholes, sewers, pavements, walks, patios and other exterior masonry at or below grade: type M based on proportion specifications, CAN/CSA A179

.7 Following applies regardless of mortar types and uses specified above:

.1 Mortar for grouted reinforced masonry: type S based on proportion specifications.

.8 Certification and proof of compliance is required. Random cube tests required for Quality Control.

.8 Mortar Mixing:

.1 Use pre-blended, pre-coloured mortar prepackaged under controlled factory conditions. Ingredients batching limitations to be within 1% accuracy.

.2 Mix mortar ingredients in accordance with CAN/CSA A179 in quantities needed for immediate use.

.3 Maintain sand uniformly damp immediately before mixing process.

.4 Do not use admixtures, including pigments, air entraining agents, accelerators, retarders, water repellent agents, or other admixtures; unless approved in writing by the Consultant.

.5 Do not use anti-freeze compounds including calcium chloride or chloride-based compounds.

.6 Use a batch type mixer in accordance with CAN/CSA A179.

.7 Stain Resistant Pointing Mortar: one part Portland cement, 1/8 part hydrated lime, and two parts graded (80 mesh) aggregate, proportioned by volume. Add aluminum tristearate, calcium stearate, or ammonium stearate to 2 percent of Portland cement by weight.

.8 Re-temper mortar only within two hours of mixing, when water is lost by evaporation.

.9 Use mortar within 2 hours after mixing at temperatures of 32 degrees C, or 2-1/2 hours at temperatures under 10 degrees C.

.9 Grout Mixes:

.1 Mortar for grouted reinforced masonry: type S based on proportion specifications.

.2 Bond Beams: grout mix 10 to 12.5 MPa strength at 28 days; 200-250 mm slump; mixed in accordance with CAN/CSA A179 coarse grout.

.3 Lintels: grout mix 10 to 12.5 MPa strength at 28 days; 200-250 mm slump; mixed in accordance with CAN/CSA A179 coarse grout.

.4 Grout: Minimum compressive strength of 12.5 MPa at 28 days. Maximum aggregate size and grout slump: CAN/CSA A179.

.10 Grout Mixing:

.1 Mix batched and delivered grout in accordance with CSA A23.1 transit mixed.

.2 Mix grout ingredients in quantities needed for immediate use in accordance with CAN/CSA A179 coarse grout.

.3 Add admixtures in accordance with manufacturer's instructions; mix uniformly.

.4 Do not use calcium chloride or chloride based admixtures.

.11 Mix Tests:

.1 Testing Mortar Mix:

.1 Test mortar to requirements of Division 01 – General Requirements, and in accordance with CAN/CSA A179. Test prior to construction and during construction for:

.1 Compressive strength.

.2 Consistency.
.3 Mortar aggregate ratio.
.4 Sand/cement ratio.
.5 Water content and water/cement ratio.
.6 Air content.
.7 Splitting tensile strength

.2 Testing Grout Mix:

.1 Test grout to requirements of Division 01 – General Requirements, and in accordance with CAN/CSA A179, for grout based on proportion specification. Test prior to construction and during construction for:

.1 Compressive strength.
.2 Sand/cement ratio.
.3 Water content and water/cement ratio.
.4 Slump.

2.5 FINISHES FOR STEEL REINFORCEMENT, TIES AND ANCHORS

.1 Finish for all steel materials and products used and incorporated into the Work shall be hot dipped galvanized after fabrication for all interior locations and SAE Type 316 stainless steel for any steel at exterior wall assemblies.

.1 Fasteners (anchors): to ASTM F593.

.2 Stainless steel products: to ASTM A484/A484M.

2.6 REINFORCED MASONRY

.1 Provide vertically reinforced and grouted masonry in accordance with requirements shown on structural drawings.

.2 Meet requirements of CSA S304.1 and CAN/CSA A371, except as otherwise indicated, and as required to meet OBC requirements for the seismic conditions noted in the geotechnical report, Class D conditions.

.3 Grout for grouted masonry shall conform to the requirements of CSA S304.1. Grout for filling concrete masonry units shall be high slump course grout with a maximum aggregate size pf 10 mm and slump of 200 mm. The minimum compressive strength of grout shall be greater than or equal to the compressive strength of the concrete block units being filled. Submit mix designs for review to Consultant prior to start of construction.

.4 Prior to start of work, an independent testing agency will test masonry materials in accordance with CSA S304.1 to confirm compressive strength.

.5 Independent testing agency will carry out tests on a minimum of 6 prisms prepared using grout mix to confirm grout strength.

.6 Independent testing agency will carry out field control test in accordance with Section 5.4 of CSA S304.1.

2.7 REINFORCED MASONRY

.1 Provide vertically reinforced and grouted masonry in accordance with requirements shown on structural drawings.

.2 Meet requirements of CSA S304.1 and CAN/CSA A371, except as otherwise indicated, and as required to meet OBC requirements for the seismic conditions noted in the geotechnical report, Class D conditions.

.3 Grout for grouted masonry shall conform to the requirements of CSA S304.1. Grout for filling concrete masonry units shall be high slump course grout with a maximum aggregate size pf 10 mm and slump of 200 mm. The minimum compressive strength of grout shall be greater than or equal to the compressive strength of the concrete block units being filled. Submit mix designs for review to Consultant prior to start of construction.

.4 Prior to start of work, an independent testing agency will test masonry materials in accordance with CSA S304.1 to confirm compressive strength.

.5 Independent testing agency will carry out tests on a minimum of 6 prisms prepared using grout mix to confirm grout strength.

.6 Independent testing agency will carry out field control test in accordance with Section 5.4 of CSA S304.1.

2.8 REINFORCEMENT

.1 Bar reinforcement: Steel to CSA A371 and CSA G30.18, Grade 400W.

.2 Masonry Joint Reinforcement: In accordance with to CSA A371, ASTM A496/A496M and ASTM A1064/A1064M, with corrosion protection in accordance with CSA S304 and CSA A370, and as follows:

.1 Interior Walls: Hot dip galvanized after fabrication.

.2 Exterior Walls: Type 316 Stainless steel.

.3 Wire Size for Side Rods: W1.7 or 3.8 mm diameter.

.4 Wire Size for Cross Rods: W1.7 or 3.8 mm diameter.

.5 Spacing of Cross Rods, Tabs, and Cross Ties: At a maximum of 400 mm o/c.

.6 Lengths: A minimum of 3000 mm, with prefabricated corner and tee units.

.3 Connectors: to CSA A370 and CSA S304 with hot dip galvanized finish, Type 316 stainless steel.

.4 Single Wythe Masonry Joint Reinforcement: Ladder type with single pair of side rods.

.1 Standard of Acceptance Materials:

.1 Ladder BL10 and Truss BL30, Blok Lok.

2.9 TIES AND ANCHORS

.1 Ties and anchors specified in this section shall be type 304 stainless steel and designed in accordance with CSA A370 for non-conventional masonry connectors as follows:

.1 Deflection: Maximum 2 mm, including free play, when acted upon by a lateral load of 0.45 kN, in all possible positions of adjustment.

.2 Positive restraint at position of maximum adjustment.

.3 Free play of multi-component ties maximum 1.2 mm when assembled in all possible configurations.

.4 Anchors shall allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall.

.2 Offset Shelf Angle Support:

.1 Standard of Acceptance:

.1 Fast Thermal Bracket™ by Fero Corporation, or similar with same or better physical properties and performance characteristics.

.3 Face Mount Tie Assemblies:

.1 Backer Plate: Fabricated from steel meeting requirements of CSA A370 and ASTM A1011; type 316 stainless steel designed to transfer wind loads to stud framing; length to suit total cavity, insulation and sheathing thickness.

.2 Ties: type 316 stainless steel Wire ties fabricated from steel wire in accordance with CSA G30.18; length to allow for cavity width and to extend minimum 50 mm into masonry unit joint hot dip galvanized in accordance with ASTM A153.

.3 Fasteners: type 316 stainless steel screws to stud backup as recommended by tie manufacturer. For concrete and concrete block backup walling, fasteners shall consist of close tolerance bits for use in percussion drills, and hammer driven anchors with pullout strengths of 5.4 kN for 20 MPa concrete and 3.75 kN for hollow concrete masonry unit with a 25 mm embedment.

.4 Standard of Acceptance:

.1 Fero Thermal Tie™ Rap-Tie® Masonry Connector System by Fero Corporation, or similar with same or better physical properties and performance characteristics.

.4 Side of Stud Mount Tie Assemblies:

.1 Flat-Plate Tie Support: Fabricated from 1.367 mm minimum base stainless steel thickness, meeting requirements of CSA A370 and ASTM A1011; designed to transfer wind loads to stud framing; length to suit total cavity, insulation, and sheathing thickness. The flat-plate has pre-engineered holes to minimize thermal bridging.

.2 V-Ties: Wire ties fabricated from 4.76 mm diameter stainless steel wire in accordance with CSA G30.18; length to allow for cavity width and to extend minimum 50 mm into masonry unit joint.

.3 Fasteners: type 316 stainless steel wood or sheet metal screws, appropriate to the substrate penetrated, to ASTM F593 or ASTM F738M; of sufficient length to penetrate minimum 13 mm into stud.

.4 Insulation Support: Purpose-made from polyethylene to hold the insulation tightly against the air and vapour barrier membrane.

.5 Acceptable Materials:

.1 Fero Thermal Tie™ Stud Shear® Connector, by Fero Corporation, or similar with same or better physical properties and performance characteristics.

.5 Lateral Partition Supports (Top of Wall Anchors):

.1 Angle Support: Fabricated from 2.657 mm type 316 stainless steel plate having 75 mm long legs fastened to deck structure to allow vertical movement of masonry assembly; hot dip galvanized; coordinate with Section 07 84 00 for firestopping insulation and smoke seals.

.2 Plate Support: Fabricated from 2.657 mm type 316 stainless steel plate with 10 mm diameter metal 150 mm long welded to plate having closed end plastic tube fitted over rod that allows rod to move in and out of tube; hot dip galvanized after fabrication.

.6 Rigid T-Intersection Anchors: Fabricate from steel bars 38 mm wide x 6 mm thick x 600 mm long with ends turned up 50 mm or with cross pins at installers option; Type 316 stainless steel.

.7 Anchor Bolts: Headed or L-shaped steel bolts in accordance with ASTM A307, Grade A; with ASTM A563/A563M hex nuts and, where indicated, flat washers; Type 316 stainless steel.

.8 Post-Installed Anchors: Provide torque-controlled expansion anchors, with capability to sustain, without failure, a load equal to six times the load imposed when installed in solid or grouted unit masonry and equal to four times the load imposed when installed in concrete when tested in accordance with ASTM E488 conducted by a qualified independent testing agency, and as follows:

.1 Indoor Locations: Carbon-steel components zinc-plated in accordance with ASTM B633, Class Fe/Zn 5.

.2 Outdoor and High Humidity Locations: SAE Type 316 stainless steel bolts complying with ASTM F593/F738M and nuts complying with ASTM F594/ASTM F836M.

.3 Fastening into Solid Concrete or Solidly Grouted Installation: Two component, injectable adhesive specifically manufactured for use in installing dowels or threaded anchor rods and inserts into new or existing concrete or grout, and as follows:

.1 Epoxy Composition: Sealed packaging containing resin, hardener, cement and water; components.

.2 Curing Time: Rapid set, high strength and stiffness; maximum time 45 minutes at 20°C.

.3 Acceptable Material: Hilti Inc., HIT HY150 System.

.4 Fastening to Hollow Wall Installation: Two component, injectable adhesive specifically manufactured for use in installing dowels or threaded anchor rods and inserts, with cylindrical mesh screen tube into new or existing masonry cavity wall, and as follows:

.1 Epoxy Composition: Sealed packaging containing resin, hardener, cement and water.

.2 Curing Time: Rapid set, high strength and stiffness; maximum time 60 minutes at 20 C.

.3 Acceptable Materials: Hilti Inc., HIT HY20 System.

.9 Toggle Bolts: Tumble wing type, class, and style as required for supported construction.

2.10 ACCESSORIES

.1 Preformed gaskets at concrete block control joints:

.1 Acceptable Materials:

.1 RS Series Rubber Control Joint, by Hohmann & Barnard, Inc.

.2 Steel Lintels: refer to Section 05 50 00 – Metal Fabrications.

.3 Slot Seal Standard 2015-3, by Williams Products

.4 Wall-mounted stainless steel and hard rubber door bumpers: TZ 5014, L 120 mm, by Dorma, or approved similar. Install as indicated.

.5 Firestopping: to Section 07 84 00.

.6 Sealants: to Section 07 92 00.

.7 Deflection Space Fillers at Non-Rated Assemblies: Roxul AFB or AD Fire Barrier Insulation.

.8 Slip Sheet for Lintel Bearing Locations: 20 mil thick PVC membrane, F20 by Lexsuco.

.9 Joint Filler: Control Joint Fillers: preformed rubber, neoprene or polyvinylchloride, size and profile to suit intended application.

.10 Bond Breaker Strips: #15 asphalt saturated, organic roofing felt in accordance with CSA A123.3.

.11 Other accessories and materials as required for a complete installation in accordance with Part 3 of this specification Section.

2.11 FINISHES

.1 Hot dip galvanizing:

.1 Sheet: to ASTM A653/A653M.

.2 Hardware: to ASTM A153/A153M.

.3 Other steel products: to ASTM A1223/A123MM.

2.12 CLEANING COMPOUNDS

.1 Use low VOC products in compliance with SCAQMD Rule 1168.

.2 Compatible with substrate and acceptable to masonry manufacturer for use on products.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's printed installation instructions, data sheets, and standard details.

3.2 EXAMINATION

.1 Verify surfaces and conditions are ready to accept work of this Section.

.2 Examine work of other Sections upon which work of this section is dependent. Should discrepancies be found which affect the proper performance of the work of this section, do not commence work until such discrepancies have been resolved.

3.3 PREPARATION

.1 Protect adjacent finished materials from damage due to masonry work.

3.4 ISOLATION COATING

.1 Apply isolation coating to metal contact surfaces in contact with cementitious materials, wood materials, and dissimilar metals.

.2 Apply isolation coating into all drilled holes, onto all fasteners (e.g., bolts, screws, rivets) and between all flat surfaces (e.g., where metal contacts concrete, masonry, or dissimilar metals).

.3 Generally, 2 – 3 mil thickness is required per application. Each application needs enough product applied so that excess isolation coating “oozes out” during assembly (this will ensure you have created a proper seal).

.4 Assemble and wipe away any excess product.

3.5 INSTALLATION – GENERAL

.1 Erect, install and build as required to meet or exceed the requirements of CSA A371 and CSA S304, and to the guidelines and recommendations of Canadian Concrete Masonry Producers Association (CCMPA).

.2 At interior locations where gypsum board is scheduled as indicated on Drawings, coordinate as required and build-in components as required to facilitate gypsum board and metal framing installations.

.3 Where mortar has started to harden at units requiring repositioning, remove and replace with fresh mortar.

.4 Masonry horizontal and vertical joints to be 10 mm thick except where adjustments are necessary to maintain the bond pattern or to adjust coursing.

3.6 BRICK MASONRY

.1 Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement type joints, returns, and offsets; avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

.2 Clean off all remaining mortar and jointing materials from salvaged bricks prior to reinstallation.

.3 Construct full height to underside of structure above with openings for mechanical as required. Tooth new partition coursing into existing at infill location. Re-use salvaged bricks from demolished walls where brick patching is required. Clean bricks prior to reuse, install using matching mortar, and match coursing pattern of adjacent partitions.

.4 Mixing and blending: mix units within each pallet and with other pallets to ensure uniform blend of colour and texture.

.5 Install hollow masonry units using face shell bedding with full head and bed joints. Minimize mortar protruding or dropping into core spaces.

.6 Bond: to match existing.

.7 Coursing height: to match existing.

.8 Jointing: to match existing.

.9 Mixing and blending: mix units within each pallet and with other pallets to ensure uniform blend of colour and texture.

.10 Clean unglazed clay masonry as work progresses.

.11 Tolerances: to CAN/CSA A371.

3.7 CONCRETE MASONRY UNITS

.1 Standard and fire-rated concrete block units:

.1 Bond: running, or as otherwise indicated.

.2 Coursing height: 200 mm for one block and one joint.

.3 Jointing: concave where exposed or where paint or other finish coating is specified; flush behind bases only.

.2 Special Shapes:

.1 Install special units to form corners, returns, offsets, reveals and indents without cut ends being exposed and without losing bond or module.

.2 Install reinforced concrete block lintels over openings in masonry where steel or reinforced concrete lintels are not indicated.

.3 End bearing: not less than 200 mm, or as otherwise indicated on drawings.

.4 Install special site cut shaped units.

.3 Construct full height to underside of structure above with openings for mechanical as required. Tooth new partition coursing into existing at infill location. Remove and reinstate existing fireproofing spray to create connection to structure above where required.

.4 Remove and reinstate existing fireproofing to create connection to structure above where required.

.5 Cull out masonry units, in accordance with CSA A165 and reviewed range of colour samples, with chips, cracks, broken corners, excessive colour and texture variation.

.6 Build in miscellaneous items such as steel angles, bolts, anchors, inserts, sleeves, and conduits.

.7 Construct masonry walls using running bond unless otherwise noted.

.8 Build around frames previously set and braced. Fill behind hollow frames within masonry walls with mortar or grout and embed anchors.

.9 Fit masonry closely against electrical and plumbing outlets so collars, plates, and covers overlap and conceal cuts.

.10 Install movement joints and keep free of mortar where indicated.

.11 Hollow Units: spread mortar bed from outside edge of face shells. Gauge amount of mortar on top and end of unit to create full joints, equivalent to shell thickness. Avoid excess mortar.

.12 Solid Units: apply mortar over entire vertical and horizontal surfaces. Avoid bridging of airspace between brick veneer and backup wall with mortar.

.13 Ensure compacted head joints. Use full or face-shell joint as indicated.

.14 Tamp units firmly into place.

.15 Do not adjust masonry units after mortar has set. Where resetting of masonry is required, remove, clean, and reset units in new mortar.

.16 After mortar has achieved initial set up, tool joints.

.17 Do not interrupt bond below or above openings.

3.8 TOLERANCES

.1 Tolerances for standard concrete unit masonry tolerances in accordance with CSA A165.1, supplemented as follows:

.1 Maximum variation in length or height between units within specific job lot for specified dimension not to exceed 2 mm.

.2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.

.3 Out of square tolerance not to exceed 2 mm.

.4 Maximum variation in width between units within specific job lot for specified dimension not to exceed 2 mm.

3.9 HORIZONTAL REINFORCING

.1 Joint Reinforcement:

.1 Install joint reinforcement in cavity, solid and partition walls.

.2 Place reinforcement continuously in horizontal joints at 400 mm on centre, beginning with course 400 mm above bearing, unless otherwise indicated.

.3 For stack bond assemblies, joint reinforcing is required at every course.

.4 Do not carry reinforcement through intersections where lateral support anchors are installed, at intersections of walls and partitions with solid piers and at block control joints.

.5 Provide additional reinforcing at openings. Provide first row of reinforcing at first joint above support. Place reinforcement in alternate courses to cavity wall connectors, except where connectors are integral with reinforcement.

.2 Place joint reinforcement continuous in first and second joint below top of walls.

.3 Lap joint reinforcement ends minimum 200 mm.

.4 Connect stack bonded unit joint corners and intersections with anchors 400 mm on centre.

.5 Install anchors in accordance with CSA A370 and CSA A371.

3.10 CONNECTORS AND REINFORCEMENT

.1 Install masonry connectors and reinforcement in accordance with CSA A370, CSA A371, CSA A23.1 and CSA S304.1 unless indicated otherwise.

.2 Prior to placing mortar and grout, obtain Consultant's approval of placement of reinforcement and connectors.

.3 Install additional premanufactured masonry reinforcement as required for a complete job meeting Code and design intent. If custom metal fabrication is required, refer to Division 05.

3.11 BONDING AND TYING

.1 Bond walls of two or more wythes using metal connectors in accordance with CSA S304.1, CSA A371 and as indicated.

.2 Tie masonry veneer to backing in accordance with Ontario Building Code 2024, CSA S304.1, CSA A371 and as indicated.

.3 Install unit, adjustable, single wythe and multiple wythe joint reinforcement where indicated and in accordance with CSA A370, CSA A371, and manufacturer's instructions.

.1 Bond walls of two or more wythes using metal connectors in accordance with CSA A371 and as indicated.

.2 Install horizontal joint reinforcement 400 mm on centre.

.3 Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 400 mm each side of opening.

.4 Place joint reinforcement continuous in first and second joint below top of walls.

.5 Lap joint reinforcement ends minimum 200 mm.

.6 Connect stack bonded unit joint corners and intersections with anchors 400 mm on centre.

3.12 REINFORCED LINTELS AND BOND BEAMS

.1 Reinforce masonry beams, masonry lintels and bond beams as indicated.

.2 Place and grout reinforcement in accordance with CSA S304.1, CSA A371, and CAN/CSA A179.

.3 Support and position reinforcing bars in accordance with CSA A371.

3.13 GROUTING

.1 Grout masonry in accordance with CSA S304.1, CSA A371 and CAN/CSA A179 and as indicated.

3.14 ANCHORS

.1 Install metal anchors in accordance with CSA A370 and CSA A371.

3.15 LATERAL SUPPORT AND ANCHORAGE

.1 Install lateral support and anchorage in accordance with CSA S304.1 and as indicated.

3.16 CONTROL AND EXPANSION JOINTS

.1 Install control and expansion joint materials in unit masonry as masonry progresses; do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

.2 Form control joints in concrete masonry consisting of a complete vertical break free from mortar using one of the following methods:

.1 Break joint reinforcement at control joints, but extend bond beam reinforcing 400 mm into wall across control joint and wrap with 0.15 mm polyethylene bond breaker.

.2 Fit bond breaker strips into hollow contour in ends of concrete masonry units on one side of control joint; fill resultant core with grout and rake out joints in exposed faces for application of sealant.

.3 Install preformed control joint gaskets designed to fit standard sash block.

.4 Install interlocking units designed for control joints; install bond breaker strips at joint; keep head joints free and clear of mortar or rake out joint for application of sealant.

.5 Install temporary foam plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

.6 Refer to Drawings for control and expansion joint locations, and vertical reinforcing requirements; confirm location with Consultant before installation; confirm with Consultant where not shown on Drawings.

.3 Install a minimum 10 mm high horizontal, pressure relieving joints by inserting a compressible filler, sealant and backer rod specified in Section 07 92 00; locate horizontal, pressure relieving joints beneath shelf angles supporting masonry.

.4 Locate joints at 6000 mm centres maximum and at inside corners and at a maximum of 1000 mm from any outside corners, any other indication notwithstanding. Exact locations to be confirmed with Consultant.

3.17 FIELD BENDING

.1 Do not field bend reinforcement and connectors except where indicated or authorized by Consultant.

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.

.3 Replace bars and connectors that develop cracks or splits.

3.18 ACCESSORIES

.1 Install firestopping: to Section 07 84 00, as required to achieve required ratings.

.2 Install sealants: to Section 07 92 00, at joints and penetrations to ensure continuity of weatherproofing and soundproofing.

.3 Install other accessories as required for a complete installation of wall assemblies.

3.19 REPAIR/RESTORATION

.1 Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective work.

3.20 FIELD QUALITY CONTROL

.1 Field quality control inspections and testing: in accordance with Division 01 – General Requirements.

.2 Allow access to scaffold and worksite as required to perform inspections and tests.

.3 Have a qualified independent testing and inspecting agency perform field tests and inspections and prepare test reports as follows:

.1 Testing Frequency: One set of tests for each 450 m^2 (5000 ft^2) of wall area or portion remaining.

.2 Concrete masonry units will be sampled and tested by independent testing agency in accordance with CSA S304.1.

.3 Clay Masonry Unit Test: For each type of unit provided, in accordance with CSA A82.2 and ASTM C67.

.4 Mortar and Test (Proportion Specification): For each mix provided, in accordance with CSA A179 for mortar air content and compressive strength.

.5 Prism Test: For each type of construction provided, in accordance with CSA A179 at 7 days and at 28 days.

.6 Concrete Cylinder Tests at 7 days and at 28 days.

.4 Prior to start of work, an independent testing agency will test masonry materials in accordance with CSA S304 to confirm compressive strength.

.5 Independent testing agency will carry out tests on a minimum of 6 prisms prepared using grout mix to confirm grout strength.

.6 Independent testing agency will carry out field control tests in accordance with CSA S304.

.7 Field testing of post-installed anchors, where directed by Consultant: in accordance with ASTM E3121/E3121M.

3.21 MASONRY CLEANING

.1 Brick Masonry:

.1 Perform cleaning within 24 hours after masonry walling has had a chance to fully dry out after erection to remove efflorescence (i.e., “new building bloom”), and construction and accumulated environmental dirt.

.2 Clean unglazed clay masonry: 10 m^2 area of wall designated by Consultant and leave for one week. If no harmful effects appear and after mortar has set and cured, protect windows, sills, doors, trim and other work, and clean brick masonry as follows:

.1 Remove large particles with wood paddles without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.

.2 Scrub with solution of 25 mL trisodium phosphate and 25 mL household detergent dissolved in 1 L of clean water using stiff fibre brushes, then clean off immediately with clean water using hose. Alternatively, use proprietary compound recommended by brick masonry manufacturer in accordance with manufacturer's directions.

.3 Repeat cleaning process as often as necessary to remove mortar and other stains.

.4 Use acid solution treatment for difficult to clean masonry as described in Technical Note No. 20 by the Brick Industry Association.

.2 Concrete Unit Masonry:

.1 Progress Cleaning:

.1 Standard and Fire-Rated Concrete Unit Masonry:

.1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block. Clean wall surface with suitable brush or burlap.

.3 Upon completion of installation, remove surplus materials, rubbish, tools, and equipment barriers.

3.22 PROGRESS CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.1 Standard and Fire-Rated Concrete Unit Masonry:

.1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block. Clean wall surface with suitable brush or burlap.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management

3.23 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Protect concrete block against wetting prior to laying in walls.

.3 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section specifies requirements for metal fabrications and is to be read in conjunction with the Drawings and technical specifications that require metal fabrications for complete installations.

1.2 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Division 03: Cast-in-Place Concrete.

.3 Section 04 22 00 – Unit Masonry.

.4 Division 05 – Structural Steel.

.5 Section 05 70 15 – Stainless Steel Fabrications.

.6 Section 06 10 00 – Rough Carpentry.

.7 Section 06 40 00 – Finish Carpentry and Casework.

.8 Section 08 80 50 – Glazing.

.9 Section 09 21 16 – Gypsum Board Assemblies.

.10 Section 09 22 00 – Non-Structural Metal Stud Framing.

.11 Section 09 91 00 – Painting.

.12 Section 09 96 53 – Powder Coating.

.13 Section 10 22 23 – Moveable Partition System.

1.3 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM A53/A53M-24, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A123/A123M-24, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.3 ASTM A153/A153M-23, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.4 ASTM A276/A276M-25, Standard Specification for Stainless Steel Bars and Shapes.

.5 ASTM A307-21, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.

.6 ASTM A500/A500M-23, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

.7 ASTM A501/A501M-21, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

.8 ASTM A666-24, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.

.9 ASTM A780/A780M-20, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

.10 ASTM F468-23(2026), Standard Specification for Nonferrous Bolts, Hex Cap Screws, Socket Head Cap Screws, and Studs for General Use.

.11 ASTM F593-24, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

.12 ASTM F3125/F3125M-25a, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi, 144 ksi, and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.

.2 CSA Group (CSA)

.1 CSA G40.20-13/G40.21-13 (R2023), General requirements for rolled or welded structural quality steel/Structural quality steel, Includes Update No. 1 (2014).

.2 CSA G164:26, Galvanizing of irregularly shaped articles.

.3 CSA S16:24, Design of steel structures, Includes Update No.1 (2026).

.4 CSA W47.1:25, Certification of companies for fusion welding of steel.

.5 CSA W48:23, Filler metals and allied materials for metal arc welding, Includes Errata (2025).

.6 CSA W55.3-08 (R2023), Certification of companies for resistance welding of steel and aluminum.

.7 CSA W59:24, Welded Steel Construction.

.8 CSA W178.1:18 (R2023), Certification of Welding Inspection Organizations.

.9 CSA W178.2:18 (R2023), Certification of Welding Inspectors.

.3 National Association of Architectural Metal Manufactures (NAAMM)

.1 NAAMM AMP 521-01 (R2012), Pipe Railing Systems Manual.

.2 NAAMM AMP 555-92, Code of Standard Practice for the Architectural Metal Industry (Including Miscellaneous Iron).

.4 National Ornamental & Miscellaneous Metals Association (NOMMA)

.1 NOMMA Guideline 1: Joint Finishes.

.5 The Society for Protective Coatings (SSPC)/National Association of Corrosion Engineers (NACE International)

.1 Surface Preparation Guidelines:

.1 SSPC-SP6/NACE No. 3, Commercial Blast Cleaning.

.2 SSPC-SP 16 is a surface preparation standard for abrasive brush-off blast cleaning of coated or uncoated non-ferrous metals, stainless steel, and galvanized steel prior to applying protective coatings. It establishes a uniform, dense surface profile of at least 0.75 mils (19 micrometers) while removing loose materials and contaminants.

.6 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - current edition

.7 Underwriters Laboratories (UL)

.1 UL 2768-11, Architectural Surface Coatings

1.4 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

.1 Supply following products for installation under other Sections:

.1 Anchor bolts, bearing plates, sleeves and other inserts to be built into concrete and masonry elements and required for anchorage and support of fabricated steel components.

.2 Fabricated steel components to be built into concrete and masonry.

.2 Supply instructions and templates as required for accurate setting of inserts and components.

1.5 COORDINATION

.1 Coordinate with other trades during the bid period and after to ensure that there are no conflicts in work scope understanding, and identify metal fabrication requirements; hold a trade coordination meeting with the General Contractor to review scopes of work.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit manufacturer's printed product literature, specifications and data sheets.

.2 Submit Shop Drawings as follows:

.1 Indicate materials, profiles, core thicknesses, finishes, connections and joints, sizes of sections, method of anchorage, number of anchors, supports, fasteners, welds, reinforcement, details, and accessories.

.2 For items where design is delegated to fabricator or otherwise require structural design (e.g., guardrails and handrails, support structures and backing plates for toilet partitions, toilet and bath accessories, wall-mounted casework, suspended mechanical items, suspended panels and ceilings, etc.), provide shop drawings signed and sealed by Professional Engineer (P.Eng.) responsible for the design and registered in Province of Ontario as indicated in Section 01 35 01 – Delegated Design.

.3 Submit Samples:

.1 Submit three (3) samples of blackened steel plate. Each sample to indicate varying levels of patina for selection by consultant. Samples to be 200mm x 200mm each.

.4 Closeout submittals:

.1 Provide closeout submittals in accordance with Section 01 77 00.

.2 Submit maintenance and cleaning instruction for blackened steel surfaces. Advise of proper materials, and methods for cleaning.

.3 Submit maintenance and cleaning instructions for any items that require special care, and indicate any processes of procedures that could cause damage.

1.7 QUALITY ASSURANCE

.1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Detail and fabricate metal fabrications in accordance with the NAAMM AMP 555.

.4 Perform Work to the highest standard of modern shop and field practice, by personnel experienced in this Work. Accurately fit joints and intersecting members in true planes with adequate fastening. Build and erect the Work plumb, true, square, straight, level, accurate to the sizes shown, and free from distortion or defects.

.5 Fabricator Qualifications: A firm experienced in producing metal fabrications similar, to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

.6 Mock-ups:

.1 Provide on site mock-up of blackened steel cladding on plywood substrate. Mock-up to include one representative full height pane, and one corner condition.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Exercise due care in storing, handling and erecting all materials and support all materials properly at all times so that no piece will be bent, twisted or otherwise damage structurally or visibly.

.2 Correct damaged material and where the Consultant deems damage irreparable, replace the affected items at no additional expense to the Consultant or Owner.

.3 Apply protective covering to face of all exposed finished metalwork before it leaves shop, covering to remain until item installed.

.4 Fabricate large assemblies so they can be safely and easily transported and handled to their place of installation.

1.9 JOB CONDITIONS

.1 Coordinate this Work with the remainder of the Work and exercise the necessary scheduling to ensure that all Work is carried out and all items incorporated during the appropriate construction phase.

.2 Provide instructions and drawings to other trades for setting bearing plates, anchors blots, and other members that are built in to work of other trades.

.3 Protect other Sections of the Work from damage by this Section of the Work.

Part 2 Products

2.1 PERFORMANCE AND DESIGN CRITERIA

.1 Provide delegated design as required.

.2 Design Requirements:

.1 Design metal construction and connections in accordance with OBC and amendments for vertical and horizontal live load requirements.

.3 Comply with CISC Code of Standard Practice for Structural Steel, Appendix I, Architecturally Exposed Structural Steel.

.4 The ultimate support for all miscellaneous fabrications is the building's structural framing. The miscellaneous metal's contractor is responsible for the design, fabrication and installation of all aspects of the required items including direct support methodology to the building's structural framing in the location and configuration as described on the structural consultant documents.

2.2 MATERIALS

.1 Steel channels, angles and plates: to CSA G40.20/G40.21, Grade 300W.

.1 Steel plate for Blackened steel plate to be 6mm thick minimum.

.2 Hollow structural sections (HSS): to CAN/CSA G40.20/G40.21, Grade 350W, Class C.

.3 Rolled steel sections: to CSA G40.21, 350W.

.4 Steel pipe: to ASTM A53/A53M standard weight (Schedule 40), galvanized finish.

.5 Welding materials: to CSA W59.

.6 Welding electrodes: to CSA W48 Series.

.7 Fasteners: bolts, nuts, washers, rivets, lock washers, anchor bolts, machine screws, and machine bolts.

.1 Unfinished fasteners: In areas not exposed to the public, use unfinished bolts conforming to ASTM A307, Grade A, with hexagon heads and nuts. Supply bolts of lengths required to suit the thickness of the material being joined, but not projecting more than 6 mm beyond nut, without the use of washers.

.2 Finished fasteners:

.1 In areas exposed to public use, bolts, nuts, washers, rivets, lock washers, anchor bolts, machine screws and machine bolts to be hot dip galvanized in accordance with ASTM A153/A153M.

.2 For joining stainless steel components use stainless steel fasteners of same type.

.8 Structural bolts: to ASTM F3125.

.9 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours. **FABRICATION - GENERAL**

.1 Fabricate to OBC requirements.

.2 Fabricate in compliance with OBC and amendments.

.3 Fabricate railings in accordance with NAAMM AMP 521 as applicable.

.4 Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

.5 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.1 Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss. Temperature change (Range): 100 deg F (38 deg C).

.6 Shear and punch metals cleanly and accurately. Remove burrs.

.7 Ease exposed edges to a radius of approximately 0.794 mm (1/32 inch), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

.8 Remove sharp or rough areas on exposed traffic surfaces.

.9 Weld corners and seams continuously to comply with American Welding Society (AWS) recommendations, and the following:

.1 Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

.2 Obtain fusion without undercut or overlap.

.3 Remove welding flux immediately.

.4 At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

.10 Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

.11 Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

.12 Shop Assembly: preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

.13 Cut, reinforce, drill and tap miscellaneous metalwork as indicated to receive finish hardware, screws, and similar items.

.14 Ensure exposed welds are continuous for length of each joint.

.15 Grind or file exposed welds and steel sections smooth and flush with adjacent surfaces. Weld locations not to be visible after application of paint finishes.

.16 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.

.17 Accurately form connections with exposed faces flush; mitres and joints tight.

.18 Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

.19 All welding is to be performed by CWB Certified Welders.

.20 Welded joints: Finish #1, to NOMMA Guideline 1: Joint Finishes.

2.4 HOT-DIP GALVANIZING

.1 Use Type 316 stainless steel as specified, and as indicated on Drawings. The following hot dipped galvanizing requirements apply to locations where stainless steel has not been specified or indicated:

.1 For steel exposed to the exterior or where otherwise indicated to have a hot-dip galvanized finish, the following applies:

.1 Hot-dip galvanize all steel components after fabrication in accordance with ASTM A123/A123M, minimum zinc coating of 705 g/m².

.2 Notify the galvanizer that components are to receive a subsequent powder coat (duplex system), or field-applied primer and finish paint system, and allow for additional zinc coating thickness to accommodate surface profiling.

.2 Surface smoothing: remove runs, drips, spikes, and surface irregularities resulting from galvanizing.

2.5 FINISHES

.1 Shop Primers: Provide primers that are compatible with paint systems specified.

.2 Blackened Steel. Blackened steel finish to be achieved using applied patina and clear lacquer.

.1 Applied black patina: Sculpt Nouveau 'Black Magic Patina'.

.2 Sealer:Sculpt Nouveau 'Ever-Clear'. Finish: Double matte.

.3 Metal degreaser / cleaner: Sculpt Nouveau 'Metal Degreaser'

.3 Isolation Coating: Apply an isolation coating to contact surfaces in contact with cementitious materials, wood materials and dissimilar metals except stainless steel.

.4 Powder Coating: to Section 09 96 53 – Powder Coating

.5 Paint: At interior locations, prepare the Work and paint, primed ready for site finish as specified in Section 09 91 00 – Painting.

2.6 ISOLATION COATING

.1 Isolate aluminum from following components, by means of bituminous paint:

.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.

.2 Concrete, mortar and masonry.

.3 Wood.

.2 Dielectric Separator / Isolation Coating: CRL Black Bituminous paint or aerosol or approved equivalent.

2.7 ROUGH HARDWARE

.1 Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required. Fabricate items to sizes, shapes, and dimensions required.

2.8 BLACKENED STEEL PANELS

.1 Provide 6mm steel plate. Ease exposed edges per 2.3 Fabrication – General. Provide countersunk fasteners of matching finish in a layout approved by Consultant.

.2 Clean and prepare surfaces in accordance with blackened steel finish manufacturer's recommended instructions.

.3 Clean and degrease surface using cleaning/degreasing system.

.4 Apply black patina in accordance with manufacturer's instructions. Apply a minimum of two (3) coats to achieve dark black patina finish to satisfaction of Consultant.

.5 Apply sealer in accordance with manufacturer's instructions

2.9 ALUMINUM ANGLES TO SUPPORT ACRYLIC PANEL (SCOPE 4)

.1 Aluminum angles to support acrylic panel in modified lightwell rooms in Scope 4.

.1 Aluminum angle spec: 25 mm x 25 mm x 3 mm (1" x 1" x 1/8")

.2 Finish: Powder-coated: RAL Colour TBC by Consultant (White).

.3 Fasteners to secure alum angle to substrate: Countersunk head without ribs

2.10 ANGLE LINTELS

.1 Steel angles: galvanized, sizes indicated for openings. Provide 150 mm minimum bearing at ends.

.2 Weld or bolt back-to-back angles to profiles as indicated.

.3 Finish: galvanized.

2.11 FABRICATION – MISCELLANEOUS ITEMS

.1 Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required. Fabricate items to sizes, shapes, and dimensions required.

.2 Miscellaneous Framing and Supports: Provide steel framing and supports for applications indicated as required to complete work.

.3 Anchors and Fastening:

.1 Provide all anchor bolts and expansion bolts or other means of anchorage required for building into floors, walls and ceilings, where necessary to secure metal and wood to concrete, masonry or steel work, other than anchorages specified under other Sections. Fasten all components and items securely. Provide adequate reinforcing to ensure safe rigid installation. Set anchor bolts in locations indicated and spaced as shown or, if not shown, as may be required for properly securing Work.

.2 Use weld studs of size not larger than 10 mm for attaching miscellaneous materials and equipment to building steel. If weight of item requires larger fasteners use clips or brackets and secure by welding or through bolting.

.3 Use self-drilling expansion type concrete anchors for attaching to masonry and concrete.

.4 Inserts and Hangers:

.1 Install inserts, hangers, and supports. Make inserts drilled lug or expansion type.

.2 Before openings are cut through structure, obtain Consultant's written acceptance for procedures, locations and reinforcements required.

.3 Do not weld hangers to structural steel members or burn holes in structural steel.

.5 Mechanical Equipment Supports:

.1 Coordinate with the requirements indicated on the mechanical Drawings and Specifications. The requirements of the mechanical Drawings and Specifications take precedence over item 2.12.5. of this Section 05 50 00 in case of conflict.

.2 Design supplementary steel structures to support mechanical equipment in locations and elevations indicated on the Drawings.

.3 Obtain dimensions and weights of equipment from reviewed architectural and mechanical shop drawings and product data.

.4 Arrangement in accordance with Drawing details where indicated, and in accordance with partition and equipment supplier's recommendations.

.5 Submit shop drawings of support for each type and size of partition and equipment, designed, reviewed and sealed by a professional engineer. Information should include:

.1 Partition and Equipment loads and connections.

.2 Connect details to building structure.

.3 Locations of partitions and equipment.

.4 Loads at each connection point to building structure.

.6 Refer to technical specification Sections for particular requirements. Mechanical equipment requiring supplementary steel supports include but are not limited to:

.1 Piping.

.2 Equipment support beams.

.3 Ductwork.

.6 Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitred joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

.7 Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.

.8 Miscellaneous Steel Trim: Provide shapes and sizes indicated for profiles shown. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages as required for coordination for assembly and installation with other work.

2.12 SHOP PAINTING

.1 Clean surfaces in accordance with Steel Structures Painting Council Manual Volume 2, minimum SSPC SP6.

.2 Apply one coat of shop primer to metal items, with exception of galvanized or concrete encased items.

.3 Apply two coats of primer of different colours to parts inaccessible after final assembly.

.4 Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale, grease, do not paint when temperature is below 7 degrees C.

.5 Do not paint surfaces to be field-welded.

.6 Prime after fabrication and before damage to surface occurs from weather or other exposure.

.7 Protect machine finished or similar surfaces that are not to be coated, but that do require protection, with coating of rust inhibitive petroleum, molybdenum disulphide, or other coating approved by the Consultant.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Check and verify that no irregularities exist that would affect quality of execution of work specified.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 ISOLATION COATING

.1 Apply isolation coating to contact surfaces in contact with cementitious materials, wood materials, and dissimilar metals.

.2 Apply isolation coating into all drilled holes, onto all fasteners (e.g., bolts, screws, rivets) and between all flat surfaces (e.g., behind door handles, hinges, lamp-housings, diamond plate, mirror housing, latches, brackets, door trim, frame rails, suspension mounts, etc).

.3 Generally, 2 – 3 mil thickness is required per application. Each application needs enough product applied so that excess isolation coating “oozes out” during assembly (this will ensure you have created a proper seal).

.4 Assemble and wipe away any excess product.

3.3 INSTALLATION

.1 Erect to OBC and amendments, CSA S16, and Code of Standard Practice for Structural Steel.

.2 Provide solid 19mm G2S plywood substrate for all **blackened steel plate applications**, securely fastened to substrate beneath. Edge of plywood substrate to be recessed 12mm from edge of panel. Provide blackened steel channel filler piece at each panel reveal to fill gap between panel and substrate.

.3 Install in required locations using welded connections wherever possible to provide rigid structure. Provide anchor bolts, bolts and plates for connecting stairs and railings to structure.

.4 At all **blackened steel plate applications**, align edge of panel with adjacent edge of masonry substrate. All panel edges forming a frame to be continuous at corners. All plywood substrate to be hidden following complete installation.

.5 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.6 Install Work in accordance with manufacturer's or fabricator's (as applicable) written instructions, job-specific details, and Drawings.

.7 Do welding work in accordance with CSA W59 unless specified otherwise.

.8 Supply finished items to be built into those trades along with instructions for proper installation.

.9 Apply architectural metalwork using hidden mechanical fasteners unless noted otherwise. Installation shall be by skilled Architectural metalworkers experienced in highest quality work.

.10 Apply **blackened steel plate panels** with countersunk fasteners, aligned in a grid approved by the Consultant. Fastener finish to match finish of blackened steel plate. Finish face of all fasteners to be flat, and to be aligned with finish face of panel. Embedded or projecting fasteners will not be accepted.

.11 Fasteners to draw adjoining sections together in proper, true alignment, and are capable of field adjustment.

.12 All fasteners, mountings to be non-loosening and installed so that they will be hidden at completion.

.13 Install all Work to true, straight lines, accurate to profile, all properly aligned.

.14 Isolate dissimilar metals in a manner approved by the Consultant to prevent electrolytic action or corrosion.

.15 Install finish hardware supplied under other Sections required for completion of components of this Section.

.16 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.17 Provide suitable means of anchorage acceptable to Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.18 Make field connections with high tensile bolts to CSA S16 and weld to prevent loosening.

.19 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.20 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.21 Repair galvanized areas damaged by welding, flame cutting or during handling, transport or erection in accordance with ASTM A780/A780M. Touch-up with organic zinc-rich paint to NPFC-MIL-P-21035 zinc rich paint, minimum DFT 8 mils.

3.4 MISCELLANEOUS ITEMS

.1 Provide steel angle frame, hanging rods and bracing for supporting bulkheads and shelving.

.2 Steel angle masonry supports as detailed.

.3 Supply and install miscellaneous metal items as indicated or specified, or as otherwise required for a complete job, in accordance with the design intent of the project.

.4 Supply and install miscellaneous metal fabrications as indicated or specified, or as otherwise required in accordance with the design intent of the project.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.7 SCHEDULE

.1 The schedule given hereunder shall not be considered to represent a complete schedule of all metal fabrications required in the Work. Thorough scrutiny of the complete Contract Documents is required to obtain a complete schedule of metal fabrications required in the Work.

.2 Include miscellaneous framing and supports that are not included under work indicated on structural drawings.

.3 Provide the following metal fabrications:

.1 Metal Fabrications Shown on Structural Drawings:

.1 Refer to Structural Drawings; fabrication work includes, but is not limited to:

.1 Additional supplementary steel fabrications and components shown on Structural Drawings, or as otherwise required to complete structural steel work.

.2 Lateral support angles at top of masonry partitions and walls in accordance with details on structural drawings where not provided by Section 04 22 00.

.3 Structural support at partitions.

.4 50 mm x 50 mm x 6 mm powder-coated continuous angle support for work desks.

.5 Interior cladding panels on plywood substrate with blackened steel finish

.6 HSS reinforcement where indicated.

.7 Miscellaneous steel hardware, angles, plates, and lintels required but not included on structural drawings.

.8 Other metal fabrications and miscellaneous hardware indicated and not specifically covered in other Sections.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the Contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 05 50 10 – Metal Fabrications.

.3 Section 06 40 00 – Finish Carpentry and Casework.

.4 Section 09 21 16 – Gypsum Board Assemblies.

.5 Section 09 91 00 – Painting.

.6 Section 09 96 53 – Powder Coating.

.7 Refer to Finish Schedule and Drawings for locations.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM A240/A240M-24, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

.2 ASTM A269/A269M-24, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.3 ASTM A276/A276M-24a, Standard Specification for Stainless Steel Bars and Shapes

.4 ASTM A312/A312M-24a, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.

.5 ASTM A666/A666M-24, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

.6 ASTM A747/A747M-23, Standard Specification for Steel Castings, Stainless, Precipitation Hardening.

.7 ASTM D1187/D1187M-97(2024), Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.

.8 ASTM F593-24, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

.9 ASTM F3125/F3125M-23, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.

.2 American Welding Society (AWS)

.1 AWS D1.6/D1.6M:2007, Structural Welding Code - Stainless Steel.

.2 AWS D18.1/D18.1M:2020, Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications.

.3 CSA Group (CSA)

.1 CSA G40.20-13/G40.21-13 (R2023), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel, Includes Update No. 1 (2014).

.2 CSA W48:23, Filler metals and allied materials for metal arc welding.

.3 CSA W59:24, Welded Steel Construction.

.4 National Ornamental & Miscellaneous Metals Association (NOMMA)

.1 NOMMA Guideline 1: Joint Finishes, 1994.

.5 SAE International (The Society of Automotive Engineers)

.1 SAE steel grades.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section and on-site installation, with contractor's representative and appropriate effected trades in accordance with Division 01 - General Requirements to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Coordination with other building subtrades.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Comply with the requirements of Section 01 33 00 – Submittal Procedures.

.2 Submit unexecuted warranty to owner for review at commencement of Work.

.3 Submit approved, executed warranty at Substantial Performance made out in name of Owner.

.4 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet for each product specified.

.5 Shop Drawings:

.1 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories. Show relationship to other parts of the work, and indicate locations of plans and elevations.

.2 Submit shop drawings bearing the stamp of a qualified professional engineer registered in the Province of Ontario for all structural assemblies and elements.

.6 Submit Samples:

.1 Submit three (3) samples of 6 mm, 200 mm x 200 mm stainless steel plate countertop/shelving/harvest table leg cladding with the following finishes - sandblasted, random orbital finish - 2 variants of finishing, with 0.5mm chamfered edges to match final plate finish.

.2 Submit two (2) 400 mm long samples of each: stainless steel angles, stainless steel channels and powder coated HSS tubing to be used for harvest table substructure support, Finishes to specifications.

.3 Submit three (3) samples of 200 mm x 200 mm proposed stainless steel expanded metal mesh with two (2) adjoining edges of each stainless steel mesh panel enclosed in specified trim enclosure. Powder-coated specified finish.

.4 Submit three (3) samples of proposed HSS guard-extension welded tube construction (support plate, bent tube, handrail tube) powder-coated to the specified finish.

.7 Closeout submittals:

.1 Provide closeout submittals in accordance with section 01 77 00.

.2 Submit maintenance and cleaning instructions for any items that require special care, and indicate any processes of procedures that could cause damage.

1.5 QUALITY ASSURANCE

.1 Welding of steel shall be in accordance with CSA W59.

.2 Use electrodes compatible with and of the same properties of the stainless steel. Grind smooth and polish to match finish.

.3 Fabricator Qualifications: A firm experienced in producing stainless steel fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

.4 Stainless steel:

.1 Welding of stainless steel shall be by the electric arc process.

.2 Weld stainless steel by the electric arc process, to CSA W59.

.3 Use electrodes compatible with and of the same properties as the stainless steel. Grind smooth and polish to match finish.

.4 Structural stainless steel welding: to AWS D1.6/D1.6M.

.5 Stainless steel tube and pipe: to AWS D18.1/D18.1M.

.6 Joint finish requirements: to NOMMA Guidelines 1: Joint Finishes:
Finish #1 - Ornamental Quality, No Evidence of a Welded Joint.

.5 Mock-ups

.1 Provide on-site mock-up of 400 mm length of stainless steel shelf, secured to substructure in finished location, demonstrating with sample blocks of thickness equivalent to backsplash how the support structure will be concealed, and how the light will be integrated.

.2 Provide on-site mock-up of one (1) stainless steel leg assembly at proposed location including: HSS & Channel substructure with angle support for countertop attachment, proposed anchorage to the floor, stainless steel plate cladding panels with specified attachment, 600 mm length of stainless steel support brace.

.3 Provide on-site mock-up of one (1) expanded metal mesh filler panel fixed into existing HSS guard substructure with specified angles.

.4 Provide on-site mock-up of 1500 mm of one (1) guardrail extension assembly on each exterior balcony (third and fourth floor), each mock-up to include two support upstands secured to guard assembly, with connecting handrail.

1.6 WARRANTY

.1 Contractor agrees to correct any deficiencies found in Work performed for a period of 5-years from date of Substantial Performance.

Part 2 Products

2.1 PERFORMANCE AND DESIGN CRITERIA

.1 Provide delegated design as required.

.1 Provide delegated design by a Professional Structural Engineer licensed to practice in the provide of Ontario for all guard-rail extension and guardrail infill panel scope.

.2 Design Requirements:

.1 Design metal construction and connections in accordance with OBC and amendments for vertical and horizontal live load requirements.

.2 Detail pipe railings to CSA S16, NAAMM Pipe Railing Manual, and Drawings.

.3 Comply with CISC Code of Standard Practice for Structural Steel, Appendix I, Architecturally Exposed Structural Steel.

.4 The ultimate support for all miscellaneous fabrications is the building's structural framing. The miscellaneous metal's contractor is responsible for the design, fabrication and installation of all aspects of the required items including direct support methodology to the building's structural framing in the location and configuration as described on the structural consultant documents.

2.2 MATERIALS

.1 Stainless-Steel Sheet: ASTM A240/A240M, Type 304, 1.519 mm thick (16 gauge) or as otherwise indicated, and Series 300 stainless-steel fasteners. Brushed finish.

.2 Structural bolts: to ASTM F3125/F3125M.

.3 Stainless steel strip, sections, shapes, U-channels, plate and flat bar: to ASTM A240.

.4 Stainless steel tubing: to ASTM A269.

.5 Stainless steel piping: to ASTM A312/A312M; pipe to NPS Schedule 40S.

.6 Structural steel: to CAN/CSA G40.20/G40.21, grade 350W.

.7 Stainless steel fittings and castings: to ASTM A747/A747M.

.8 Structural stainless-steel fasteners: to ASTM A738/A738M.

.9 Stainless steel fasteners, washers and nuts: to ASTM F593, type 316 austenitic stainless steel, sized as required for purpose intended, or as otherwise indicated. Cold Finished Materials: Condition B, cold worked, to ASTM A276. Exposed Fasteners: Stainless steel countersunk screws or bolts, consistent with design intent.

.1 Anchors shall be fabricated from stainless steel with capability to sustain, without failure, load imposed within a safety factor of 4, as determined by testing to ASTM E488.

.10 Welding materials: to CSA W59.

.11 Welding electrodes: to CSA W48 Series.

.12 Solder and flux: to ASTM B32, alloy composition Tin (Sn) for stainless steel, and 85 Tin/15 Zinc for aluminum. Flux: rosin, cut hydrochloric acid, or commercial preparation suitable for materials to be soldered.

.13 Emulsified asphalt protective coating for dissimilar metals: to ASTM D1187/D1187M.

2.3 STAINLESS STEEL PLATE [COUNTERTOP]

.1 Provide SUS 304 (AISI 304) austenitic stainless steel, 6 mm thick plate,

.2 Stainless steel finish: Sandblasted matte

.3 Standard of Acceptance:

.1 Lastra surfaces - Stainless Steel Countertop.

.4 Countertop to include single integrated welded sink fabricated as a single unit with countertop measuring 400 mm x 600 mm, 200 mm deep, with 12 mm inside radius rounded corners, a drain, and an overflow drain.

2.4 STAINLESS STEEL PLATE [BENT METAL SHELVING]

.1 Provide SUS 304 (AISI 304) austenitic stainless steel, 6 mm thick plate, w/ bent or welded profile at concealed corner, with pre-drilled holes for in-wall installation.

.2 Stainless steel finish: Sand-blasted matte

.3 Standard of Acceptance:

.1 Lastra surfaces - Stainless Steel Countertop.

2.5 STAINLESS STEEL HARVEST TABLE LEGS

.1 Stainless steel Plate Cladding: SUS 304 (AISI 304) austenitic stainless steel, 6mm thick plate, sand-blasted matte finish.

.1 Standard of Acceptance:

.1 Lastra surfaces - stainless steel countertop.

.2 Fastened to stainless support frame with countersunk flat-head stainless fasteners.

.3 Stainless steel framing channel: 38 mm x 19 mm x 3.2 mm, type 304, sand-blasted finish to match plate cladding.

.4 Steel HSS Base Tube: 38 mm x 38 mm x 3 mm, powder-coated graphite, mechanically fastened to floor below.

.5 Steel Angle for table-top attachment: 38 mm x 38 mm x 3 mm steel angle.

2.6 BALCONY GUARD EXTENSION

.1 Balcony guard extension on exterior patio for Scope 2 & for Scope 3. Inclusive of powder coated stainless steel tube handrail + expanded metal mesh infill panels set within a frame comprised of steel angles.

.1 HSS handrail: 32mm diameter stainless steel tube w/ 3mm wall thickness

.2 HSS upstands: 19mm diameter stainless steel tube w/ 3mm wall thickness

.3 3mm Stainless Steel Plate.

.4 Expanded Metal Mesh w/ U-Channel Support:

.1 Metal Mesh – McNichols Item no: 4800121348 // Expanded Metal Standard, Stainless Steel, Type 304, ½” No.13 Standard (Raised), 60% Open Area

.5 U-Channel Support: McNichols Item no: 4080140110 // U-Edging, Stainless Steel, Type 304, 14 Gauge (.0781" Thick), Type 401 U-Edging (1/4" Opening x 1" Width)

.6 Steel Attachment angle for U-Channel support: 19mm x 19mm x 3mm stainless steel angle, powder coated to match RAL colour of other railing elements.

.2 Finishes: Powder-coated. Contractor to provide four (4) beige/brown RAL colour samples to match finish of existing HSS guard on Scope 2 Balcony, for selection by Consultant.

2.7 ACCESSORIES

.1 Sheet metal fastening system: hidden fastening system to the extent possible. If exposed, exposed surfaces shall match sheet finish. Fastener material shall be same as sheet metal material.

.2 Stainless steel anchors, bolts and screws as required for a complete installation.

.1 Predrilled recessed holes for screw attachment; screw heads to be flush with adjacent surface and screws/bolts shall be of same material and finish as material fastened (type(s) and lengths as required).

2.8 STAINLESS STEEL WELDING

.1 Welding of stainless steel shall be by the electric arc process.

.2 Weld stainless steel by the electric arc process, to CSA W59.

.3 Use electrodes compatible with and of the same properties as the stainless steel. Grind smooth and polish to match finish.

.4 Structural stainless steel welding: to AWS D1.6/D1.6M.

.5 Stainless steel tube and pipe: to AWS D18.1/D18.1M.

.6 Joint finish requirements: to NOMMA Guidelines 1: Joint Finishes: Finish #1 - Ornamental Quality, No Evidence of a Welded Joint

2.9 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.1 Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss. Temperature change (Range): 100 deg F (38 deg C).

.2 Fabricate and finish railings and guardrails in accordance with CISC Guide for Specifying Architecturally Exposed Steel: to AESS 3 *Feature Elements* (see Table 1 – AESS Category Matrix).

.3 Cap open ends of sections exposed to view, such as pipes, channels, angles, and other similar work.

.4 Ease exposed edges to a radius of approximately 0.794 mm (1/32 inch), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

.5 Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the work.

.6 Form simple and compound curves in bars, piping, tubing, and extruded shaped by bending members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces.

.7 Remove sharp or rough areas on exposed traffic surfaces.

.8 Shop Assembly: preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling

limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

.9 Weld corners and seams continuously to comply with American Welding Society (AWS) recommendations, and the following:

.1 Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

.2 Obtain fusion without undercut or overlap.

.3 Remove welding flux immediately.

.4 At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

.10 Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

.11 Cut, reinforce, drill and tap miscellaneous metalwork as indicated to receive finish hardware, screws, and similar items.

.12 Fabricate and form stainless steel sheet as required from stainless steel sheet, SAE (SUS) Type 304.

.13 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush; to NOMMA Guidelines 1: Joint Finishes: Finish #1 - Ornamental Quality, No Evidence of a Welded Joint.

.14 Ensure exposed welds are continuous for length of each joint.

.15 Grind or file exposed welds and steel sections smooth and flush with adjacent surfaces. Weld locations not to be visible after application of paint finishes.

.16 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.

.17 Accurately form connections with exposed faces flush; mitres and joints tight.

.18 Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

.19 All welding is to be performed by CWB Certified Welders.

.20 Other miscellaneous premanufactured stainless steel parts and components as required; refer to Drawings.

.21 Surface preparation; non-ferrous metals: Remove tool and die marks and stretch lines, or blend into finish. Grind and polish surfaces to produce uniform finish, free of cross scratches. Run grain of directional finishes with long dimension of each piece.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Check and verify that no irregularities exist that would affect quality of execution of work specified.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 ISOLATION COATING

.1 Apply isolation coating to contact surfaces in contact with cementitious materials, wood materials, and dissimilar metals.

.2 Apply isolation coating into all drilled holes, onto all fasteners (e.g., bolts, screws, rivets) and between all flat surfaces (e.g., behind door handles, hinges, lamp-housings, diamond plate, mirror housing, latches, brackets, door trim, frame rails, suspension mounts, etc).

.3 Generally, 2 – 3 mil thickness is required per application. Each application needs enough product applied so that excess isolation coating “oozes out” during assembly (this will ensure you have created a proper seal).

.4 Assemble and wipe away any excess product.

3.3 ERECTION

.1 Do welding work in accordance with CSA W59 unless specified otherwise, to NOMMA Guidelines 1: Joint Finishes: Finish #1 - Ornamental Quality, No Evidence of a Welded Joint.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Technical Authority, such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Supply components for work by other trades in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CAN/CSA-S16, or weld.

.7 Provide corrosion protection from direct contact with concrete or dissimilar metals with emulsified asphalt protective coating for dissimilar metals: to ASTM D1187/D1187M.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 - General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 - General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.1 Clean doors, frames and glass.

.2 Remove temporary labels and visible markings.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.6 SCHEDULE

.1 Meet or exceed the requirements of the Ontario Building Code 2024. Provide engineered stamped shop drawings for all structural fabrications

.2 The schedule given hereunder shall not be considered to represent a complete schedule of all metal fabrications required in the Work. Thorough scrutiny of the complete Contract Documents is required to obtain a complete schedule of metal fabrications required in the Work; refer to Drawings.

.1 Sand-blasted finish stainless steel plate floating shelving.

.2 Sand-blasted finish stainless steel plate countertop.

.3 Sand-blasted finish stainless steel plate harvest table legs - cladding and support structure.

.4 Expanded metal mesh guard infill panel and trim channels.

.5 Exterior Guard Handrail HSS tube steel and support plates.

.6 Stainless steel fabrications, miscellaneous items, and supporting hardware indicated, or as required to support other Work, and not specifically covered in other Sections.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the Contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 06 40 00 – Finish Carpentry and Casework.

.3 Section 09 91 00 – Painting.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM A307-21, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.

.2 ASTM C954-22, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

.3 ASTM F1667/F1667M-21a, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.2 American Wood Protection Association (AWPA)

.1 2026 AWPA Book of Standards.

.3 CSA Group

.1 CAN/CSA O80 Series:21, Wood Preservation, Includes Administrative Update (2022) and Errata (2022)

.2 CSA O121:26, Douglas fir plywood.

.3 CSA O141:23, Canadian standard lumber.

.4 CSA O325:21, Construction sheathing (Adopted NIST PS 2-18, with Canadian deviations), includes Administrative Update (2021).

.4 National Lumber Grading Association (NLGA)

.1 Standard Grading Rules for Canadian Lumber 2025 Edition.

.5 UL Solutions in Canada (ULC)

.1 ULC 102-19 (R2024), Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies (CAN-ULC-102-2019-(R2024)).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures:

.1 Submit manufacturer's printed product literature, specifications and datasheets.

.2 Submit SDS sheets or official manufacturer literature stating no urea-formaldehyde was used in the manufacturing of composite wood.

.2 Submit engineered, stamped shop drawings designed by a structural engineer (P.Eng.) licensed to practice in Ontario for load-bearing wood construction, including details, elevations, and plans. Include engineering calculations with submissions.

1.4 QUALITY ASSURANCE

.1 Lumber identification: Grade stamp of an agency certified by the Canadian Lumber Standards Accreditation Board.

.2 Plywood identification: Grade mark in accordance with applicable CSA standards.

.3 Each board of fire retardant treated material to shall bear the ULC label indicating 'Flame Spread Classification' (FSC), and smoke developed.

.4 Engage the services of a structural engineer (P.Eng.), to Section 01 35 01 – Delegated Design, licenced to practice in Ontario to design, draw and stamp the specified engineered shop drawings and review the site as required by Code.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver wood products bundled or crated to provide adequate protection during transit. Inspect wood products for damage upon delivery and remove and replace damaged materials.

.2 Store materials a minimum of 150 mm off the ground on blocking. Keep materials under cover and dry. Provide for air circulation within and around stacks and under temporary coverings.

.3 Protect sheet materials to prevent breaking of corners and damage to surfaces.

Part 2 Products

2.1 LUMBER

.1 Lumber: Structural Light Framing and Structural Joists and Planks to CSA-O141, softwood, S-P-F, S4S, graded and stamped in accordance with National Lumber Grading Association (NLGA) Standard Grading Rules for Canadian Lumber and as follows:

.1 Moisture Content: maximum 8% at time of installation.

.2 Maximum moisture content when used for attachment of drywall: 16%.

.3 Stud (No.3) Grade or better.

2.1 MISCELLANEOUS LUMBER

.1 Provide lumber for support or attachment of other construction, including furring, blocking, nailing strips, and similar members.

.2 Fabricate miscellaneous lumber from dimension lumber of sizes indicated, and into shapes shown on drawings.

.3 Moisture Content: 19% maximum for lumber items not specified to receive wood preservative treatment.

.4 Grade: for dimension lumber sizes provide No. 2 or Standard grade lumber per NLGA. For board-sized lumber, provide sheathing grade, S2S.

2.2 WOOD PRESSURE TREATMENTS

.1 Where lumber or plywood is indicated as preservative treated or is specified to be treated, treat in accordance with CAN/CSA O80.9M and AWPA.

.2 Fire-Retardant Treatment: to CAN/CSA O80.9M, CAN/CSA O80.20M and CAN/CSA O80.27M, pressure impregnated, and as follows:

.1 Flame Spread Classification: FSC 25 maximum.

.2 Smoke developed of not more than: 75.

.3 Acceptable materials:

.1 Dricon FRT, by Lonza.

.2 D-Blaze Fire Retardant Treated Wood, by Viance.

.3 Pyro-Guard, by Hoover Treated Wood Products, Inc.

.3 Complete fabrication of treated items before treatment where possible. If cut or drilled after treatment, apply field treatment to cut and drilled surfaces.

.4 Wood Preservatives: Maximum allowable VOC limit 350 g/L in accordance with SCAQMD Rule #1113 - Architectural Coatings.

2.3 ACCESSORIES

.1 Sealants: in accordance with Section 07 92 00 – Joint Sealants. Maximum allowable VOC limit 250 g/L in accordance with SCAQMD Rule 1168.

.2 General purpose adhesive: to CSA O112 Series. Maximum allowable VOC limit 70 g/L in accordance with SCAQMD Rule 1168.

.3 Structural Adhesive: LePage PL 400, or equivalent with same or better physical, application and performance properties per technical data sheet.

.1 Required Application Locations: adhesive required for subfloor plywood to subfloor joists/structure.

.4 Screws for Fastening to Cold-Formed Metal Framing: ASTM C954, hot-dip galvanized with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened with sufficient penetration to resists pull-out loads.

.5 Rough Hardware (bolts, nuts, washers, etc.): hot dip galvanized in conformity to ASTM A153.

.6 Proprietary fasteners: hot dip galvanized steel toggle bolts, expansion shields and lag bolts, screws and lead plugs, recommended for purpose by manufacturer. Use Type 316 stainless steel for any product set in concrete or in direct contact with concrete substrate.

.7 Nails, spikes: to ASTM F1667, Hot-Dip Galvanized *Spikes* and Nails; nailing guns permitted.

.8 Rough Hardware (bolts, nuts, washers, etc.): Hot-dip galvanized in conformity with ASTM A153.

.9 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.

.10 Joist hangers: minimum 1 mm thick sheet steel, galvanized ZF001 coating designation.

.11 Nailing discs: flat caps, minimum 25 mm diameter, minimum 0.4 mm thick, fibre, formed to prevent dishing. Bell or cup shapes not acceptable.

.12 Dielectric Separator / Isolation Coating: C.R. Laurence bituminous paint or aerosol.

2.4 FASTENER FINISHES

.1 Stainless steel: use type 316 stainless steel fasteners for pressure-preservative or fire-retardant wood products.

.2 Galvanizing: use hot-dipped galvanized fasteners complying with ASTM A153 and connectors complying with ASTM A653, class G185, for all other applications.

2.5 SITE FABRICATION

.1 Fabricate items rigid, plumb and square, as detailed, with tight, bevelled, hairline joints. Sand work smooth, set all nails and screws.

.2 Countersink bolts and washers, fill holes with matching wood plugs.

Part 3 Execution

3.1 COMPLIANCE

.1 Meet or exceed the requirements of the Ontario Building Code, errata and amendments, and the requirements of this Section.

.2 Accurately frame and properly assemble rough carpentry work. Include all necessary nails or other connectors.

3.2 ISOLATION COATING

.1 Apply isolation coating to contact surfaces in contact with cementitious materials, wood materials, and dissimilar metals.

3.3 INSTALLATION

.1 Install members true to line, levels and elevations, square and plumb.

.2 Construct continuous members from pieces of longest practical length.

.3 Install spanning members with crown-edge up.

.4 Select exposed framing for appearance. Install lumber and panel materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.

.5 Install blocking, plates and backing for all components mounted on gypsum board walls ceilings and bulkheads requiring support.

.1 Components include, but not limited to: architectural woodworking components, door frames and hardware, windows, displays, white boards and tack boards, interior signage, manufactured specialties, mechanical and electrical devices, and items indicated as N.I.C. and requiring support.

.2 Center supporting members on fastening line of supported component.

.3 Supporting members to extend one stud spacing to each side of the supported component.

.6 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.7 Use dust collectors and high-quality respirator masks when cutting or sanding wood panels.

3.4 ERECTION

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.2 Countersink bolts where necessary to provide clearance for other work.

.3 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

3.5 FASTENINGS AND ROUGH HARDWARE

.1 Unless indicated otherwise, fasten to concrete surfaces with expansion shields and bolts.

.2 Where screws are required use lead or inorganic fibre plugs. Wood or organic plugs not permitted.

.3 Powder actuated fasteners may be used in lieu of bolts if approved by the Consultant in writing prior to materials arriving on site.

.4 Provide all rough hardware such as nails, bolts, nuts, washers, screws, clips and strap metal.

3.6 PRESSURE PRESERVATIVE TREATED WOOD INSTALLATION

.1 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation. Allow first coating to fully soak into grain before applying second coating in accordance with manufacturer's instructions.

.2 Remove with fine sandpaper chemical deposits on treated wood to receive applied finish.

.3 Use only hot dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of preservative treated materials.

.4 Use water borne preservative treated wood for:

.1 Wood in contact with masonry or concrete,

3.7 FIRE RETARDANT TREATED WOOD INSTALLATION

.1 Install as indicated and as required by Code and as directed by authorities having jurisdiction.

.2 Field Cuts:

.1 Do not rip, mill or conduct extensive surfacing of fire retardant treated lumber, label will be voided.

.2 Only end cuts, drilling holes and joining cuts are permitted.

.3 All cuts on plywood will be considered end cuts.

.4 Fire-retardant lumber and plywood can be given a light sanding for cosmetic cleaning after treatment.

.5 Pre-cut to the greatest extent possible before treating.

.3 Fire retardant treated plywood used in structural applications shall be graded or span-rated material.

.4 Use only hot-dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of fire resistant treated materials.

.5 Where humidity conditions are such that moisture may condense between hardware and treated wood, hardware shall be back-primed with a corrosive inhibitive paint.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.9 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.10 SCHEDULE

.1 Erect and install all wood materials, elements and fabrications in accordance with Contract Drawings.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 The work of this section includes the supply, fabrication, finishing, and installation of finish carpentry and architectural woodwork.

.2 This Section includes material selection criteria required to ensure continuity of appearance of wood components consistent with the design intent.

1.2 RELATED REQUIREMENTS

.1 The General Conditions of the Contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 05 50 00 – Metal Fabrications.

.3 Section 05 70 15 – Stainless Steel Fabrications.

.4 Section 06 10 00 – Rough Carpentry.

.5 Section 07 92 00 - Joint Sealants.

.6 Section 08 80 50 – Glazing.

.7 Section 09 21 16 – Gypsum Board Assemblies.

.8 Section 09 65 00 – Resilient Flooring.

.9 Section 09 91 00 – Painting.

.10 Division 23 Mechanical: Sinks in countertops. Refer to Drawings.

.11 Division 26 Electrical. Refer to Drawings.

.12 Refer to Drawings for Millwork Schedule, construction and details.

.13 Finish Schedule and Legends on Drawings.

1.3 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI A135.4 2012, Basic Hardboard.

.2 ANSI A208.1-2022, Particleboard.

.3 ANSI A208.2-2022, Medium Density Fiberboard (MDF) for Interior Applications.

.4 ANSI/HPVA HP-1-2020, Standard for Hardwood and Decorative Plywood.

.2 ASTM International (ASTM)

.1 ASTM D2555-17a(2024)e1, Standard Practice for Establishing Clear Wood Strength Values.

.2 ASTM D2559-12a(2024), Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions.

.3 ASTM D2832-25, Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.

.4 ASTM D3930-08(2023), Standard Specification for Adhesives for Wood-Based Materials for Construction of Manufactured Homes.

.5 ASTM D4300-23, Standard Test Methods for Ability of Adhesive Films to Support or Resist the Growth of Fungi.

.6 ASTM D5116-25, Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.

.7 ASTM E1333-22, Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber.

.8 ASTM F1667/F1667M-21a, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Woodwork Institute

.1 North American Architectural Woodwork Standards (NAAWS 5.0), 2026.

.4 CSA Group (CSA)

.1 CSA O86:24, Engineering design in wood, Includes Update No. 1.(2025) and Errata (2025)

.2 CSA O112.9:21, Evaluation of Adhesives for Structural Wood Products (Exterior Exposure), Includes Administrative Update (2022).

.3 CSA O112.10:24, Evaluation of adhesives for structural wood products (limited moisture exposure).

.4 CSA O121:26, Douglas fir plywood.

.5 CSA O141:23, Canadian standard umber.

.6 CSA O151:26, Canadian softwood plywood.

.7 CSA O153:26, Poplar plywood.

.5 National Hardwood Lumber Association (NHLA)

.1 Rules for the Measurement and Inspection of Hardwood and Cypress 2023.

.6 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber, 2025 Edition.

.7 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)

.1 SCAQMD Rule 1113-16, Architectural Coatings.

.2 SCAQMD Rule 1168-22, Adhesives and Sealants Applications.

.8 UL Solutions in Canada (ULC)

.1 ULC 104-15 (R2025), Standard Method for Fire Tests of Door Assemblies, (CAN-ULC-104-2015-(R2025)).

.2 ULC 105-16 (R2026), Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC 104 (CAN-ULC-105-2016-(R2026)).

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Prepare and submit material list in accordance with AWMAC NAAWS, cross-referenced to specifications.

.2 Submit manufacturer's instructions, printed product literature and data sheets for architectural woodwork and include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.

.3 Submit two copies of WHMIS SDS in accordance with Section 01 10 00 - Summary.

.3 Hardware List:

.1 Submit hardware list cross-referenced to specifications.

.2 Include manufacturer's specification sheets indicating name, model, material, function, finish, BHMA designations and other pertinent information.

.4 Shop Drawings:

.1 Submit shop drawings for the work of this section complying with the North American Architectural Woodwork Standards (NAAWS) 5.0 requirements

.2 Show location of each item, dimensioned plans and elevations, large scale details, attachment devices, and other components.

.3 Show details of construction, profiles, jointing, fastening and other related details.

.4 Show materials, thicknesses, finishes and hardware.

.1 Plans and elevations - 1:20.

.2 Sections - 1:10.

.3 Details - 1:2.

.4 Axonometric views 1:20

.5 Show locations and sizes of cut-outs and holes for plumbing fixtures and other items installed in architectural woodwork.

.6 Show relation to adjoining construction, details of outside and inside corners, and door openings.

.5 Samples

.1 Label each sample to indicate Drawing number and room location.

.2 Finish one side and edge of samples representing items to receive factory finishes.

.3 Submit three samples of high-pressure decorative laminate clad panel material laid up on specified core material, 300 mm x 600 mm for each type, colour, pattern, and surface finish, complete with specified edge banding where specified.

.4 Submit three samples of veneer-clad MDF panels with solid wood edge banding, 300 m x 600 mm for each type, colour, and surface finish.

.5 Submit three 215 mm x 280 mm samples of panel products for each factory-applied finish system.

.6 Submit casework hardware, one unit of each type and finish.

.7 Where materials are being matched, verify that specified materials match existing prior to submitting samples.

.8 Alternative cabinet hardware from that specified shall be submitted to the Consultant for approval.

.9 Reviewed samples shall become the standard for the work.

.10 Contractor to provide 600 mmm x 600 mm samples of the following veneered panels onto a 3/4" MDF core with solid wood edging of matching wood species for Consultant's review and selection.

.1 Basis of Design/Pricing for veneer scope: Rotary Cut Alder Veneer + lye & matte water-based polyurethane

.2 Rotary Cut Douglas Fir Veneer + lye & matte water-based polyurethane.

.3 Rotary Cut Maple + white pigmented matte finish

.4 Rotary Cut White Ash + light whitewash finish

.5 Rotary Cut European Brich + matte water-based polyurethane

.11 Certifications:

.12 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.13 Test and Evaluation Reports: submit certified test reports for composite wood from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.6 Closeout Submittals:

.1 Project Record Sheet: Submit to the Consultant 2 copies of the project record sheet identifying the project title and address, Owner, Consultant, and Architectural Woodwork Subcontractor. Indicate also materials and finishes used for architectural woodwork and whether shop finished or site finished and by whom. Include type and source of all cabinet hardware and any special items used under architectural woodwork.

.2 Submit in accordance with Section 01 78 00 – Closeout Submittals.

1.5 MAINTENANCE MATERIALS:

.1 Provide extra sets of hardware items for maintenance (5% of each type installed, but not less than 2)

1.6 COORDINATION

.1 Coordinate with other trades as required to maintain construction schedule, and to provide supports and blocking as required.

.2 Ensure that back-priming of finish carpentry surfaces concealed after installation, has been performed as specified in Section 09 91 00 – Painting, prior to installation.

1.7 MOCK-UPS

.1 Construct mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution before fabricating and installing interior casework.

.2 Shop fabricate one mock up the following:

.1 Hardwood veneer-finished base cabinet, PLAM-finished wall cabinet, stainless steel countertop, PLAM-finished countertop, complete with all specified edging and joint types, hardware and shop applied finishes.

.2 1200 mm section of pull V-shaped profile of veneer-clad ceiling panel above harvest table complete with edge banding, filler strips, locking mounting hardware. Mock-up to include both terminus conditions at transition to veneer-clad wall panels at the column enclosure, and termination of ceiling panel at opposite end.

.3 Two full height & full depth 1220 mm wide sections of the study lounge wood veneer-clad feature wall and ceiling panels. Mock-up to include lighting and air return ceiling cove, panel jointing, reveal filler strips, and tamper-proof locking cleat system.

.3 Build full size mock-up on site using specified materials and hardware required for the completed work, and as follows:

.1 Place mock-up in location and size indicated.

.2 Provide minimum 48 hours of notice in advance of mock-up reviews by Consultant.

.3 Demonstrate the proposed range of aesthetic effects and workmanship; Consultant may request minor changes to finish, fabrication or hardware that does not affect Contract Price.

.4 Obtain Consultant's acceptance of mock-up, allow 48-hours after acceptance before proceeding with Work.

.5 Maintain mock-up during construction in an undisturbed condition as a standard for judging the completed work.

.1 Mock-up may form a part of the completed work when accepted by the Consultant..

1.8 QUALITY ASSURANCE

.1 Manufacturer/fabricator/millworker: shall be a member in good standing of the Architectural Manufacturers Association of Canada (AWMAC) through one of its Chapters.

.2 Work of this Section shall be Certified in accordance with the AWMAC Guarantee and Inspection (GIS) program.

.3 Architectural Woodwork Quality Standards (NAAWS) and Errata shall be used to establish the minimum level of quality for this project.

.4 Execute the work of this Section by a member of AWMAC with five years' experience in work of comparable complexity and scope.

.5 Any reference to Custom or Premium grade in this specification or on the Drawings shall be as defined in the NAAWS.

.6 Any item not explicitly given a specific quality grade shall be Premium Quality Grade as defined in the NAAWS.

.7 A copy of the NAAWS shall be made readily available for reference purposes on the job site.

.8 References in this specification to part and item numbers mean those parts and items contained within the NAAWS.

.9 Perform the Work in accordance with the definition of 'Good Workmanship' as defined in the NAAWS.

.10 Remove and replace finish carpentry Work which does not conform to the NAAWS

.11 Guarantee and Inspection Service (GIS)

.1 Architectural woodwork shall be manufactured and/or installed to the current AWMAC Architectural Woodwork Standards and shall be subject to an inspection at the factory and/or site by an appointed AWMAC Certified Inspector. Inspection costs shall be included in the tender price for this project. (Contact your local AWMAC Chapter for details of inspection costs). Shop drawings shall be submitted to the AWMAC Chapter office for review before work commences. Work that does not meet the AWMAC Architectural Woodwork Standards, as specified, shall be replaced, reworked and/or refinished by the architectural woodwork contractor, to the approval of AWMAC, at no additional cost to the owner.

.2 If the woodwork contractor is an AWMAC Manufacturer member in good standing, a two year AWMAC Guarantee Certificate will be issued. The AWMAC Guarantee shall cover replacing, reworking and/or refinishing deficient architectural woodwork due to faulty workmanship or defective materials supplied and/or installed by the woodwork contractor, which may appear during a two year period following the date of issuance.

.3 If the woodwork contractor is not an AWMAC Manufacturer member they shall provide the owner with a two year maintenance bond, in lieu of the AWMAC Guarantee Certificate, to the full value of the architectural woodwork contract.

.12 If the Consultant's specifications are in conflict with AWMAC Standards, per NAAWS 5.0, the AWMAC Standards will take precedence, unless the Consultant specifically issues a note in writing that a particular design detail is required even if it varies from the AWMAC Standards.

.13 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.14 Hardwood plywood, Douglas fir plywood, and particleboard shall meet or exceed the applicable CSA and ANSI standards, as follows:

.1 Hardwood plywood: to ANSI/HPVA HP-1, Standard for Hardwood and Decorative Plywood.

.2 Douglas Fir Plywood: to CSA O121, Douglas Fir Plywood.

.3 Particleboard: to ANSI A208.1, Particleboard.

.15 Cabinet hardware shall be Grade 1 as defined by ANSI/BHMA A156.9 Cabinet Hardware unless explicitly specified otherwise.

.16 Installer shall be responsible for supplying field dimensions that will affect the work of this Section.

.17 Source Limitations: Engage a qualified woodworking firm to assume undivided and complete responsibility for the fabrication and installation of interior architectural woodwork and finish carpentry, having completed work similar in material, design, and extent to that indicated, and whose work has resulted in construction with a record of successful in-service performance, as well as sufficient production capacity to produce required work.

.18 Installer Qualifications: An experienced installer who has completed architectural woodwork similar in material, design, and extent to that indicated and whose work has resulted in construction with a record of successful in service performance.

.19 Fabricator Qualifications: A firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in service performance, as well as sufficient production capacity to produce required units.

.20 Site Supervision: Provide full-time site supervision for work of this section; supervisor shall be directly employed by the installer and shall have the authority to receive, represent, and make decisions for work of the Project

1.9 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.1 Protect millwork against dampness and damage during and after delivery.

.2 Store millwork in ventilated areas, protected from extreme changes of temperature or humidity.

.3 Storage and Handling Requirements:

.1 Store materials off ground and protected from the weather, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect architectural woodwork from nicks, scratches, and blemishes.

.4 Replace defective or damaged materials with new.

1.10 PROJECT CONDITIONS

.1 Comply with the NAAWS requirements for care and storage for optimum temperature and humidity conditions. Maintain a minimum 430 lx (40 f.c.) illumination on surfaces and areas where work is being installed.

.2 Where work is indicated to be fitted to other construction, check dimensions of other construction by field measurement before fabrication; show recorded field measurements on final Shop Drawings. Coordinate fabrication schedule with construction schedule and progress to avoid delay of Work.

.3 Where field measurements cannot be made without delaying the Work, guarantee dimensions, and proceed with fabrication without field measurements, coordinating as required with other construction and site conditions to ensure that actual dimensions correspond to guaranteed dimensions.

1.11 WARRANTIES

.1 Submit a warranty for plastic laminate work of this Section in accordance with General Conditions, except that warranty period is extended to 2 years.

1. Warrant against defects in material and workmanship including but not limited to opening of joints, cracking, shrinkage, warpage, and delamination of plastic laminate.

2. Coverage: Complete replacement including affected adjacent Work for labour and materials.

.2 Provide manufacturer’s standard 10-year warranty for solid surfacing against defects in materials and workmanship; including material and labour to repair or replace defective materials.

.3 Contractor agrees to correct any deficiencies found in the work performed for a period of 2-years from date of Substantial Performance.

Part 2 Products

2.1 MINIMUM AESTHETIC REQUIREMENTS

.1 Obtain all hardwood materials from same supplier for each species.

2.2 LUMBER MATERIALS

.1 SPF Softwood lumber: unless specified otherwise, spruce-pine-fir species, S4S, average moisture content of 6% and maximum of 9% for interior work in accordance with following standards:

.1 CAN/CSA O141

.2 NLGA Standard Grading Rules for Canadian Lumber.

.3 NAAWS premium grade, moisture content as specified.

.4 Use for concealed framing lumber

2.3 PANEL MATERIALS

.1 Panel Materials: Provide panel materials meeting requirements for moisture content and grades in accordance with NAAWS requirements, and as specified below. Panel products must be manufactured with no added urea-formaldehyde.

.1 Softwood Plywood: Meeting CSA O121, cross-banded, sanded G2S, thickness as indicated. Forestry Stewardship Council (FSC) certified.

.2 Fire Rated Plywood Panels, to CSA O325, Class A fire retardant produced under Performance Standard PS-1, certified by the American Plywood Association. Fire-Rated Materials: ULC-labelled fire resistant, provide grade stamp or certification as noted for fire retardant pressure treated lumber.

.3 Hardwood Plywood Kiln dried to maximum moisture content of 8%, NAAWS premium grade, Maple core with high-quality poplar faces and backs, thickness as indicated.

.1 Standard of Acceptance:

.1 Columbia Forest Products, DesignEdge® or approved equivalent

.2 Use for all exposed edge high-pressure laminate (Plastic Laminate) finish applications

.4 Particleboard: to ANSI A208.1, Industrial Grade M2 or better, minimum 720 kg/m^3 density and Grade M3, minimum 750 kg/m^3 particleboard for countertops and shelves; clearly mark panels with grade mark in visible location; extruded particleboard having loose cores with voids will not be permitted; having no added urea formaldehyde.

.5 Medium Density Fibreboard (MDF): Meeting ASTM D1037 and ANSI A208.2, Premium Grade for interior use, minimum 700 kg/m3 density; formaldehyde emissions shall be 0.30 ppm or less per 0.424m2/m3 of room value.

.1 Acceptable Materials for high moisture areas

.1 Medex MDF, SierraPine Ltd.

.2 Flakeboard Premier Plus Moisture Resistant MDF, Flakeboard

.2 Acceptable Materials for standard applications:

.1 Medite II MDF, SierraPine Ltd.

.2 Flakeboard Premier MDF, Flakeboard.

.3 Acceptable Materials for three-dimensional applications:

.1 Medite 3D MDF, SierraPine Ltd

.4 Acceptable Materials for fire resistant core:

.1 Medite MDF FR, SierraPine Ltd.

.2 Flakeboard Premier MDF FR, Flakeboard.

.6 Hardwood Faced Veneer Panels:

.1 Hardwood Face Veneer: to CSA O115, AA Veneer Grade:

.1 Minimum 150 mm flitch width.

.2 Continuous across face of panel, no end matching allowed.

.3 Species: Alder, rotary Cut, single sheet match and symmetry.

.4 Minimum veneer thickness 1 mm

.5 Vertical grain direction.

.6 Grain Matching: Slip Matched.

.2 Core Construction: Materials meeting the requirements specified above for medium density fibreboard, 19 mm thick, fire resistant core.

.3 Back Veneer: #1 Backing Grade where entirety of back of panel hidden. Matching face veneer where any portion of back of panel is exposed.

.4 Panel Edge: matching face veneers, hardwood 3 mm wide x thickness of panel, edge glued to side of panel where edge of panel is exposed.

.5 Grade stamp, non-exposed, marked on the edge of each panel, indicating cut, species and grade, and manufacturer's name.

.2 High-Pressure Decorative Laminate: to ANSI/NEMA LD3 and European Standard EN438: 2016; heavy wear resistant, Grades and application in accordance with applicable NAAWS requirements and as follows:

.1 Acceptable Manufacturers:

.1 Formica

.2 Tafisa

.3 Wilsonart

.2 Plastic Laminate: Refer to Drawings for locations.

.1 Standard of Acceptance:

.1 Where substrate is to be laminated on both top and underside of substrate:

.1 Fenix NTM® 1.2 mm Solid Core Laminate Material by Formica. JJ Grade.

.1 Colour: J0751 Rosso Jaipur.

.2 For all vertical panel applications.

.1 Fenix NTM® 0.7 mm Solid Core Laminate Material by Formica.

.1 Colour: J0754 Blu Fes.

.3 For all horizontal applications:

.1 Fenix NTM® 1.2 mm Solid Core Laminate Material by Formica.

.1 Colours:

.1 Colour 1: J0754 Blu Fes.

.2 Colour 2: J0751 Rosso Jaipur.

.3 General notes for (HPDL) Plastic Laminate finished millwork:

.1 Edge Banding: Matching PVC edging shall be minimum 3 mm thick, high-impact, purified, solid through-colour, and acid resistant. Heat welded.

.4 Constructed of multiple layers of phenolic resin-saturated kraft paper in combination with a layer of decorative thermosetting plastic-saturated paper, fused together under heat and pressure.

.5 Horizontal General Purpose Grade (HGS): thickness of 1.2 mm ±0.12 mm, used on the following: Horizontal surfaces, unless specified otherwise.

.6 Vertical General Purpose Grade (VGS): thickness of 0.7 mm ±0.10 mm, used on the following:

.1 Vertical surfaces, unless specified otherwise.

.2 Exposed portions of case bodies, including ends, divisions and bottoms.

.3 Exposed shelves.

.4 Casework Doors: exposed and semi-exposed surfaces.

.5 Drawer Faces: exposed and semi-exposed surfaces.

.3 Low Pressure Decorative Laminate: to ANSI/NEMA LD3, in accordance with applicable NAAWS requirements, and as follows:

.1 Melamine impregnated papers thermally fused under pressure.

.2 Thickness: 0.5 mm minimum.

.3 Wear Resistance: 400 cycles minimum.

.4 Colour: Grey.

.5 Locations: Used on Interior portions of case bodies, all surfaces of drawer boxes, and cabinet interior shelving.

.4 Stainless Steel Countertop with welded stainless steel sink, and shelves: to Section 05 70 15 - Stainless Steel Fabrications.

.1 Type 304, to ASTM A240-20a.

.2 Finish: matt sandblasted finish.

.3 Thickness: 6 mm thick plate.

.4 All welded seams.

.5 Refer to Section 05 70 15 – Stainless Steel Fabrications, and drawings for design intent

2.4 STANDING AND RUNNING TRIM – FABRICATION

.1 Provide standing and running trim where indicated.

.2 Wood Species: as indicated.

2.5 CABINET WORK AND MILLWORK

.1 Work shall conform to NAAWS Premium Grade requirements.

.2 Door and Drawer Bumpers: Self-adhesive type approximately 6 mm diameter clear silicone bumpers for all cabinet work doors and drawer faces, two per door and drawer, placed at door top and bottom and drawer top.

.3 Refer to Drawings for construction and details of casework and millwork.

.4 Provide the following minimum thicknesses:

.1 Doors: 19 mm.

.2 Drawer fronts: 19 mm.

.3 Gables: 19 mm.

.4 Cabinet backs (floor mounted): 12 mm.

.5 Cabinet backs (wall mounted): 19 mm.

.6 Shelves: 19 mm, or as otherwise specified.

.5 Refer to Drawings for construction and details of casework and millwork.

.6 Shelves spanning up to 813 mm to be minimum 19 mm thick. Shelves spanning up to 1070 mm to be minimum 25 mm thick. Reinforce shelves where span exceeds 1000 mm.

2.6 ACCESSORIES AND ANCILLARY PRODUCTS

.1 Fasteners:

.1 Nails and staples: to ASTM F1667; galvanized to ASTM A123/A123M for humid areas and for treated lumber; plain finish elsewhere.

.2 Wood screws: type and size to suit application.

.3 Particleboard screws: for use with particleboard core substrates; low root and high thread, purpose-made for installation in particle board, size to suit application.

.4 Screws and bolt caps to cover heads of fasteners used to secure work to walls - pop on screw covers for 6 mm diameter screws – fabricator's choice, as approved by Consultant.

.5 Bolts, nuts, washers, screws, cup washers for removal panels, etc., all hot dip heavy zinc coated.

.6 Draw Bolt Fasteners, available from various sources.

.2 Splines: wood.

.3 Miscellaneous metal fabrications: to Section 05 50 00.

.4 Gable connectors: joint connector bolts and caps to suit application, zinc-coated steel, available from various sources.

.5 Connectors: zinc-coated steel, types to suit application, available from various sources.

.6 Spacers: Rigid PVC to size and profile indicated.

.7 Adhesives, use commercial-grade, brush-applied adhesives only, and recommended by manufacturer for application and conditions:

.1 Adhesives shall contain no added urea formaldehyde.

.2 Decorative laminate: polyvinyl acetate or aliphatic resin in accordance with manufacturer's recommendation for curing under pressure for bonding to wood cores, water-resistant type.

.3 Edge banding: Thermoplastic hot melt, synthetic resin suitable for applying thin veneer wood edge banding and film overlays.

.4 Structural Adhesive: LePage PL 400, or approved equivalent.

.8 Door and drawer bumpers: thin self-adhesive bumpers available from various sources.

.9 Wall bumpers: bumpers about 6 mm thick from various sources.

.10 Joint Sealants: in accordance with Section 07 92 00 - Joint Sealants.

.11 Paper Towel Dispenser in Kitchen Area:

.1 Supplied by Owner, Installed by Contractor.

2.7 MILLWORK SCHEDULE

.1 Refer to Millwork Drawings.

.2 Harvest Table (at Scope 3 - Lounge/Kitchenette Area):

.1 4751 mm x 1066 mm x 38 mm thick. Laminated Plywood Table with plastic laminate top and bottom finish complete with custom fabricated stainless steel legs and straighteners.

.1 Tabletop Finish:

.1 FENIX NTM, JJ Grade - 1.2 mm thickness. Laminated on both top and underside of substrate.

.1 Colour: J0751 Rosso Jaipur,

.2 Substrate: Hardwood plywood 38mm thick laminated DesignEdge; 2 x 19 mm = 2 x11-ply with half-lap overlapping plies to achieve long dimension.

.3 Edge Finish: 6 mm chamfered edge on top and bottom of panel, applied after panel lamination.

.4 Custom Stainless Steel legs, Straightening Rails, Wall-Mounted Brackets: Refer to item **2.8 HARDWARE** in this Section 06 40 00 and to Section 05 70 15 - Stainless Steel Fabrications.

.2 Provide firestopping/sealant at gypsum, board penetration at fire-rated wall assembly.

.3 Wall-Mounted Bar Countertops (at Scope 3 - Lounge/Kitchenette Area)

.1 38 mm thick Laminated Plywood counters with plastic laminate top and bottom finish. Cantilevered off one wall with hidden bracket support. Depth: 375 mm; Widths: various.

.1 Countertop:

.1 FENIX NTM, JJ Grade - 1.2 mm thickness. Laminated on both top and underside of substrate.

.1 Colour: J0751 Rosso Jaipur,

.2 Substrate: Hardwood plywood 38mm thick laminated DesignEdge; 2 x 19 mm = 2 x11-ply with half-lap overlapping plies to achieve long dimension.

.3 Edge Finish: 6 mm chamfered edge on top and bottom of panel, applied after panel lamination.

.4 Wall-Mounted Bracket: Refer to item **2.8 HARDWARE** in this Section 06 40 00.

.2 Provide firestopping/sealant at gypsum, board penetration at fire-rated wall assembly.

.4 Built-in Wall-Mounted Work Desks:

.1 38 mm thick Laminated Plywood counters with plastic laminate top and bottom finish. Depths & Widths: Varies.

.1 Work Desktop:

.1 FENIX NTM, JJ Grade - 1.2 mm thickness. Laminated on both top and underside of substrate.

.1 Colour: J0751 Rosso Jaipur,

.2 Substrate: Hardwood plywood 38mm thick laminated DesignEdge; 2 x 19 mm = 2 x11-ply with half-lap overlapping plies to achieve long dimension.

.3 Edge Finish: 6 mm chamfered edge on top and bottom of panel, applied after panel lamination.

.4 Wall-Mounted Bracket: 50 mm x 50 mm x 6mm continuous steel angle; powder-coated finish.

.1 Provide continuous angle along entire wall-adjoining perimeter of built-in desk.

.2 Countersunk into u/s of tabletop. Pre-drilled fastener holes to be countersunk.

.5 Wall & Ceiling Veneer-clad MDF Paneling:

.1 Scope 3 & Scope 5: 3 mm Alder Rotary Cut Veneer laminated onto 19 mm Fire Rated MDF with Flame Spread Rating of 25, 3mm solid Alder edge.

.1 Veneer Standard of Acceptance:

.1 Columbia Forest Products.

.2 Core: Fire Rated MDF with Flame Spread Rating of 25 or less

.3 Installed w/ concealed fasteners, i.e. Lockable aluminum Z-clips/French cleat system or equivalent. Refer to item **2.8 HARDWARE** in this Section 06 40 00.

.4 Provide solid wood filler pieces at all visible reveals.

.2 Finish:

.1 Lye - (2 coats), Water- Based polyurethane - matt finish (3-5 coats), sanded between coats

.2 Refer to item **2.12 SHOP FINISHING** in this Section 06 40 00.

.6 Tall Kitchen Cabinets:

.1 Grey Melamine finish on cabinet carcasses

.2 0.7 mm PLAM finish w/ Solid Edging on 3/4" (19 mm) MDF panel core for all cabinet fronts, drawer fronts, exposed shelves, backsplash panel, exposed side walls, and gables.

.1 Colour: J0754 Blu Fes.

.7 Low Kitchen Cabinets Beneath Countertop:

.1 6 mm Stainless Steel Plate Countertops, Matt Sandblasted finish

.2 Grey melamine finish on cabinet carcass and drawer interiors

.3 3/4" (19 mm) Veneer-Clad MDF panel w/ solid wood edging for all cabinet doors and drawer fronts. To match Wall & Veneer-clad MDF Paneling specification.

2.8 HARDWARE

.1 Casework hardware: to ANSI/BHMA A156.9, Grade 1 unless otherwise explicitly specified. Hardware shall include all fasteners, mounting hardware, and accessories as required for complete installations. Supply hardware as indicated.

.2 Hardware: Bolts, nuts, washers, screws, cup washers for removal panels, etc., all steel type.

.3 Draw Bolt Fasteners

.1 Acceptable Materials:

.1 K&V 516 by Knape & Vogt Canada.

.4 Spacers: Rigid PVC to size and profile indicated.

.5 Access Panel Connectors.

.1 Acceptable Materials:

.1 Richelieu Type JCB-A0101C complete with Tee-Nut 261.12.

.6 Grommets for electrical cords through counter tops, as indicated on drawings.

.1 Acceptable Materials:

.1 Richelieu 20692170, 47 mm Ø, stainless steel finish.

.7 Hinges (Typical Cabinet Doors): Concealed, euro-style hinge with cover caps; fully adjustable for overlay, depth, height and closing force; opening angle of 110°; self-closing feature; nickel plated steel construction – brushed finish; overlay and half overlay mounting, size and profile to suit cabinet construction:

.1 Standard of Acceptance:

.1 Blum Canada Ltd., Clip top BluMotion.

.8 Locks: All millwork to be lockable.

.1 Typical lockable doors and drawers: Die-cast, nickel finished, master keyed, keyed alike in groups, cylinder locks

.1 Acceptable Materials:

.1 Richelieu

.2 CompX National

.3 Trimline

.9 Cabinet Drawer/Door Pulls:

.1 Standard of Acceptance:

.1 Richelieu

.1 Modern Stainless Steel Pull – JS165M

.1 Finish: Stainless Steel

.2 Dimensions: Centre to Centre: 160 mm

.10 Heavy-duty drawer runners with push open and close function: Concealed, full extension, rated for frequent use, self-closing, opens with light touch. Low-friction cylindrical nylon roller runners and synchronized carriage system. Length and load bearing class per Drawings.

.1 Standard of Acceptance:

.1 Blum Movento with Tip-On Blumotion.

.11 Shelf Supports:

.1 Recessed pilaster with shelf rests sized for shelf depth.

.1 Acceptable Materials:

.1 (pilaster) Knape & Vogt, 255, zinc plated.

.2 (shelf rests/clips) Knape & Vogt, 256, zinc plated.

.12 Shelf Support grommets and Pins for open shelving:

.1 Acceptable Materials:

.1 Knape & Vogt, anachrome finish.

.13 Fixed Shelves: mortise and tenon joint glued with Structural Adhesive.

.14 Harvest Table Custom Stainless Steel Legs:

.1 Refer to Section 05 70 15 Stainless Steel Fabrications

.2 6mm Stainless Steel Plate – Sand-blasted matte finish

.3 38mm x 18mm x 3.2mm Stainless Steel Channels

.4 38mm x 38mm x 3mm HSS Base tube fastened into floor below.

.1 Finish: Powder-coated; Colour: Charcoal.

.5 All mechanical connections to use countersunk stainless steel screws, with sufficient shear to carry load of designed desk.

.15 Harvest Table Straightening Rails:

.1 Provide countersunk steel channel with slotted connections routed into underside of wood to prevent cupping/warping of top; to allow movement perpendicular to grain.

.2 Finish: Powder-coated; Colour: Charcoal.

.16 Harvest Table Wall-Mounted Brackets Bent Cold-Rolled Steel. Routed into underside of harvest table countertop. Weight Capacity: 375 lbs. per pair. 2” width. Projection: 12” Provide appropriate size. Sold in pairs. Takes ¼” Hex Lag screws. Black powder-coated.

.1 Standard of Acceptance:

.1 Richelieu, Hidden Counter Bracket – Kolossus, Product #6802121290.

.1 Steel hidden bracket: 12” x 12” x ¼” (300 mm x 300 mm x 6 mm).

.2 To be routed into underside of tabletop.

.3 Provide at connection to wood-clad steel stud wall.

.17 Kitchen Bar Countertops – Aluminium Heavy-Duty Brackets. Weight Capacity: 1300lb per pair. T shaped cross-section profile 50mm x 50mm. Projection 12”. Sold in pairs. Black powder coated.

.1 Standard of Acceptance:

.1 Richelieu, K-R650 Kolossus Heavy-Duty Aluminum Brackets, Product #40121290

.1 Aluminium Brack: 12”x12” – Black Finish

.2 Provide quantity as shown on elevation drawings.

.3 Provide on Study-booth counters if wall to wall span exceeds 1000mm.

.18 Door bumpers: Richelieu, Product # 2650611 Quiet Polyurethane Bumper.

.19 Panel Hanger Z-clips/ Cleat System:

.1 Acceptable Materials:

.1 Cleat System: Fry Reglet Millwork Cleat 25

.2 Monarch Z-clip MF 625.

.2 Depth:

.1 6mm (1/4”)

.2 12.7mm (1/2”)

.20 Lockable Panel Hanger Z-clip/Cleat System: (For Ceiling Panels):

.1 Acceptable Materials:

.1 Cleat System: Eagle Aluminum – Aluminum Ceiling Clip Rail ZCP-600

.2 Depth:

.1 18.4mm (0.725”)

.21 Miscellaneous reinforcing and metal shapes as shown on drawings or otherwise required to support loads as calculated to OBC 2024, including amendments.

2.9 PRECONDITIONING

.1 Decorative laminates and core materials should be conditioned before bonding so that all materials reach equilibrium and are neither too dry nor too damp, the latter being most important at the time of pressing. Optimum conditions are best achieved in a dry storage area (about 20°C and 50-60% Relative Air Humidity).

.2 The sheets that will form the opposite faces of the same composite board are best conditioned as a pair, with their sanded backs together. Sheets paired in this manner should be stacked, covered, and left for a minimum period of three days in order to reach moisture equilibrium. This will ensure that they achieve near identical moisture contents prior to so that bonding, and any subsequent dimensional movements will therefore be similar in both magnitude and direction on each side of the composite panel.

.3 Wood-based core materials should have a moisture content of around 9%. The moisture content of laminates cannot be measured with a normal moisture meter, but it is essential that the face laminate has the same moisture content as the corresponding backing board.

.4 Panels and boards faced with decorative laminate will nearly always be required to have the reverse side faced with a similar material to counter-balance the effects of dimensional changes that may take place

2.10 FABRICATION – GENERAL

.1 Fabricate items rigid, plumb and square, as detailed, with tight, bevelled, hairline joints. Sand work smooth, set all nails and screws.

.1 Coordinate railings, guardrails and handrails with the requirements of Section 05 50 00 – Metal Fabrications, and integrate with finish carpentry Work as required for a complete installation.

.2 Countersink bolts and washers, fill holes with matching wood plugs.

.3 Fabricate all straight run millwork accurately to profiles indicated. Provide over length for site trimming to proper fit.

.4 Plane all sides and back, sand exposed faces, surfaces. Hollow out backs 3 mm (1/8"). Round off edges.

.5 Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

.6 Flush overlay cabinet doors and drawer fronts as detailed.

.7 Fabricate gables and edges meeting walls oversize to allow for scribing to fit on site.

.8 Assemble Work with flush butt hairline corners and joints. Cut-outs for services to be done on site during installation. No hairline cracks will be allowed in the face area of cabinet work modules unless approved in writing by Consultant.

.9 Carefully fit, cope or mitre and well glue-up Joints. There shall be no end wood visible on finished surfaces.

.10 Glue, dowel, mortise, lock joint or dado all cabinet work and cabinet work. Do not use staples. Nailing and screws are acceptable.

.11 Set nail heads in finished surfaces. Countersink screws and bolts, except those detailed to be exposed, and fill holes with edge grain wood plugs to match colour and grain.

.12 Blocking, framing, web frames to be solid lumber.

.13 Provide solid wood edge strips in all doors and cases to receive hardware. Rebate and pressure glue to core.

.14 Cut and adapt all Work to receive hardware.

.1 Drill and prepare end gables for insert type shelf standards on gables.

.2 Install all finishing hardware and fittings in shop.

.3 Fittings which may be susceptible to damage during shipping and installation may be installed after millwork installed on site.

.15 Ensure adjacent part of continuous work match in colour and pattern.

2.11 FABRICATION – PLASTIC LAMINATE

.1 NAAWS Quality Grade Premium.

.2 Install high pressure and low-pressure laminate as indicated; colours per Schedules.

.3 Comply with NEMA LD3, Annex 'A', and Manufacturer's Technical Data Sheets and fabrication guidelines.

.4 Obtain governing dimensions before fabricating items that are to accommodate or abut appliances, equipment and other materials.

.5 Ensure adjacent parts of continuous laminate work match in colour and pattern.

.6 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 2400 mm. Keep joints 600 mm from sink cutouts.

.7 Drill oversized holes for screws or bolts. Screws or bolts to be slightly countersunk into the face side of a laminate-clad substrate.

.8 Provide cores of not less than 19 mm nominal thickness.

.9 All inside corners to have a minimum of 1/8" (3.18 mm) radius, and all edges to be routed smooth.

.10 Apply backing sheet to laminated flatwork. Supply uniform coating of sealer on exposed edges. Provide backing sheet of sufficient thickness to compensate stresses caused by facing sheet.

.11 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.

.12 Locate joints at 2400 mm to 3000 mm oc. or as indicated on Drawings. At 'L' shaped corners mitre plastic laminate to outside corners. Accurately fit member together to provide tight and flush butt joints, in true planes. Provide 6 mm blind spline and approved type draw bolts. Provide 1 draw bolt for widths up to 150 mm. For width exceeding 150 mm, provide draw bolts at maximum 250 mm centres. Colour match adjoining units.

.13 Provide cut outs as required for inserts, fixtures and fittings. Use radiused corners and chamfer edges around cut outs to avoid chipping laminate.

.14 Doors: apply matching laminated plastic to both outside and inside faces of door panels.

.15 At other locations, apply laminate backing sheet to reverse side of core of plastic laminate work.

.16 Apply laminated plastic liner sheet to interior of cabinetry.

.17 Post form laminate work to details indicated. Provide same core and laminate profiles to provide continuous support and bond for entire surface.

.18 Assemble work, true and square. Arrange adjacent parts of continuous laminate work to match in colour and pattern.

.19 Use hot-pressing method for adhering plastic laminate to substrate to greatest extent possible to minimize field application. Use only brush-applied adhesives suitable to the surfaces to be bonded.

2.12 SHOP FINISHING

.1 Finishes: refer to Finishes identified on Drawings.

.2 Do finishing to NAAWS Premium Quality Grade. Finish wood trim at fabrication shop as specified in this Section. Defer only final touch-up, cleaning, and polishing until after installation.

.3 Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing wood trim, as applicable to each unit of work.

.1 Back-priming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of wood trim. Apply two coats to end-grain surfaces.

.4 Hardwood materials shall be shop-finished and stained as directed by Consultant.

.1 Prior to water-based polyurethane, contractor to apply 2 coats of a lye finish, sanding the surface in between.

.2 Colour: clear finish.

.3 Basecoat of catalyzed sealing lacquer.

.4 Two finish coats of catalyzed topcoat lacquer.

.5 Standard of Acceptance:

.1 Primer: Sansin® Resolution I, or equivalent.

.2 Topcoat: Sansin® Resolution II, or equivalent.

.6 Sheen: Matte, 0-10 gloss units measured on 60-degree gloss meter per ASTM D523.

.7 Sand between coats per lacquer manufacturer's printed directions.

.5 Flame retardant coating system:

.1 Location: wood panel ceiling.

.2 Low-VOC water-base intumescent fire-retardant wood treatment, colourless, odourless, tested to ULC 102.

.3 Standard of Acceptance:

.1 Sansin® FireStop99™, or Flame Control No. 166 by Flame Control Coatings Canada Ltd.

.6 Shop-fabricate and finish to extent possible.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Check and verify that no irregularities exist that would affect quality of execution of work specified.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.1 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 COORDINATION

.1 Coordinate with other trades as required for complete installations and as required to maintain project schedule.

3.3 PREPARATION

.1 Discard materials that are warped, twisted, bowed, crooked or otherwise defective.

.2 Allow wood materials to fully acclimatize to interior ambient temperature and humidly prior to cutting and installation.

.3 Obtain measurements from site.

.4 Check access to ensure large pieces of work can be safely handled to their place of final installation.

.5 Before installation, condition wood to average prevailing humidity conditions in installation areas.

.6 Back prime woodwork before installation, to NAAWS

3.4 COMPLIANCE

.1 Comply with requirements of OBC 2024 as amended, CSA O86, and Drawings.

.1 Minimum sizes and spacing of members, thickness of materials, allowable species and lumber grades, shall meet the requirements of the above noted standards, unless indicated or specified otherwise

.2 Accurately frame and properly assemble rough carpentry work. Include all necessary screws, lag bolts and through-bolts and connectors required to complete the work.

3.5 CONSTRUCTION – GENERAL

.1 Gluing wood elements together prior to mechanical fastening:

.1 Apply structural adhesive in accordance with the requirements of item **3.6 STRUCTURAL ADHESIVE APPLICATION** of this Section.

.2 Fastening:

.1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.

.2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.

.3 Fasten directly into wood studs and dimension lumber framing; do not use screws into gypsum board as the method of attachment.

.4 Use concealed fastening system as practicable. Where not practicable, set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.

.5 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

.6 Fasteners shall penetrate 1-1/4" (32 mm) into structural wood elements.

.1 Standing and running trim: Butt and cope internal joints of baseboards to make snug, tight, joint. Cut right angle joints of casing and base with mitred joints.

.2 Fit backs of baseboards and casing snugly to wall surfaces to eliminate cracks at junction of base and casing with walls.

.3 Make joints in baseboard, where necessary using a [45] degrees scarf type joint.

3.6 STRUCTURAL ADHESIVE APPLICATION

.1 Preparation:

The temperature of the adhesive, the surfaces and the working area must be between -17°C (1.4°F) and 49°C (120°F). For smooth, fast, easy application during cold weather, store adhesive at room temperature (21°C) 24 hours prior to use. Ensure surfaces to be bonded are clean, dry, structurally sound and free of dust, grease, oil or other contaminants. To increase adhesion, sand glossy surfaces to a dull finish. Pre-fit all materials prior to applying product. Cut off tip of cartridge at 45° angle to desired bead size. For exterior applications, the recommended bead size is 9.5 mm (3/8"). Puncture seal inside of nozzle.

.2 Application:

.1 Using a caulking gun, apply adhesive in a continuous bead to joists, studs or back side of siding or panels, whichever is appropriate. Ensure that all outer edges and centers are adequately supplied with adhesive to ensure a complete and total bond. Use wood screws sparingly for support and as an aid to alignment during installation. Join surfaces within 15 minutes. Once joined, repositioning time is approximately 30 minutes. If work is delayed, remove excess adhesive and begin again. After use, wipe off nozzle tip and recap immediately.

3.7 MILLWORK LIGHTING

.1 Millwork contractor shall coordinate installation with electrical contractor.

.2 Millwork contractor to provide openings for outlet boxes in millwork and coordinate wiring (by electrical) to ensure a clean inconspicuous installation.

3.8 INSTALLATION

.1 Install architectural woodwork to indicated NAAWS Premium Quality Grade.

.2 Install prefinished millwork at locations shown on drawings. Install work plumb, true and square, neatly scribed to adjoining surfaces.

.3 Make allowances around perimeter where fixed objects pass through or project into laminated plastic work to permit normal movement without restriction.

.4 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.

.5 Fasten and anchor millwork securely.

.1 Anchor to floor, walls, or ceiling using heavy duty fastening devices and hardware consistent with the building materials encountered. Do not use wood plugs. Do not use plastic plugs for ceilings or walls. Provide wall strapping as required.

.6 Countersink mechanical fasteners at semi-exposed surfaces, excluding installation attachment screws and screws securing cabinets end to end.

.7 Use draw bolts and splines in countertop joints. Maximum spacing 450 mm on centre, 75 mm from edge. Make flush hairline joints.

.8 Provide cutouts for inserts, grilles, appliances, outlet boxes and other penetrations. Round internal corners, chamfer edges and seal exposed core.

.9 At junctions of stainless steel countertop and PLAM backsplash, and adjacent wall finish, apply small bead of sealant in accordance with Section 07 92 00 - Joint Sealants. Apply joint sealants at other locations as indicated.

.10 Supply and install hardware required for the completion of architectural woodwork, including, without limitations, adjustable shelf supports and cabinet hinges, catches, pulls, drawer accessories, bumpers, drawer slides and closet hanger bars, and similar items. Install millwork hardware in the shop wherever possible. Install millwork hardware secure, plumb, level, true to line, and in accordance with the hardware manufacturers' printed instructions. Cut and fit to millwork for proper installation and operation. Provide smoothly operating units free from binding. Clean and adjust hardware for proper operation.

.11 Where access is required to valves and other mechanical and electrical components located within cabinetwork, install removable plywood access panels of size required to permit safe and easy access, and secure with 4 screws.

3.9 FIRE RETARDANT TREATMENT AT INTERIOR WOOD LOCATIONS

.1 Schedule:

.1 Treat interior wood construction, including all cut ends, cutouts and holes, and unexposed surfaces with clear fire retardant. Treat after cutting but before fabrication, assembly and erection.

.2 Locations: refer to Drawings for locations requiring fire-retardant treatment. Meet the requirements of the Ontario Building Code Regulations and OBC.

.2 Preparation:

.1 Ensure surfaces are free of contaminates such as dust, grease and oils.

.2 Sand to create even smooth surface, remove glaze and improve adhesion of fire retardant.

.3 Use 120-150 grit paper for final surface finish.

.3 Application:

.1 Stir well before and during use.

.2 Apply two or four coats of fire retardant to achieve a net coverage rate of 90 -100 Ft²/Gal and achieve a CAN/ULC S102 class “A” rating.

.3 Ensure the first coat is “dry-to touch” before the second coat is applied.

.4 Fire retardant is best applied by spray equipment (11 to 13 thou tip).

.5 Fire retardant is a ready to use product.

.6 For spray application, thin up to 5% with water.

.7 Ensure adequate dry film thickness to meet performance specifications.

.8 Do not apply at temperatures lower than 15°C (59°F). Best application temperature recommended is 20°C to 25°C (68°F to 77°F).

.9 Buff using a fine scotch bright pad after final coats or between coats for a smoother finish.

.10 Apply approved wood finish system as specified.

3.10 ADJUSTING

.1 During installation and again at Substantial Performance, adjust all hardware and operating parts as necessary to ensure smooth and proper operation.

3.11 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.12 PROTECTION

.1 Fill and retouch all nicks, chips and scratches in factory finishes and substrate materials to NAAWS standards. Replace damaged items that cannot be repaired to NAAWS standards

.2 Protect installed products and components from damage during construction.

.3 Repair damage to adjacent materials caused by Work of this Section.

3.13 SCHEDULE

.1 Refer to Drawings for Millwork Schedule, scope and extent of Work, construction details, finishes, and colours.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 02 07 50 – Cutting and Patching.

.3 Section 06 10 00 – Rough Carpentry.

.4 Section 07 92 00 - Joint Sealants.

.5 Engineering: coordinate with electrical and mechanical trades as required.

.6 Refer to Drawings.

1.2 REFERENCES

.1 Canadian Roofing Contractors Association (CRCA)

.1 CRCA Roofing Specifications Manual (most recent published edition).

.2 CSA Group (CSA)

.1 CSA A123.21:26, Standard test method for the dynamic wind uplift resistance of membrane-roofing systems.

.3 UL Solutions in Canada (ULC)

.1 ULC 107-19 (R2024), Methods of Fire Tests of Roof Coverings (CAN-ULC-107-2019-(R2024)).

.2 ULC 704.1-26, Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced (CAN-ULC-704.1-2026).

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Construction Meetings: Meet on site at the location of required penetrations and repairs in accordance with Section 01 10 00 - Summary, before ordering materials to review existing conditions affecting work of this Section, determine membrane and flashing types, patching and repair procedures and protection of interior components from water infiltration and weather, attended by the following:

.1 Consultant.

.2 Contractor.

.3 Mechanical trade(s).

.4 Roofer.

.2 Intrusive Investigation Meeting: Following the requirements set out in pre-construction meeting and outlined in the architectural/mechanical and structural drawings, perform an intrusive investigation of the scupper drain, associated roof connection, and downstream plumbing connection to determine the nature of the roof leak located above room 3603B (Proposed). Refer to 02 41 20 - Selective Interior Demolition and Structural drawings for procedures associated with removal of existing fireproofing spray that will be necessary to perform the required joist repair. Once full extents of the nature of the leak and the extents of the structural damage are clear, schedule a follow-up meeting with the Consultant to present and discuss the proposed remediation strategy.

.3 Sequencing and Scheduling: Coordinate roofing repairs with work of other related trades; remove existing roofing in area and quantity that can be completely repaired in the same day, including installation of flashings.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures:
- .1 Provide manufacturer's printed product literature, specifications and datasheets for membranes and roofing system components and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Provide one electronic copy of WHMIS SDS - Safety Data Sheets in accordance with WHMIS acceptable to Labour Canada, and Health and Welfare Canada.

1.5 QUALITY ASSURANCE

.1 Ensure that products used comply with membrane manufacturer’s warranty and are compatible.

1.6 SITE CONDITIONS

.1 Existing Conditions: Protect openings using tarps, dams and diversion materials to prevent water or snow from entering interior of building.

.2 Ambient Conditions: Install materials during dry weather and temperatures are within manufacturer’s written minimum and maximum application range.

Part 2 Products

2.1 MATERIALS

.1 Materials: Confirm specification of roof with Consultant and Owner and ensure all new materials are compatible with existing roofing; match materials used at adjacent roofing assembly.

.2 Flashing: compatible with existing roofing; match materials used at adjacent roofing assembly.

.3 Pavers: compatible with existing roofing; match materials used at adjacent roofing assembly.

.4 Accessories: compatible with existing roofing; match materials used at adjacent roofing assembly.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that substrates and conditions are in accordance with manufacturer’s written recommendations and installation guidelines before starting work of this Section.

.2 Start of roofing work will be interpreted as meaning roofing conditions are in accordance with manufacturer’s requirements.

3.2 PREPARATION

.1 Building Protection: Provide tarps and hoarding as required to protect existing building finishes and assemblies from work of this Section; clean any spills and repair any damaged materials resulting from work of this Section.

.2 Provide suitable protection during preparation and installation of new roofing installations and penetrations to prevent water or weather from entering interior spaces:

.1 Lap protective coverings over existing roofing to prevent water ingress.

.2 Secure protective coverings against wind blow-off.

.3 Leave protective covering in place for duration of the work.

3.3 ROOFING REPAIRS

.1 Refer to Drawings for scopes of Work.

.2 Coordinate with other trades as required to sequence the work properly, and ensure that the construction schedule is met.

.3 Provide all temporary protection as required to protect the roof assembly and building interior from damage during the work in the event of rain, snow, sleet weather events.

.4 Remove existing roofing and flashing systems to accommodate new construction, demolition and relocations:

.1 Remove existing systems to expose substrates.

.2 Clean and prepare surfaces ready for new materials.

.5 Perform an intrusive investigation of the scupper drain, associated roof connection, and downstream plumbing connection to determine the nature of the roof leak located above room 3603B (Proposed). Refer to 02 41 20 - Selective Interior Demolition and Structural drawings for procedures associated with removal of existing fireproofing spray that will be necessary to perform the required joist repair. Once full extents of the nature of the leak and the extents of the structural damage are clear, document conditions & schedule a follow-up meeting with the Consultant to present and discuss the proposed remediation strategy.

.6 Provide and install new materials as required to form a complete and continuous roof assembly:

.1 Complete work of this Section in accordance with original design intent of existing roofing assembly.

.2 Tie-in to existing roofing to remain in a manner that maintains integrity of system performance.

.7 Restore existing roofing to sound, waterproof and weatherproof condition, remove construction debris and leave area of work in a condition acceptable to the Consultant; remove all traces of splashed or spilled materials.

.8 Restore existing roofing flashings to original condition, matching colour and profile where repairs are observable from grade or from other parts of the building.

3.4 SITE QUALITY CONTROL

.1 Inspection and testing of roofing application may be carried out by testing laboratory designated by Owner in cooperation with the Consultant.

.2 Inspection fees will be paid by the Owner in accordance with Division 01: General Requirements. If deficiencies are found, costs of inspections and remedial work shall be at Contractor’s expense.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01: General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01: General Requirements.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Construction Waste Management.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.7 SCHEDULE

.1 Perform isolated roofing demolition and repairs at locations indicated on Drawings, as required. All repairs must match existing adjacent roofing materials and thicknesses and be fully compatible with the existing roofing. New work shall be tied-in to the existing assembly as required to provide and ensure continuity of waterproofing protection.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the Contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Division 03: Cast-in-Place Concrete.

.3 Division 05: Structural Steel.

.4 Section 07 84 00 – Firestopping and Smoke Seals.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM E84-26a, Standard Test Method for Surface Burning Characteristics of Building Materials.

.2 ASTM E119-26, Standard Test Methods for Fire Tests of Building Construction and Materials.

.3 ASTM E605/E605M-19(2023), Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.

.4 ASTM E736/E736M-19(2023), Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.

.5 ASTM E759/E759M-92(2023), Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members.

.6 ASTM E760/E760M-92(2023), Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members.

.7 ASTM E761/E761M-92(2023), Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members.

.8 ASTM E859/E859M-23, Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members.

.9 ASTM E937/E937M-93(2023), Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.

.2 Association of the Wall and Ceiling Industry (AWCI)

.1 AWCI Technical Manual 12-A, 4th Edition, Standard Practice for the Testing and Inspection of Field Applied Sprayed Fire-Resistive Materials, an Annotated Guide.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Safety Data Sheets (SDS).

.4 UL Solutions in Canada (ULC)

.1 ULC 101-14 (2021), Standard Methods of Fire Endurance Tests of Building Construction and Materials (CAN-ULC-S101-14-REV3).

.2 ULC 102-19 (R2024), Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies (CAN-ULC-102-2019-(R2024)).

.3 ULC 114-18 (R2024), Standard Method of Test for Determination of Non-Combustibility in Building Materials (CAN-ULC-114-2018-9R2024)).

.4 ULC List of Equipment and Materials, latest edition.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Ensure surfaces meet manufacturer's minimum surface preparation requirements for bond surface, free from wax, grease or other deleterious material that could affect bond of materials specified in this Section, and as follows:

.1 Coordinate installation of hangers, inserts, clips and similar items to surfaces needing protection before applying sprayed fire-resistive materials.

.2 Coordinate installation of ducts, pipes, conduits and similar items that could obstruct spraying operations before applying sprayed fire-resistive materials.

.3 Coordinate installation of walls, tracks, bracing channels and similar items requiring a structural connection to a substrate encased in existing spray-applied fireproofing before applying sprayed fire-resistive materials

.4 Coordinate installation of structural steel reinforcement and extension of existing floor assemblies and supporting structure before applying sprayed fire-resistive materials.

.2 Pre-Installation Meeting: Convene pre-installation meeting two weeks prior to beginning work of this Section, with Contractor, Consultant, inspection and testing agency, and manufacturer's representative to:

.1 Verify Project requirements.

.2 Review installation and substrate conditions.

.3 Coordination with other building subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

.5 Coordination and cooperation with inspection and testing agency.

1.4 ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

.1 Submittals shall conform to the requirements of Section 01 33 00 - Summary.

.2 Submit product data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide electronic copy of WHMIS SDS - Safety Data Sheets in accordance with WHMIS requirements acceptable to Health Canada.

.3 Delegated Design Submittals: Design sprayed-on fireproofing thickness required by the Contract Documents to withstand fire ratings indicated and in accordance with requirements of the Ontario Building Code (OBC) 2024, as adopted and amended by the Province of Ontario, and as follows:

.1 Provide manufacturer's standard listing where site conditions match standard assembly listings.

.2 Provide manufacturer's engineered judgement, indicating acceptance by the authority having jurisdiction, signed and sealed by manufacturer's design engineer, where assembly does not match standard assembly listing.

.4 Submit quality assurance submittals in accordance with Division 01 General Requirements:

.1 Test Reports:

.1 Submit product data including certified copies of test reports verifying fireproofing applied to substrate as constructed on project will meet or exceed requirements of Specification.

.2 Submit test results in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.

.3 For assemblies not tested and rated, submit proposals based on related designs using accepted fireproofing design criteria.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

.6 Manufacturer's Field Reports: submit manufacturer's written field reports within three days of review, verifying compliance of Work, as described in Part 3, Field Quality Control.

.7 Submit field reports from independent inspection and testing agency as described in Part 3, Field Quality Control.

1.5 QUALITY ASSURANCE

.1 Qualifications: Provide proof of qualifications for review by Consultant:

.1 Installer: company specializing in sprayed-on fireproofing with five years documented experience and approved by manufacturer.

.2 Materials: Use materials produced under label service of an agency that has tested material, or assemblies containing material, in accordance with specified test standards.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Deliver packaged materials in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.

.2 Storage and Protection:

.1 Store materials in dry location.

.2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

.3 Damaged or opened containers will be rejected.

.4 Packaging to indicate shelf-life and materials to be applied prior to expiration of shelf-life.

.5 Provide temporary enclosures to prevent spray from contaminating air beyond application area.

.6 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of fireproofing materials.

1.7 SITE CONDITIONS

.1 At temperatures less than 5 degrees C, ensure that 5 degrees C air and substrate temperature is maintained during and for 24 hours after application.

.2 Maintain relative humidity within limits recommended by fireproofing manufacturer.

.3 Ensure that natural ventilation to properly dry fireproofing during, and subsequent to, its application is provided.

.4 In enclosed areas lacking openings for natural ventilation, provide minimum of four air exchanges per hour by forced air circulation.

Part 2 Products

2.1 MANUFACTURERS

.1 Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

.1 Carboline Company (A/D Fire Protection Systems)

.2 Isolatek International (CAFCO).

.3 GCP Applied Technologies (Monokote Fireproofing).

.4 Urecoat Inc.

2.2 PERFORMANCE/DESIGN CRITERIA

.1 Adhesion: Provide materials that meet or exceed adhesion requirements in accordance with ASTM E736.

.2 Thickness and Weight: Determine application thickness and weight of applied fireproofing based on tests of assemblies in accordance with CAN/ULC-S101; apply same thickness of fireproofing material to all structural components forming a part of the assembly, including, but not limited to, cross bracing, support angles and hangers.

.3 Engineered Judgements: Provide engineered judgement acceptable to authority having jurisdiction where assembly being protected differs from the tested assembly used to determine thickness.

.4 Systems must meet CAN/ULC-S114, and be listed to ULC List of Equipment and Materials.

2.3 MATERIALS

.1 Sprayed fireproofing: ULC certified gypsum based cementitious fireproofing qualified for use in ULC Designs specified and fire rating times as indicated on Drawings for structure and floors at locations as indicated on Drawings.

.2 Provide materials containing no asbestos.

.3 Water: Clean, fresh, suitable for domestic consumption, and free from such amounts of mineral or organic substance as would affect set of fire resistant material.

.4 Curing compound: type recommended by fireproofing manufacturer, qualified for use in ULC Designs specified.

.5 Sealer: type recommended by fireproofing manufacturer, qualified for use in ULC Design specified.

.1 Colour: white.

.6 Fireproofing: minimum dry density and cohesion/adhesion properties as follows:

.1 Fireproofing for structural components concealed above ceiling, or within wall, chase, or furred space: minimum applied dry density of 240 kg per cubic metre and cohesion/adhesion strength of 9.57 kPa.

.2 Fireproofing for exposed structural components, except where otherwise specified or indicated: minimum applied dry density of 350 kg per cubic metre and cohesion/adhesion strength of 20.83 kPa.

.3 Fireproofing for structural components located in mechanical rooms and storage areas: minimum applied dry density of 640 kg per cubic metre and cohesion/adhesion strength of 350 kPa.

.4 Ensure spray-applied fireproofing: does not crack, spall or delaminate under downward deflection conditions over 3 m clear span, when tested in accordance with ASTM E759.

.5 Minimum compressive strength: 48 kPa, in accordance with ASTM E761.

.6 Spray-applied fireproofing material: not contribute to corrosion of test panels, when tested in accordance with ASTM E937.

.7 Dust removal: not exceed 0.25 gram per square metre, when tested in accordance with ASTM E859.

2.4 ACCESSORIES

.1 Reinforcement mesh, wire lath, mould inhibitors and other components necessary for a complete and functioning fireproof coating installation.

Part 3 Execution

3.1 EXAMINATION

.1 Check environmental conditions and examine surfaces to receive fire-resistant material; report any conditions that would detrimentally affect application of material.

.2 Review owner's Hazardous material's consultant's Designated Substances Report for presence of hazardous materials in work area, follow all required precautions.

.3 Commence Work when conditions of surfaces and working conditions are suitable.

3.2 PREPARATION

.1 Where adjacent floors, walls and similar surfaces are going to be exposed, provide and maintain masking, drop cloths and polyethylene coverings for such surfaces to protect them during spraying operations.

.2 Provide complete enclosures and human protective devices when spraying hazardous materials.

.3 All surfaces to receive cementitious fireproofing material shall be free of oil, grease, dirt, loose paint, mill scale, or any other matter that would impair bond, including paint, unless a test application of cementitious fireproofing material has been done to determine that the paint formulation will not impair adhesion.

.4 Prime surfaces as required.

.5 Make provisions for natural ventilation to properly dry fire resistant material during and subsequent to its application. In enclosed areas or area lacking openings for natural ventilation, circulate interior air and exhaust it to outside by use of temporary circulators, exhaust fans, or air-conditioning system.

3.3 APPLICATION

.1 Compliance: comply with AWCI Technical Manual 12-A guidelines and recommendations, and the product manufacturer's published data sheets, recommendations and specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

.2 Mix and apply fire resistive material to all structural steel and metal decking, as required to provide a fire resistance rated assembly, in accordance with approved submittals and manufacturer's instructions. Ratings as indicated.

.3 Apply spray coats of no greater thickness per coat than maximum recommended by manufacturer until required thickness is applied.

.4 Do not re-temper material or use frozen, caked, or lumpy material.

.5 Mix each batch of material separately, following manufacturer's instructions, to achieve required density.

.6 Cut, patch, and repair any material which fails to meet requirements of this specification or which fails to attain properties stipulated in reports of tests used to determine fire resistance rating of assembly.

.7 Repair damage to fire-resistant material caused by installation of subsequent Work.

.8 Apply sealer to vertical exterior wall application in accordance with manufacturer’s written instructions.

3.4 REPAIR

.1 Patch damage to fire resistant material caused by testing or by other trades before fire resistant material is concealed, or if exposed, before final inspection.

3.5 FIELD QUALITY CONTROL

.1 Inspection and testing shall conform to AWCI Technical Manual 12-A guidelines and recommendations.

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in Part 1, Action Submittals/Informational Submittals.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits to review Work periodically as follows: at commencement of work to discuss methodology, at 30% completion, and at 60% completion.

.3 Inspection and Site Tests:

.1 The installer shall pay for an independent testing laboratory to sample and verify thickness and density of fire resistant material in accordance with provisions of

ASTM E605, and bond strength testing in accordance with provisions of ASTM E736.

.2 The Contractor and installer must cooperate fully with the inspection and testing agency, including providing a means of accessing work areas as required for inspection and testing.

.3 Test results will be forwarded to the Consultant, who will distribute the results of above tests to all relevant parties at completion of each work area.

.4 One series of tests will be performed for both laboratory and field-tests, in accordance with the frequencies set out in Article 3.5.4 of this Section. Make good after all cut tests.

.5 Non-Conforming Work: Repair deficiencies identified in test results; patch damage to fireproofing material caused by other work of the Project before fireproofing material is concealed; or if exposed, before Substantial Performance.

.4 Frequency of Testing:

.1 Frequency of Thickness Testing to ASTM E605:

.1 Standard Rate: Measurements are generally required for every 1,000 sq.ft. (approx. 93 sq.m.) of applied material.

.2 Structural Members: Thickness shall be verified on at least 25% of the members (beams and columns) on each floor.

.3 Locations: as determined by inspection and testing agency.

.2 Frequency of Bond Strength Testing to ASTM E736:

.1 Field testing for cohesive and adhesive strength is required to ensure the material remains attached to the substrate.

.2 Testing shall be done at start of construction, midway, and at time of review for Substantial Performance of work.

.3 Locations: as determined by inspection and testing agency.

.3 Frequency of Density Testing to ASTM E605:

.1 Minimum 1 test per 10,000 sq.ft. (approx. 930 sq.m.); minimum 1 test for project.

.2 Locations: as determined by inspection and testing agency.

3.6 PATCHING

.1 Review continuity of existing fire-resistant material on existing structure in project scope area. Report damaged areas to Consultant and provide remediation proposal for review. In areas where damage is present, inspect encapsulated substrate (i.e. joist or steel decking) for damage prior to patching with new fire-resistant material.

.2 Patch and properly repair damage to fire resistant materials caused by testing, or by other trades, before fire resistant material is concealed, or if exposed, before final inspection.

3.7 CLEANING

.1 Progress Cleaning: Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment. Perform cleaning after installation to remove construction and accumulated dirt and debris.

.3 Manage and properly dispose of construction waste materials in accordance with governing legislation and local by-laws.

3.8 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.9 SCHEDULE

.1 Install as indicated on Drawings, or as otherwise required by code or requirements of authority having jurisdiction.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 02 07 50 – Cutting and Patching.

.3 Section 07 81 00 – Applied Fireproofing.

.4 Section 09 21 16 – Gypsum Board Assemblies.

.5 Divisions 21, 22 and 23 Work. Refer to Mechanical Drawings.

.6 Division 26 Work. Refer to Electrical Drawings.

.7 Other Sections as required by Ontario Building Code 2024.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM A653/A653M-25, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A1008/A1008M-25, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

.3 ASTM E119-26, Standard Test Methods for Fire Tests of Building Construction and Materials.

.4 ASTM E814-24, Standard Test Method for Fire Tests of Penetration Firestop Systems.

.5 ASTM E1966-24, Standard Test Method for Fire-Resistive Joint Systems.

.6 ASTM E2174-24, Standard Practice for On-Site Inspection of Installed Firestops.

.7 ASTM E2307-25b, Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus.

.8 ASTM E2393-24, Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.

.2 Firestop Contractors International Association (FCIA)

.1 FCIA Firestop Manual of Practice - 8th Edition (MOP).

.2 FM 4991, Standard for the Approval of Firestop Contractors, 2013.

.3 International Firestop Council (IFC)

.1 Recommended IFC Guidelines for Evaluating Firestop Systems in Engineering Judgments (EJs).

.2 Recommended IFC Guidelines for Evaluating Fire Stop Systems in Engineering Judgements on Fire Resistant Duct Enclosure Systems for Ventilation Ducts.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 SDS - Safety Data Sheets.

.5 UL Solutions in Canada (ULC)

.1 ULC Guide No. 40 U19, Firestop Systems; ULC Category Code Number XHEZC.

.1 ULC 101-14 (R2021), Standard Methods of Fire Endurance Tests of Building Construction and Materials (CAN-ULC-S101-14-REV3).

.2 ULC 102-18 (R2024), Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies (CAN-ULC 102-2019-(R2024)).

.3 ULC 114-18 (R2024), Standard Method of Test for Determination of Non-Combustibility in Building Materials (CAN-ULC-114-2018-(R2024)).

.4 ULC 115:2018 (R2023), Standard Method of Fire Tests of Firestop Systems (CAN-ULC-S115-2023).

.5 ULC 702.1-21, Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification (CAN-ULC S702.1-2021).

.6 ULC 702.2-15 (R2023), Standard for Mineral Fibre Thermal Insulation for Buildings, Part 2: Installation (ULC S702.2-15-(R2023)).

.7 ULC 1001-11 (R2025), Standard for Integrated Systems Testing of Fire Protection and Life Safety Systems (CAN/ULC S1001-2025).

.8 List of Equipment and Materials.

.6 UL Solutions (UL)

.1 UL 263, Fire Tests of Building Construction and Materials - Fourteenth Edition; Reprint with revisions through and including September 2, 2025.

.2 UL 1479-2026, Fire Tests of Penetration Firestops, Edition 4.

1.3 REGULATORY REQUIREMENTS

.1 Work of this Section shall comply with the following:

.1 FCIA Firestop Manual of Practice (MOP).

.2 Ontario Building Code 2024 and amendments (OBC).

.3 National Fire Code of Canada 2025 (NFC).

.2 In cases of conflict, the more stringent requirement applies as decided by Consultant at sole discretion.

.3 Building services that penetrate either a membrane forming part of an assembly required to have a fire-resistance rating, or a fire separation, shall be tightly fitted or sealed by a firestop system that conforms to ULC 115 and that has an F-rating at least equal to the fire protection rating required for closures in fire separations.

.4 Building services that penetrate a horizontal membrane forming part of a horizontal assembly required to have a fire-resistance rating, or a fire separation, shall be sealed by a firestop system that conforms to ULC 115 and that has an FT-rating at least equal to the fire resistance rating of the assembly.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with Contractor, Subcontractor's representative and Consultant in accordance with Section 01 10 00 - Summary to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Coordination with other building trades.

.4 Review manufacturer's installation instructions, and warranty requirements.

1.5 PERFORMANCE AND DESIGN CRITERIA

.1 Delegated Design Requirements: Design firestopping and smoke seals required by the Contract Documents to meet fire ratings indicated, and in accordance with requirements of the Ontario Building Code 2024 and amendments.

.2 Performance Requirements: Manufacturer shall design proprietary assemblies to withstand the listed ratings in accordance with the Ontario Building Code, Underwriters Laboratories Canada, and authorities having jurisdiction, and as follows:

.1 Provide through-penetration firestop and joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire resistance rating of assembly penetrated:

.1 Fire resistance rated load bearing walls, including partitions, with fire protection rated openings.

.2 Fire resistance rated non-load bearing walls, including partitions, with fire protection rated openings.

.3 Fire resistance rated floor assemblies.

.2 F-Rated Systems: Provide through penetration firestop systems with F-ratings indicated, as determined by ULC 115, but not less than that equalling or exceeding fire resistance rating of constructions penetrated.

.3 T-Rated Systems: For the following conditions, provide through penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per by ULC 115, where systems protect penetrating items exposed to potential contact with adjacent materials:

.1 Penetrations located outside wall cavities.

.2 Penetrations located outside fire resistive shaft enclosures.

.3 Penetrations located in construction containing fire protection rated openings.

.4 Penetrating items larger than 100 mm diameter nominal pipe or 100 cm^2 in overall cross sectional area.

.4 Firestopping and Smoke seals Systems Exposed To View: Systems exposed to view, traffic, moisture, and physical damage; provide products that after curing do not deteriorate when exposed to these conditions both during and after construction, and as follows:

.1 Provide moisture resistant through penetration firestop systems for piping penetrations for plumbing and wet pipe sprinkler systems.

.2 Provide firestopping and smoke seals systems capable of supporting floor loads involved either by installing floor plates or by other means for floor penetrations with annular spaces exceeding 100 mm in width and exposed to possible loading and traffic.

.3 Provide firestopping and smoke seals systems not requiring removal of insulation for penetrations involving insulated piping.

.4 Provide products with flame spread ratings of less than 25 and smoke developed ratings of less than 50 for firestopping and smoke seals and joint systems exposed to view.

.5 Fire Resistance of Joint Systems: Assembly ratings and movement capabilities indicated, but with assembly ratings not less than that equalling or exceeding fire resistance rating of constructions in which joints are located.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.1 Not later than 30 working days following Award of Contract, submit a schedule and shop drawings, including room numbers from the Contract Drawings. Indicate ULC assembly number for each condition, required temperature rise and flame rating, hose stream rating, thickness, installation methods and materials of firestopping and smoke seals, damming materials, reinforcements, anchorages and fastenings, size of opening, adjacent materials and number of penetrations. Include manufacturer's printed instructions for each type of penetration.

.2 Where possible determine thickness to be applied from tests of assemblies identical to the assembly to be protected, conducted in accordance with ULC 101.

.3 Engineering Judgements: where a UL / ULC / c-UL Design (assembly number) has not been issued, obtain an engineering judgement from the system manufacturer for a solution relevant to the job conditions involved, and obtain approval of the Authorities Having Jurisdiction.

.1 Determine system from available engineering studies, or correspondence with the labelling agency indicating the effect of the differences on the fire separation of the assembly. Confirm acceptance of system by Authorities Having Jurisdiction in writing.

.2 Obtain and submit fire stop system manufacturer's engineering judgement(s) meeting the requirements of Authorities Having Jurisdiction.

.3 Engineering judgements shall comply with "Recommended IFC Guidelines for Evaluating Firestop Systems in Engineering Judgments (EJs)."

.2 Submit product data in accordance with Section 01 33 00 – Submittal Procedures:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Quality assurance submittals: submit following in accordance with Section 01 33 00 – Submittal Procedures.

.1 Subcontractor shall obtain a training letter from the firestop system manufacturer, and submit it to Consultant prior to firestop installation.

.2 Submit copies of engineering judgments approved by local authorities having jurisdiction to Consultant prior to installation.

.3 The firestopping system manufacturer shall submit a letter of certification to the Contractor, certifying that all firestopping has been installed in compliance with the approved ULC design specifications for each type of penetration. Forward one copy to Consultant, and include one copy in each maintenance manual specified in Section 01 78 00 - Closeout Submittals.

.1 The 'Certificate of Substantial Performance' shall not be issued until Consultant has received the manufacturer's letter of certification from the Contractor indicating that all fire-stopping applications comply with the tested assemblies of the manufacturer.

.4 Submit the manufacturer's engineering judgment identification number(s) and Shop Drawing details when no ULC or cUL system is available for an application. Engineering judgments must include the Contract name and number, and the , Contractor's name, and Subcontractor's name.

.5 For those firestop applications that exist, for which no ULC or cUL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar ULC or cUL system designs or other tests shall be submitted to local Authorities Having Jurisdiction, with a copy to Consultant, for their review prior to installation. Engineering judgment Drawings must follow the requirements set forth by the IFC.

1.7 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer:

.1 Company or person specializing in fire stopping installations, and approved by the manufacturer with minimum 5-years' documented experience.

.2 Company or person shall be a member in good standing of the Firestop Contractors International Association (FCIA).

.2 Use materials and methods of determining required thickness of application that have the full acceptance of Authority Having Jurisdiction.

.3 Use materials tested to ULC 115. Assemblies containing the materials shall be in accordance with assemblies tested and approved by agencies acceptable to Authority Having Jurisdiction.

.4 Single Source Responsibility:

.1 Obtain through-penetration firestop and joint systems for each kind of penetration and construction condition From a single source of manufacture and installation responsibility.

.2 To the extent possible, firestop and smoke seal products shall be supplied by a single manufacturer and installed by a qualified FCIA installer for entire Contract (the Work).

.5 The manufacturer's direct technical representative (not distributor or agent) shall be on-site during the initial installation of the firestop systems to provide training to the installer's personnel in the proper product selection and installation procedures.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling, and unloading:

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, and ULC markings.

.2 Storage and Protection:

.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.3 Use stock before its expiration date.

1.9 PROJECT CONDITIONS

.1 Install firestopping and smoke seals materials only when the areas in which they are scheduled are closed-in and protected from dampness.

.2 Environmental Limitations: Install firestopping and smoke seals systems when ambient or substrate temperatures are within temperature and moisture limits permitted by firestopping and smoke seals system manufacturers or when substrates are not wet due to rain, frost, condensation, or other causes.

.3 Ventilate firestopping and smoke seals systems in accordance with manufacturer's written instructions by natural means or forced air circulation where natural means are not adequate.

Part 2 Products

2.1 MANUFACTURERS

.1 Acceptable Manufacturers: Subject to compliance with requirements specified in this Section and as established by the Standard of Acceptance Materials, manufacturers offering products that may be incorporated into the Work include; but are not limited to, the following:

.1 Hilti Canada Ltd.

.2 3M Canada Inc.

.3 A/D Fire Protection Systems Inc.

.4 Firestop Systems Inc.

.5 Nuco Self Seal Firestopping Products.

.6 Owens Corning.

.7 Specified Technologies Inc.

.8 Tremco Ltd.

2.2 FIRESTOPPING AND SMOKE SEALS: GENERAL

.1 Compatibility: Provide firestopping and smoke seals systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating firestopping and smoke seals systems, under conditions of service and application, as demonstrated by firestopping and smoke seals system manufacturer based on testing and field experience, and as follows:

.1 Service penetration assemblies: certified by ULC in accordance with ULC 115 and listed in ULC Guide No. 40 U19.

.2 Service penetration firestopping and smoke seals components: certified by ULC in accordance with ULC 115 and listed in ULC Guide No. 40 U19.13, under the Label Service of ULC.

.3 Fire resistance rating of installed firestopping and smoke seals assembly not less than the fire resistance rating of surrounding floor and wall assembly.

.4 Firestopping and Smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal; do not use cementitious or rigid seal at such locations.

.5 Firestopping and Smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal; do not use a cementitious or rigid seal at such locations. Exemption to fire dampers.

.2 Accessories: Provide components for each firestopping and smoke seals systems that are needed to install fill materials. Use only components specified by firestopping and smoke seals system manufacturer and approved by the qualified testing and inspecting agency for firestopping and smoke seals systems indicated. Accessories include, but are not limited to, the following items:

.1 Permanent forming, damming and backing materials, including the following:

.1 Slag or rock wool fibre insulation.

.2 Sealants used in combination with other forming, damming or backing materials to prevent leakage of fill materials in liquid state.

.3 Fire-rated form board.

.4 Fillers for sealants.

.2 Temporary forming materials.

.3 Substrate primers.

.4 Collars.

.5 Steel sleeves.

.6 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.7 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.8 Metal fire stop: Commercial galvanized steel, to ASTM A1008/A1008M, zinc coating 260 g/m^2, minimum metal core thickness 0.912 mm.

.9 Steel Deck Moulded Flute Inserts: One piece moulded mineral fibre flute inserts, sized for steel deck profiles, for placement at top of fire rated wall assemblies:

.1 Acceptable material: Hilti CP777 Speed Plugs.

.10 Labels: Peel-and-stick labels printed with the following information:

.1 ATTENTION: FIRE RATED ASSEMBLY. DO NOT MODIFY

.2 Name of firestopping manufacturer

.3 Names of products used

.4 Hour Rating of Assembly

.5 Manufacturers standard detail number, or Engineered Judgement identifier; ULC or $_{c}UL_{us}$ Number

.6 Date of installation

.7 Name of installing Trade Contractor

.8 Contact telephone number for repair or replacement of firestopping materials.

2.3 FILL MATERIALS

.1 General:

.1 Provide firestopping and smoke seals systems containing the types of fill materials indicated in the Firestopping and Smoke seals System Schedule below by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies

as fill, void, or cavity materials.

.2 Firestopping and smoke seal systems shall be tested in accordance with ULC 115, and be comprised of asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases, and not to exceed opening sizes for which they are intended for the ratings as indicated on drawings.

.2 Cast-in-Place Firestopping and Smoke seals Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

.3 Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

.4 Firestopping and Smoke seals Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrating item.

.5 Cable Penetration Devices: premanufactured fire rated cable pathway systems, the following products are acceptable:

.1 EZ-Path Fire Rated Pathway, Specified Technologies Inc.

.2 CP 653 Speed Sleeve, Hilti.

.6 Intumescent Composite Sheets: Rigid panels consisting of aluminum foil faced elastomeric sheet bonded to galvanized steel sheet.

.7 Intumescent Putties: Non-hardening dielectric, water resistant putties containing no solvents, inorganic fibres, or silicone compounds.

.8 Intumescent Spray Foam: Expanding spray-in-place intumescent foam sealant.

.9 Intumescent Wrap Strips: Single component intumescent elastomeric sheets with aluminum foil on one side.

.10 Mortars: Pre-packaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.

.11 Silicone Foams: Multi-component, silicone based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.

.12 Silicone Sealants: Moisture curing, single component, silicone based, neutral curing elastomeric sealants of grade indicated below:

.1 Grade for Horizontal Surfaces: Pourable (self-levelling) formulation for openings in floors and other horizontal surfaces.

.2 Grade for Vertical Surfaces: non-sag formulation for openings in vertical and other surfaces.

.13 Sealants, sprays, or pre-formed materials for use with fire-rated construction joints and other gaps. Refer to detail 1 on Drawing A410, & detail 1 on Drawing A421.

.1 Standard of Acceptance:

.1 Hilti Firestop Joint Spray (CFS-SP WB: water-based acrylic sealant spray.

.14 Mineral Wool Safing: Minmum 4PCF Density, compressed to 50% within joint.

2.4 ACCESSORIES

.1 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.2 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.3 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.

.4 Metal fire stop: Commercial galvanized steel, to ASTM A1008/A1008M, zinc coating 260 g/m^2, minimum metal core thickness 0.95 mm (20 ga.).

2.5 MIXING

.1 For those products requiring mixing before application, comply with firestopping and smoke seals system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

Part 3 Execution

3.1 EXAMINATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.

.1 Ensure that substrates and surfaces are clean, and dry.

.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 without interruption to air vapour barrier.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's printed installation instructions, technical datasheets, details and specifications.

3.3 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.

.2 Ensure that substrates and surfaces are clean, and dry.

.3 Prepare surfaces in contact with firestopping materials and smoke seals to manufacturer's instructions.

.4 Maintain insulation around pipes and ducts penetrating fire separation without interruption to air vapour barrier.

.5 Mask where necessary to avoid spillage and over-coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.4 INSTALLATION

.1 Apply firestopping materials to correspond with tested assemblies, or acceptable calculation procedures to provide following fire resistance ratings:

- .1 Floor assemblies shall be fire separations with fire-resistance rating of not less than 1 hour.
- .2 Loadbearing walls, columns and arches shall have a fire-resistance rating not less than that required for the supported assembly.
- .3 Other fire ratings as indicated, refer to Building Code Review.

.2 Install firestopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.

.3 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.4 At electrical boxes installed at gypsum board fire separations, Provide firestop back coating on box.

.5 Provide firestopping assemblies at joints and penetrations at acoustically rated separations (refer to Drawings) as required to achieve and maintain a minimum Sound Transmission Class (STC) of 60.

.6 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.7 Tool or trowel exposed surfaces to neat finish.

.8 Remove excess compound promptly as work progresses and upon completion.

3.5 SPECIAL REQUIREMENTS

.1 Install firestop at rated and unrated fire separations; pack perimeters and holes full depth using mineral slag fibrous insulation firestop, and then install firestop membrane/sealant as required; firestop at deflection caps at both rated and unrated fire separations; back coat electrical boxes at fire rated partitions, including application of firestop mouldable putty pads and firestop coatings meeting Code; outlet boxes and fittings at fire separations shall ULC, cUL or cULus classified fire-resistant for fire rating matching rating of assembly.

.2 Location of special requirements for firestopping and smoke seal materials at openings and penetrations in fire-resistant rated assemblies are as follows:

- .1 Designed for re-entry, removable at: electrical wiring and communications cable penetrations through partitions.
  - .1 Use Prefabricated Firestop Sleeves or prefabricated Cable Pathways.

3.6 SEQUENCING

.1 Proceed with installation only when submittals have been reviewed by Consultant.

.2 Install mechanical and electrical services prior to firestopping. Firestopping shall not be installed at these locations until the electrical and mechanical installations have been reviewed and accepted by Consultant.

.3 Install floor firestopping before interior partition erections.

.4 Mechanical pipe insulation: certified fire stop system component.

.1 Ensure pipe insulation installation precedes fire stopping.

3.7 FIELD QUALITY CONTROL

.1 Inspections: notify Consultant when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of firestop and smoke seal work, in handling, installing, applying, protecting and cleaning of product, and submit Manufacturer's Field Reports to Consultant.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits with manufacturer to review Work before Work is closed-in to permit review.

3.8 PROJECT RECORD DOCUMENTATION

.1 At completion of fire stopping work, update Schedule and Shop Drawings submitted in accordance with the requirements of item 1.6.1.1 of this specification Section 07 84 00 – Firestopping and Smoke Seals.

.2 Ensure that each location that firestopping has been applied is recorded along with all applicable fire stop information.

.3 Ensure that each application of firestopping is documented with location and installation details provided.

.4 At the location of each application of firestop, secure an identification label at both sides of penetration in a convenient, easy to read location, that documents the product used, manufacturer, installer, date of install, and the ULC assembly number involved.

.5 Submit updated Schedule and Shop Drawings in accordance with the requirements of Section 01 32 00 – Construction Progress Documentation, including accurate as-built information.

3.9 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.10 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.11 SCHEDULE

.1 Install firestopping and smoke seals at fire resistance rated assemblies as required.

.2 Meet or exceed the requirements of Ontario Building Code as amended and National Fire Code as amended, and as follows:

.1 Firestop and smoke seal at:

.1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.

.2 Intersection of fire-resistance rated masonry and gypsum board partitions.

.3 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.

.4 Around mechanical and electrical assemblies penetrating fire separations.

.5 Rigid ducts: greater than 129 cm2: firestopping to consist of bead of firestopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

.6 Other locations shown on Drawings and/or as required to achieve and maintain required fire separations.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 06 40 00 – Finish Carpentry and Casework.

.3 Section 09 21 16 – Gypsum Board Assemblies.

.4 Other technical sections as required

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM C834-17(2023), Standard Specification for Latex Sealants.

.2 ASTM C919-24, Standard Practice for Use of Sealants in Acoustical Applications.

.3 ASTM C920-18(2024), Standard Specification for Elastomeric Joint Sealants.

.4 ASTM C1193-25, Standard Guide for Use of Joint Sealants.

.5 ASTM C1330-23, Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.

.6 ASTM C1521-19(2025), Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.

.7 ASTM D2240-15(2021), Standard Test Methods for Rubber Property, Durometer Hardness.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Safety Data Sheets (MSDS).

.3 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1168, Adhesive and Sealant Applications (amended November 4, 2022).

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings: convene pre-installation meeting 48-hours prior to beginning work of this Section, with Manufacturer's representative and Subcontractor's representative in accordance with Section 01 10 00 – Summary to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Joint condition and profile.

.4 Inspection of surfaces and joints.

.5 Compatibility of materials.

.6 Backing materials.

.7 Coordination with other building trades.

.8 Review manufacturer's installation instructions, and warranty requirements.

.2 Submit written report of meeting to Consultant.

1.4 COORDINATION

.1 Coordinate work of this specification section with interfacing and adjoining work for proper sequencing of each sealant installation and to provide moisture and water migration resistance, durability of the work, and protection of materials and finishes.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Manufacturer's product technical datasheets and literature to describe:

.1 Caulking compound.

.2 Primers.

.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.4 Submit 2 copies of WHMIS SDS.

.3 Samples:

.1 Submit 2 samples of back-up material, primer, joint fillers, and each type and colour of sealant to be used. Cure samples under conditions anticipated at the site during application

.4 Manufacturer's Instructions:

.1 Submit instructions to include installation instructions for each product used.

1.6 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 – Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.7 QUALITY ASSURANCE

.1 Installer Qualifications: Company or person specializing in joint sealant installations, with minimum 5 years documented experience.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements,.and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground, protected from the elements, in dry location and in accordance with manufacturer's recommendations.

.2 Store and protect joint sealants from damage.

.3 Replace defective or damaged materials with new.

1.9 SITE CONDITIONS

.1 Ambient Conditions:

.1 Proceed with installation of joint sealants only when:
- .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
- .2 Joint substrates are dry.
- .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.2 Joint-Width Conditions:

.1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

1.10 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.

.2 Ventilate area of work by use of approved portable supply and exhaust fans.

1.11 WARRANTY

.1 Submit manufacturer’s warranty in accordance with the requirements of Division 01 – General Requirements, made out in Owner’s name, for each Product specified.

.2 Contractor agrees to correct any deficiencies of labour or material found in the work performed for a period of 2-years from date of Substantial Performance.

Part 2 Products

2.1 MANUFACTURERS

.1 Acceptable Materials: Use products meeting the requirements of this Section and suitable to the application to which the sealant is to be applied, selections restricted to the manufacturers listed below:
- .1 Master Builders Solutions (previously BASF, Sonneborn).
- .2 Chemtron Manufacturing Ltd.
- .3 DuPont
- .4 Dow.
- .5 Euclid Chemical.
- .6 Momentive Performance Materials Canada Inc.
- .7 MAPEI Inc.
- .8 Pecora
- .9 Sika Canada Inc.

.10 Tremco Canada Inc.

.11 W.R. Meadows Canada.

.2 Use materials as received from manufacturer without additives or adulteration. Use one manufacturer's product for each Type specified. Where sealant applications cross or contact each other, ensure compatibility, maintenance of physical properties and performance characteristics, and continuity of seal.

2.2 GENERAL

.1 Use materials as received from manufacturer without additives or adulteration.

.2 Use one manufacturer's product for each Type specified.

.3 Where sealant applications cross or contact each other, ensure compatibility, maintenance of physical properties and performance characteristics, and continuity of seal.

.4 Joint sealants and caulking shall be commercial-grade.

2.3 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off-gas time.

.3 Where sealants require primers for suitable adhesion to substrate, use manufacturer’s recommended primer.

.4 Unless otherwise specified, VOC content limits of sealants shall be in accordance with SCAQMD Rule 1168 and as follows:

.1 Architectural Materials:

.1 Sealants: VOC content limit 250 g/L.

.2 Sealant Primers for Non-Porous Surfaces: VOC content limit 250 g/L.

.3 Sealant Primers for Porous Surfaces: VOC content limit 775 g/L.

.2 Roofing:

.1 Non-Membrane Related Sealants: VOC content limit 300 g/L.

.2 SBS Membrane Sealant Primer: VOC content limit 500 g/L.

.3 All Other Applications:

.1 Sealants: VOC content limit 420 g/L.

.2 Sealant Primers: VOC content limit 750 g/L

2.4 SEALANT MATERIAL DESIGNATIONS

.1 Type S-1: Acrylic Latex One Part, Shore A Hardness 20, to ASTM C834.

.1 Acceptable Materials:

.1 Latacalk, Chemtron.

.2 MasterSeal NP 520 (formerly Sonolac), Master Builders Solutions.

.3 Tremflex 834, Tremco Canada.

.2 Type S-2: Silicone Sealants; mould and mildew resistant.

.1 To ASTM C920: type S; grade NS; class 50; use NT, M, G, A, and O.

.1 Acceptable Materials:

.1 Spectrem® 3, Tremco Canada.

.2 DOWSIL™ 790 Silicone Building Sealant, Dow.

.2 To ASTM C920: type S; grade NS; class 50; use NT, G, and A.

.1 Acceptable Materials:

.1 Multiseal, Chemtron.

.2 DOWSIL™ 795 Silicone, Dow.

.3 SCS2000, Momentive.

.4 895 NST, Pecora

.5 Spectrem 2 Silicone, Tremco Canada.

.3 To ASTM C920: type S; grade NS; class 100/50; use NT, G, and A.

.1 Acceptable Materials:

.1 DOWSIL™ 790 Silicone, Dow.

.2 SilPruf SCS 2000, Momentive.

.3 890 NST, Pecora

.4 Spectrem 1 Silicone, Tremco Canada.

.4 To ASTM C920: type S; grade NS; class 25; use NT, G, and A.

.1 Acceptable Materials:

.1 OmniPlus, Master Builders Solutions.

.2 DOWSIL™ 786 Silicone, Dow.

.3 SCS1700, Momentive.

.4 898 NST, Pecora

.5 Tremsil 200, Tremco Canada.

.3 Type S-3: Silicone Sealant; general construction and air-seal sealant.

.1 To ASTM C920: type S; grade NS; class 25; use NT, M, G, A, O.

.1 Acceptable Materials:

.1 DOWSIL™ 790 or DOWSIL™ 795 Silicone, Dow.

.4 Type S-4: Silicone Sealant; structural glazing.

.1 To ASTM C920: type S; grade NS; class 25; use NT, A, G, O.

.2 Acceptable Materials:

.1 DOWSIL™ 995 Silicone, Dow.

.2 SSG4000, Momentive.

.3 860, Pecora

.4 Proglaze SSG, Tremco Canada.

.5 Type S-5: Acoustical Sealant; interior, non-skimming, non-hardening, single component synthetic rubber sealant.

.1 Acceptable Materials:

.1 Metaseal, Chemtron.

.2 AIS 919, Pecora

.3 Acoustical Sealant, Tremco Canada.

.6 Type S-6: Multi-component polyurethane sealant; chemical curing, exterior wall sealant.

.1 To ASTM C920: type M; grade NS; class 50; use T, NT, M, A, O.

.2 Acceptable Materials:

.1 MasterSeal NP2, Master Builders Solutions.

.2 Thioplast 400, Chemtron.

.3 Iso-Flex 830, LymTal International.

.4 Dynatrol II, Pecora

.5 Sikaflex 2c NS, Sika.

.6 Dymeric 240FC, Tremco Canada.

.7 Type S-7: Single-component polyurethane or hybrid sealant; non-sag, for general construction.

.1 To ASTM C920: type S; grade NS; class 25; use NT, M, A, O, T.

.2 Acceptable Materials:

.1 MasterSeal NP 1 or NP 150, Master Builders Solutions.

.2 Multiflex, Chemtron.

.3 Mapeflex P1, MAPEI Inc.

.4 Dynatrol I-XL Hybrid, Pecora

.5 Sikaflex 1a or SikaHyflex 150LM, Sika.

.6 Dymonic FC, Tremco Canada.

.7 Pourthane NS, W.R. Meadows Canada.

.8 Type S-8: Control joint sealant: two-component, epoxy-urethane, self-levelling, load bearing saw cut or preformed control joints.

.1 Basis-of-Design Materials:

.1 Loadflex, Sika.

.9 Type S-9: Control joint sealant: two-component, semi-rigid epoxy, load bearing, self-levelling sealant.

.1 Acceptable Materials:

.1 Dural 340 SL, Euclid Chemical.

.2 Rezi-Weld Flex, W.R. Meadows Canada.

.10 Type S-10: Wet area applications, etc.: two-component, gun-grade, slump-resistant elastomeric polyurethane sealant, specially formulated for sealing joints in water-immersion conditions, and highly resistant to biodegradation by both aerobic and anaerobic bacteria; to ASTM C920, Type M, Grade NS, Class 25, use T, NT, M, G, A, O; certified to ULC 115; Canadian Food Inspection Agency acceptance.

.1 Acceptable Materials:

.1 Sikaflex 2c NS EZ Mix, by Sika Canada.

.2 Sikaflex 2c NS EZ Mix TG, by Sika Canada (traffic grade option).

.11 Type S-11: Single-component polyurethane sealant; medium-modulus, non-sag, low-VOC, UV stable.

.1 To ASTM C920: type S; grade NS; class 50; use NT, T, M, A, O, I.

.2 Acceptable Materials:

.1 Multiflex, Chemtron.

.2 Vulkem 116, Tremco Canada.

.3 Dymonic 100, Tremco Canada.

2.5 ACCESSORIES

.1 Preformed compressible and non-compressible back up materials that are non-staining, compatible with joint substrate, sealants, primers, and other joint fillers, and are approved for applications indicated by sealant manufacturer based on site experience and laboratory testing.

.1 Rod Type Sealant Backings:

.1 ASTM C1330, Type B (soft bi-cellular polyethylene foam material with a surface skin).

.2 Use any of the preceding types, as approved in writing by joint sealant manufacturer for joint application indicated.

.3 Size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

.4 Non adhering to sealant, to maintain two-sided adhesion across joint.

.2 High Density Foam: Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m3 density, or neoprene foam backer, size as recommended by manufacturer.

.3 Bond Breaker Tape.

.1 Polyethylene bond breaker tape which will not bond to sealant.

.2 Preformed Sealants

.1 Preformed Silicone Sealant System: Manufacturer's standard system consisting of pre-cured low modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral curing silicone sealant for bonding extrusions to substrates:

.1 Acceptable Materials:

.1 Dow; 123 Silicone Seal.

.2 Momentive; UltraSpan US1100.

.3 Tremco Canada; Spectrem® Simple Seal.

.3 Primer: Non-staining type as recommended by sealant manufacturer.

.4 Cleaning Solvents: Non-dulling, residue-free solvents acceptable to sealant manufacturer and compatible with substrates; oil-free.

.1 Non-oily contamination: anhydrous isopropyl alcohol, 99% purity minimum.

.2 Oily contamination: xylene, toluene, or VM&P naphtha.

.3 Do not use solvents containing water, detergents, or re-oiling agents.

2.6 COLOURS

.1 Sealant colour: confirm sealant selections with Consultant prior to ordering materials. Colours shall be selected by Consultant from manufacture’s full range, and as follows:

.1 Sealants at all locations to match colour of adjacent exposed material.

.2 Where colour match choice is unclear, Consultant will decide.

2.7 SEALANT SELECTION

.1 Where no specified type of sealant is shown or specified, choose one of the sealants specified in this Section appropriate for its location.

.2 Make sealant selections consistent with manufacturer's recommendations.

.3 Use acrylic sealant Type S-1 only on the interior and only in situations where little or no movement can occur.

.4 Use mould & mildew resistant silicone sealant Type S-2 for non-moving joints in washrooms and kitchens. Do not use on floors.

.5 Use general construction sealant Type S-3 or Type S-6 and S-7 for all joints, interior and exterior, where no other specific sealant type specified. Use Type S-6 for joints over 19 mm.

.6 Use structural glazing silicone Type S-4 for sealing glass, interior and exterior.

.7 Use acoustical sealant Type S-5 and air seal sealant Type S-3 only where they will be fully concealed and only where no constant or consistent air pressure difference will exist across the joint; apply acoustical sealants in accordance with ASTM C919.

.8 Use multi-component sealant type S-6, primed penetration element surfaces other than concrete.

.9 Use control joint sealant S-8 as filler for interior only, horizontal saw cut or preformed control joints where joints are subject to load bearing conditions.

.10 Use control joint sealant S-9 as filler for interior, horizontal saw cut or preformed control joints where joints are subject to thermal shock conditions, traffic loops, and where a high bond strength is required.

.11 Use joint sealant S-10 for exterior door thresholds, and wet areas.

.12 Use sealant S-11 for sealing exterior holes and penetrations around pipes and other services passing through concrete foundations and requiring greater movement capability.

Part 3 Execution

3.1 PROTECTION

.1 Protect installed Work of other trades from staining or contamination.

3.2 EXAMINATION

.1 Carefully inspect surfaces, materials to receive sealants and verify they are physically capable of retaining sealant bond.

.2 Verify that fillers and backing provided under other Sections properly installed.

.3 Grind joint surfaces if required to achieve adequate surface preparation.

3.3 PREPARATION

.1 Prepare surfaces in accordance with manufacturer's instructions.

.2 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.3 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.4 Use air stream to blow out dirt and water from crevices.

.5 Ensure joint surfaces are dry and frost free.

.6 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.7 Prime all porous material (e.g. wood, masonry, concrete, ceramic tile, etc).

.8 Prime other joints when recommended by manufacturer. Use a brush that will reach all parts of the joints. Mask adjoining surfaces with tape prior to priming to prevent staining.

3.4 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.5 BACKUP MATERIAL

.1 Use backer rod as specified, to limit depth of sealant and to act as bond breaker at back of joint.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

.3 Where depth of joint does not permit the use of backer rod apply polyethylene bond breaker tape to back of joint to act as bond breaker.

.4 Ensure that no joints are formed which are bonded on adjacent sides where there is any possibility of movement.

3.6 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions

3.7 APPLICATION

.1 Apply sealant in accordance with ASTM C1193 and in strict accordance with manufacturer’s recommendations.

.2 For joints where movement is possible, apply backer rod to achieve a joint depth of one half the joint width but not less than 9 mm; for joints larger than 25 mm use a depth of 13 mm.

.3 Use pressure gun fitted with suitable nozzle. Use sufficient pressure to fill voids and joints solid.

.4 Form surface of sealant smooth, free from ridges, wrinkles, sags, or air pockets and imbedded impurities. Neatly tool surface to a slight concave appearance.

.5 Tool sealants to achieve air tight joints. Use wet tools as required.

.6 Ensure bead is solid, filling entire space between sides and bedding material, exerting sufficient pressure to obtain maximum bond, by allowing sealant to bulge out in advance of nozzle.

.7 Apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within recommended temperature range.

.8 Seal perimeters of hollow metal door frames on both sides.

.9 Seal control joints in gypsum board and stucco, and junctures between interior partitions with exterior walls.

.10 Seal window and door frames around the inside perimeter, so that an airtight seal is obtained, as indicated on drawings.

.11 Seal joints in floors and walls and around service and mechanical and electrical fixture penetrations.

.12 Seal at all locations where dissimilar material meet.

.13 Curing

.1 Cure sealants in accordance with sealant manufacturer's instructions.

.2 Do not cover up sealants until proper curing has taken place.

.3 On porous surfaces allow sealant to cure overnight, and remove excess by light wire brushing.

3.8 FIELD ADHESION TESTING

.1 Field test joint sealant adhesion to substrates in the presence of Consultant as follows:

.1 Extent of Testing: test completed and cured sealant joints as follows:

.1 Perform 10 tests for the first 300 m of joint length for each kind of sealant and joint substrate.

.2 Perform 1 test for each 300 m of joint thereafter or 1 test per each floor per elevation.

.2 Test Method: test joint sealants according to method A, Field-Applied Sealant Joint Hand Pull Tab, Appendix X1, ASTM C1193 or Method A, Tail Procedure, ASTM C1521.

.1 For joints with dissimilar substrates, verify adhesion to each substrate separately. Extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

.3 Inspect tested joints and report on finding for the following requirements:

.1 Joint cavities filled and free of voids.

.2 Sealant dimensions and configurations comply with sealant manufacturer’s data sheet and printed installation requirements.

.3 No adhesive or cohesive failure noted during pull tests per ASTM criteria. Include data on pull distance used to test each kind of product and joint substrate.

.4 Record tests results in a field-adhesion test log. Include dates when sealants were installed, name of worker responsible in each instance, test dates, test locations, whether joints were primed or not, adhesion results and percent elongations, sealant fill, sealant configuration and dimensions.

.5 Repair sealant test locations by applying new sealants following approved preparation and application procedures.

.2 Evaluation of Field Adhesion Test results:

.1 Sealants passing ASTM pull-tests and compliant with specifications will be considered satisfactory.

.2 Remove sealants that fail adhesion tests or do not meet specifications, and apply in accordance with approved preparation and application requirements.

.3 Retest re-applied sealants until test results are satisfactory and sealant application is compliant.

3.9 CLEANING

.1 Clean adjacent surfaces immediately and leave Work neat and clean.

.2 Compatibility of the solvent with the surface must first be established and confirmed before cleaning with any solvent.

.3 On non-porous surfaces (e.g., sheet metal, glass, etc.) a two-cloth cleaning method should be used. The first cloth has a solvent applied and is wiped on the surface, followed immediately by a second clean white cloth to collect any re-deposited material loosened by the first cloth. Some solvents perform better than others in cold weather because they will pick up residual moisture; longer flashing solvents are better in warm weather.

.1 Cold-weather application (ambient temperature below 5 degrees C): use fast-evaporating, water-miscible solvent (isopropyl alcohol) to remove residual moisture and frost film from substrate.

.2 Warm-weather application: slower-evaporating solvents (xylene, naphtha) are acceptable where required for degreasing.

.3 Prefinished metal surfaces (PVDF, SMP, and polyester coil coatings): use isopropyl alcohol only, unless coating manufacturer confirms in writing that aromatic solvents will not soften, dull, or discolour finish. Perform test wipe at inconspicuous location before general cleaning.

.4 Protection: mask adjacent finished surfaces where required to prevent contact with solvent, primer, and uncured sealant; remove masking immediately after tooling.

.4 Remove excess and droppings, using substrate manufacturer's recommended cleaners as work progresses.

.5 Remove masking tape after initial set of sealant.

.6 Correct staining and discolouring of adjacent surfaces as directed by Consultant.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 07 92 00 – Joint Sealants.

.3 Division 08 – Door Hardware and Door Hardware Schedule.

.4 Section 08 80 50 – Glazing.

.5 Section 09 91 00 – Painting.

.6 Division 28: Electrical Safety and Security.

.7 Refer to Door Schedule, and Interior Screen Elevations on Drawings, and coordinate with adjacent construction as required.

1.2 REFERENCES

.1 American National Standards Organization (ANSI) / Steel Door Institute (SDI)

.1 ANSI/SDI A250.3-2025, Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames.

.2 ANSI/SDI A250.8-2023, Specifications for Standard Steel Doors and Frames 9SDI-100).

.3 ANSI/SDI A250.10-2025, Test Procedure and Acceptance Criteria For Prime Painted Steel Surfaces for Steel Doors and Frames.

.2 ASTM International (ASTM)

.1 ASTM A653/A653M-25a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A780/A780M-20, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

.3 ASTM A879/A879M-22, Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface.

.4 ASTM A924/A924M-25a, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.5 ASTM C553-24, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications

.6 ASTM C578-23, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

.7 ASTM C591-22, Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.

.8 ASTM C1289-25, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

.9 ASTM D1622-20, Standard Test Method for Apparent Density of Rigid Cellular Plastics.

.10 ASTM D4726-24, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Exterior-Profile Extrusions Used for Assembled Windows and Doors.

.11 ASTM D6386-22, Standard Practice for Preparation of Zinc (Hot Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.

.12 ASTM D7396-25, Standard Guide for Preparation of New, Continuous Zinc-Coated (Galvanized) Steel Surfaces for Painting.

.13 ASTM E336-25a, Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings.

.14 ASTM E413-22, Classification Rating Sound Insulation.

.3 Builders Hardware Manufacturers Association (BHMA)

.1 BHMA A156.16-2023, Auxiliary Hardware.

.4 CSA Group (CSA)

.1 CSA G40.20-13/G40.21-13 (R2023), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel, Includes Update No.1 (2014).

.2 CSA W47.1:25, Certification of companies for fusion welding of steel.

.3 CSA W59:24, Welded Steel Construction.

.5 Canadian Steel Door Manufacturers' Association (CSDMA)

.1 CSDMA, Guide Specification for Installation and Storage of Hollow Metal Doors and Frames, 2025.

.2 CSDMA, Recommended Specifications for Commercial Steel Doors and Frame Products, 2025.

.3 CSDMA, Recommended Selection and Usage Guide for Commercial Steel Doors, 2025.

.6 Glazing Association of North America (GANA):

.1 GANA Glazing Manual, International Year of Glass (IYOG) Edition, December 2022.

.7 International Organization for Standardization (ISO)

.1 ISO 12944-2:2017, Paints and Varnishes – Corrosion Protection of Steel Structures by Protective Paint Systems – Part 2: Classification of Environments.

.8 National Fire Protection Association (NFPA)

.1 NFPA (Fire) 80, Standard for Fire Doors and Other Opening Protectives, 2025 Edition.

.2 NFPA (Fire) 252, Fire Tests of Door Assemblies, 2022 Edition.

.9 The Society for Protective Coatings (SSPC)

.1 SSPC-PS 12.01-02, One Coat Zinc-Rich Painting System.

.2 SSPC-PS Guide 12.00-07, Guide to Zinc-Rich Coating Systems.

.10 UL Solutions in Canada (ULC)

.1 ULC 104-15 (R2025), Standard Method for Fire Tests of Door Assemblies (CAN-ULC-104-2015-(R2025)).

.2 ULC 105:2016 (R2026), Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC 104 (CAN-ULC-105-2016-(R2026)).

.3 ULC 106-15 (R2025), Standard Method for Fire Tests of Window and Glass Block Assemblies (CAN-ULC-106-2015-(R2025)).

.4 ULC 702.1:2021, Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification (CAN-ULC-S702.1-2021).

.5 ULC 702.2-15 (R2023), Standard for Mineral Fibre Thermal Insulation for Buildings, Part 2: Installation (ULC S702.2-15-(R2023)).

.6 ULC 704.1-26, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced (CAN-ULC-704.1-2026)

.7 ULC 705.1-18 (R2021), Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density - Material – Specification (CAN-ULC-S705.1-2018-REV1)

.8 ULC 705.2-22, Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density – Application (CAN-ULC-705.2-2022)

1.3 DESIGN RESPONSIBILITY

.1 The design, engineering, procurement, fabrication and erection of the specified assemblies as required to meet these performance specifications shall be the complete responsibility of the Contractor.

.2 The ultimate support for all door installations is the building's structural elements. The Contractor is responsible for the design, fabrication and installation of all aspects of the required doors including direct support methodology to the building's structural elements

1.4 ACTION AND INFORMATION SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheets for each type of door and frame specified to meet performance requirements listed in paragraph 2.1 PERFORMANCE AND DESIGN CRITERIA.

.3 Submit shop drawings:

.1 Indicate general construction of each type of door and frame, configurations, material, material thickness, jointing methods, mortises, reinforcements, anchors, tie-ins to adjacent assemblies/ systems, arrangement of hardware, fire ratings, finish and special features.

.2 Reference door and frame types to Door Schedule on Drawings. Indicate door numbers where applicable.

1.5 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for cleaning and maintenance of finishes for incorporation into manual specified in Section 01 78 00 – Closeout Submittals

1.6 QUALITY ASSURANCE

.1 Manufacturer/Fabricator: member in good standing of the Canadian Steel Door and Frame Manufacturer's Association.

.2 Installer: Use installers who are experienced with the installation of hollow metal doors and frames of similar complexity and extent to that required for the Project.

.3 Manufacture door and frame assemblies to ANSI/SDI A250.8.

.4 Preconstruction Testing: Provide fire-labelled frame products for those openings requiring fire protection ratings, as scheduled:

.1 List by nationally recognized agency having factory inspection service and construct as detailed in Follow-up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements, and as follows:

.1 Receive and store materials as recommended by materials manufacturer.

.2 2. Inspect and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Consultant. Remove and replace damaged items that cannot be repaired as directed.

.3 Adequately protect surfaces from damage during moving, handling and storage.

1.8 MOCK-UPS

.1 Construct mock-up in accordance with Section 01 40 00 - Quality Requirements.

.2 Construct a mock-up of a typical door assembly at the entrance to the mid-sized classroom (RM 4333) to establish a standard of construction, workmanship, and appearance, and for the purpose of testing security hardware.

.3 Do not continue with work of this Section until Consultant has approved mock-up.

.4 Accepted mock-up may remain part of Work.

Part 2 Products

2.1 PERFORMANCE AND DESIGN CRITERIA

.1 Perform work in accordance with CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, except as otherwise specified herein.

.2 Provide doors and frames complying with ANSI A250.8 for quality and ANSI A250.4 for physical-endurance level.

.3 Steel fire rated doors and frames: Label and list fire rated doors and frames by an organization accredited by the Standards Council of Canada in conformance with CAN/ULC S104 and CAN/ULC S105 for ratings indicated. Fire labels must be factory-applied by the manufacturer.

2.2 ACCEPTABLE MANUFACTURERS

.1 All Steel Doors 2000Ltd,

.2 Apex Industriest Inc,

.3 Artek Door (1995) Ltd,

.4 Daybar Industried Ltd,

.5 Fleming-Baron Door Products,

.6 Gensteel Doors

2.3 MATERIALS

.1 Steel:

.1 Doors and frames to be Made in Canada or a Product of Canada.

.2 Doors and frames: coated steel sheets to ASTM A924/M924; coating designation to ASTM A653/A653M: Commercial Steel (CS), Type B, ZF180 galvannealed; stretcher levelled.

.2 Nominal Base Metal Thickness Requirements:

.1 Frames: refer to frame fabrication requirements specified in this section.

.2 Doors: refer to door fabrication requirements specified in this section.

.3 Hardware Reinforcement for Doors and Frames: Carbon steel, welded in place, prime painted, to the following minimum nominal thicknesses:

Hardware Reinforcement	Door (mm)	Frame (mm)
Pivot Hinge:	4.20	4.20
Mortise Hinge:	3.51	3.51
Mortise or Bored Lock or Deadbolt:	1.98	1.98
Flush or Surface Bolt Front:	1.98	1.98
Surface or Concealed Closer:	2.74	2.74
Strike Reinforcements:	1.98	1.98
Hold Open Arm:	1.98	1.98
Electronic Hardware Reinforcements:	1.98	1.98
Pull Plates and Bars:	1.30	1.30
Mortar Box:	--	0.84
Surface Exit Devices:	1.98	1.98
Door Surface Hardware Reinforcements:	1.30	1.30
Frame surface hardware reinforcements:	2.74	2.74

.3 Door Core Materials

.1 Honeycomb: Structural small cell 25 mm maximum. kraft paper honeycomb:

.1 Weight: 36.3 kg/ream minimum.

.2 Density: 16.5 kg/m^3 minimum.

.3 Sanded to required thickness.

.2 Polystyrene: Rigid extruded, closed cell insulation, fire retardant treated meeting the requirements of ULC S701, Type 4, minimum thermal resistance RSI 0.8/25 mm thickness.

.3 Polyurethane: rigid, cellular type, board, conforming to ASTM D1622, or foamed-in-place, 1.8 pound per cubic foot (29 kilograms per cubic meter) density minimum, containing no urea formaldehyde resins.

.1 Temperature Rise Rated (TRR): core composition shall provide the fire-protection rating and limit the temperature rise on the unexposed side of door at 250°C for 30 or 60 minutes as determined by Ontario Building Code. Core shall be tested as part of a complete door assembly in accordance with CAN/ULC S104 covering the Standard Method of Tests of Door Assemblies and shall be listed by a nationally recognized testing agency having a factory inspection service.

2.4 ADHESIVES

.1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.

.2 Polystyrene cores: heat resistant, epoxy resin based, low viscosity, contact cement.

.3 Interlocking Edge Seam Adhesive: fire-resistant, resin-reinforced polychloroprene, high-viscosity, sealant/adhesive.

2.5 ACCESSORIES

.1 Coordinate with the Division 08 door hardware Section to ensure that all hardware groups required are provided and installed.

.2 Door silencers (bumpers): Black neoprene, to ANSI/BHMA A156.16 Type 6-180; three silencers on strike jambs of single door frames; two silencers on heads of double door frames; screw fastener applied. Stick on bumpers are not acceptable.

.3 Provide Pemko Door Bottoms to function as acoustic seals; refer to door hardware schedule and groups.

.4 Interior top caps: rigid polyvinylchloride extrusion, to ASTM D4726.

.5 Fabricate glazing stops as formed channel, minimum 16 mm (0.63”) height, accurately fitted, butted at corners, and fastened to frame sections with counter-sunk oval head sheet metal screws.

.6 Make provisions for glazing as indicated and provide necessary glazing stops.

.1 Provide removable glazing beads.

.7 Metallic paste filler: to manufacturer's standard.

.8 Fasteners: tamperproof type 316 stainless steel screws with countersunk flat head.

.9 Labels for fire doors and door frame: brass plate, riveted to door and door frame.

.10 Labels for acoustic doors and frames indicating the Sound Transmission Classification rating (STC).

.11 Joint Sealants: Section 07 92 00 – Joint Sealants.

.12 Glazing: Section 08 80 50 – Glazing.

2.6 FABRICATION - GENERAL

.1 Welded construction: assemble units by welding in accordance with CSA W59 to produce a finished unit square, true, and free of distortion. Welding shall be continuous unless specified otherwise. Welding shall be undertaken only by a fabricator fully approved by the Canadian Welding Bureau to the requirements of CSA W47.1.

.2 Permit access by an approved inspection and testing company for the purpose of inspecting at random, doors being fabricated for this project.

.3 Make provisions in doors and frames to suit requirements of trade or section providing electrically operated hardware or security devices. Provide removable plates or knock outs for electrical contacts. Provide junction boxes on security door frames as required for door strikes, mag locks and door contacts. Ensure frames arrive on site prepared for wiring.

.4 Fabricate galvanized steel channels to reinforce frames as required for size. Extend reinforcements from floor to structure above. Design top connection to accommodate structural deflection. Conceal reinforcements in frames.

.5 Interior frames: (16ga) 1.5mm minimum for single doors; (14ga 1.98mm for fames with opening width in excess of 1220mm; slip-on type construction (welded type construction for fire-rated applications). (1.5") 38mm face standard frame profile, throat and frame width to suite wall construction. Knock-down frames are not allowed.

.6 Fabricate all rated doors, frames and screens to fire rating labelling authority standard.

2.7 FABRICATION – DOORFRAMES AND SCREEN FRAMES

.1 Fabricate frames in accordance with CSDMA specifications.

.2 Accurately form frames to profiles indicated. Construct frames straight and free from twist or warp.

.3 Fabricate frames of ZF120 coated steel unless otherwise indicated.

.4 Temperature Rise Rated (TRR): core composition shall provide the fire-protection rating and limit the temperature rise on the unexposed side of door at 250°C for 30 or 60 minutes as determined by Ontario Building Code. Core shall be tested as part of a complete door assembly in accordance with CAN/ULC S104 covering the Standard Method of Tests of Door Assemblies and shall be listed by a nationally recognized testing agency having a factory inspection service

.5 Interior frames: (16ga) 1.5 mm minimum for single doors; (14ga) 1.98 mm for fames with opening width in excess of 1220 mm; slip-on type construction (welded type construction for fire-rated applications). (1.5") 38 mm face standard frame profile, throat and frame width to suite wall construction. Knock-down frames are not allowed.

.6 Provide welded type pressed steel door frame and screen components in minimum thickness of 1.5mm (16 gauge).

.7 Assemble components with accurately cut joints. Mitre outside corner joints of frames. Continuously weld joints on inside of profile and grind welds, flush and sand to smooth uniform surface; tabbed and spot-welded connections are not acceptable.

.8 Provide recessed sheet steel panels, bases, and covers, where indicated, minimum 2 mm thick. Weld panels, bases, and covers to perimeter framing in concealed manner where possible; where welds are exposed, provide continuous welds. Reinforce or laminate panels, bases, and covers as required to provide a flat uniform surface.

.9 On factory-assembled frame product, provide two removable steel jamb spreaders welded to the base of the jambs or mullions to maintain alignment during shipping and handling. Remove spreaders prior to anchoring frames to floor.

.10 Brace frame units to prevent distortion and protect finish during shipment.

.11 Install three bumpers in interior frames at single opening latch jambs, and two at double door frame heads.

.12 Provide mullions and rails of closed construction type. For fixed condition, attach members to frame with butt-welded joints. For removable condition, attach members with removable mullion anchors.

.13 Conceal fastenings unless otherwise indicated.

.14 Fasten removable stops by counter-sunk Phillips head screws at approximately 225mm (9") on centre symmetrically space on stop length.

.15 Form Door stops and glass stops integrally with frame and not added as a separate profile.

.16 Anchor frames to floor by 1.6 mm (0.063") thick adjustable base clips, welded to frame and Provide with 2 holes for floor anchorage.

.17 Provide minimum 3 mm (1/8”) anchors for connection to adjacent floor and wall construction. Each wall anchor shall be located immediately above or below each hinge reinforcement on the hinge jamb and directly opposite the strike jamb. On each jamb, install 2 anchors for openings up to and including 1525 mm (60") high and install 1 anchor for each additional height of 610 mm (24") of height or fraction thereof, except as indicated below. Frames placed in previously placed concrete, masonry or structural steel shall be Provided with anchors located not more than 150 mm (6") from top and bottom of each jamb, and intermediate anchors at 660 mm (26") on centre maximum. Fasteners for such anchors shall be provided by Section 06 20 00. Anchors for stainless steel frames shall be Type 316L stainless steel.

.18 Secure frames set in previously constructed concrete or masonry openings by countersunk expansion bolts at same centres as for adjustable Tee wall anchors. Reinforce frame at fastening location to prevent indentation of frame by fastening device. Provide steel sleeves between frame and wall.

.19 Protect strike and hinge reinforcements using guard boxes welded to frames at masonry construction. Provide guard boxes welded to frame at hinges, strikes, door alarm contacts, switches, and other hardware items recessed into frames.

.20 Reinforce head of frames wider than 1220mm (48") with steel angles or channels.

.21 Prepare door frames for security system contacts. Coordinate with Division 28.

.22 Hardware reinforcements shall be minimum thicknesses as specified herein, not including frame thickness. Provide reinforcement at hardware fastening points. Provide high frequency (angle type) reinforcement at hinges. Provide full height reinforcement of thicknesses at hinge side of frames with continuous hinges.

.23 Provide hollow-metal door frame infill pieces as noted on drawings

2.8 FRAME ANCHORAGE

.1 Provide appropriate anchorage to floor and wall construction.

.2 Where frames terminate at finished floor, supply floor plates for anchorage to slab. Check depth of extension of finished floor to structural slab and provide jamb extension anchorage as required. Provide 50 mm (2”) minimum adjustment

.3 Locate wall anchors immediately above or below each hinge reinforcement on the hinge jamb, and directly opposite on the strike jamb. Provide three anchors per jamb for frames up to 2300 mm (7’-6”). Add one anchor per jamb for each additional 760 mm (30”) or fraction thereof in frame height.

.4 Locate anchors for frames in existing openings not more than 150 mm (6”) from top and bottom of each jambs and intermediate at 660 mm (26”) on centre maximum.

2.9 FRAMES: WELDED TYPE

.1 Locations: at all new construction.

.2 Welding in accordance with CSA W59.

.3 Cut frame mitres accurately and weld on inside of frame profile. Fill frame corners, exposed surface depressions and butted joints with air drying paste filler. Sand to a smooth uniform finish. Touch up damaged galvanized finish with zinc rich primer.

.4 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.

.5 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.

.6 Securely attach floor anchors to inside of each jamb profile.

.7 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

2.10 DOOR FABRICATION: GENERAL

.1 Doors: swing type, flush, with provision for openings as indicated.

.2 Fabricate doors with longitudinal edges locked seamed with adhesive and spot-welded for larger doors. Seams: not visible, grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish. Bevel both stiles of single doors 1 in 16.

.3 Top and bottom of doors shall be provided with inverted, recessed, nominal 1.60 mm (0.063”) steel end channels; nominal 2.74 mm (0.1”) steel end channels for acoustic doors, welded to each face sheet at 150 mm (6”) O/C.

.4 Equip top and bottom of acoustic doors with nominal 1.60 mm (0.063”) continuous flush steel non-removable end caps welded securely in place.

.5 Provide fixed transoms, side panels and base panels where indicated or scheduled of same materials, gauge, thickness, construction and finish as door. Reinforce transoms and panels to prevent oil canning. Install transoms and panels with concealed fastenings and reinforce to accommodate hardware as required. Seal joint between transom or panel airtight. Provide accurately formed ship lap joint between door and transom panel where no transom rail occurs.

.6 Mortise, reinforce, drill, and tap doors to receive templated hardware, security, and electrical devices.

.7 Reinforce doors where required, for surface mounted hardware. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.

.8 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.

.9 Cut-outs: Where openings are required, provide integrally formed cut-outs with steel framing, and closely fitted steel glass and grille stops, as required. Mitre corners of stops. Drill and countersink fasteners symmetrically at 150 mm o.c. Supply and install coated steel stops, with same coating type and thickness as doors. Screw stops in place.

.10 Supply and install steel vent grilles in doors where indicated.

.11 Fabricate doors with a clearance of 1/8” (3 mm) to the frame and 1/4” (6 mm) to completed floor finish or threshold, except at openings in non-fire rated separations where undercuts are indicated.

.12 Provide flush top and bottom steel edge on doors to stair shafts.

.13 Provide touch-up primer at areas where zinc coating has been removed or damaged during fabrication.

.14 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in conformance with CAN/ULC S104 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

.15 Manufacturer's nameplates on doors are not permitted.

2.11 FABRICATION: INTERIOR DOORS

.1 Face sheets: Minimum 1.2 mm base steel sheet thickness.

.2 Core: honeycomb core laminated under pressure to each face sheet.

.3 Longitudinal edges mechanically interlocked, adhesive assisted with edge seams continuous welded, sanded flush with no visible seam.

2.12 FABRICATION: FIRE RATED DOORS

.1 Fabricated in accordance with CAN/ULC S104-15 and NFPA 80.

.2 Face sheets: Minimum 1.6 mm (0.063”) base steel sheet thickness.

.3 Stiffened and sound deadened with honeycomb core laminated under pressure to each face sheet.

.4 Longitudinal edges mechanically interlocked; adhesive assisted with edge seams continuous welded, sanded flush with no visible seam.

.5 Equip pairs of fire labelled doors with minimum 2.7 mm (0.105") steel surface mounted flat bar astragal, shipped loose for application on site.

.6 Glass and glazing to be included in overall fire rating of assembly as required by OBC.

.7 Labelled by Underwriters Laboratories of Canada, ITS/Warnock Hersey, or other testing laboratory approved by the authority having jurisdiction.

2.13 LAMINATED CORE CONSTRUCTION

.1 Form face sheets for interior doors from 1.6 mm sheet steel with honeycomb core laminated under pressure to face sheets.

2.14 FRAMES

.1 Provide welded dust boxes at latch side of frames.

2.15 PRIMER

.1 Factory prime doors, to ANSI/SDI A250.10.

.2 Touch-up primer: Commercial rust inhibitive primer, shop prime coat doors and frames before delivery; grey or red coloured primer; in accordance with Section 09 96 53 – Powder Coating. Clear primer not acceptable; provide primer for field touch-up.

2.16 FINISHING

.1 Remove weld slag and splatter from exposed surfaces

.2 Fill and sand smooth tool marks, abrasions and surface blemishes to present smooth uniform surfaces. Prepare surfaces for field painting to ASTM D6386 and ASTM D7396 and Section 09 91 00 - Painting.

2.17 PAINT

.1 Shop paint steel doors and frames in accordance with Section 09 96 53 – Powder Coating. Provide final finish free of scratches or other blemishes.

.2 Colour: Contractor to provide powder-coated samples of each of the RAL colours listed below, for consultant to select one. All doors will be same colour.

.1 RAL 7016 - Anthracite Grey

.2 RAL 7021 - Black Grey

.3 RAL 7024 - Graphite Grey

2.18 ISOLATION COATING

.1 Dielectric Separator/Isolation Coating.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 EXAMINATION

.1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work means acceptance of existing conditions

3.3 ISOLATION COATING

.1 Apply isolation coating to contact surfaces in contact with cementitious materials, wood materials, and dissimilar metals.

.2 Apply into all drilled holes, onto all fasteners (e.g., bolts, screws, rivets) and between all flat surfaces (e.g., behind door handles, hinges, lamp-housings, diamond plate, mirror housing, latches, brackets, door trim, frame rails, suspension mounts, etc).

.3 Generally, 2 – 3 mil thickness is required per application. Each application needs enough product applied so that excess material “oozes out” during assembly (this will ensure you have created a proper seal).

.4 Assemble and wipe away any excess product.

3.4 INSTALLATION GENERAL

.1 Install fire rated doors and frames in accordance with requirements of NFPA 80.

.2 Install doors and frames to, CSDMA Guide Specification for Installation and Storage of Hollow Metal Doors and Frames.

3.5 MODIFICATION TO EXISTING HOLLOW METAL FRAMES - INFILL COMPONENTS:

.1 Where frame infill is indicated on the drawings, provide a hollow metal frame infill piece, matching profile depth, thickness and finish of existing hollow metal frame.

.2 Scribe infill piece to suit profile of existing frame.

.3 Create tight seams with reinforced metal filler.

.4 Finish filler frame to match existing.

3.6 MODIFICAITON TO EXISTING HOLLOW METAL FRAMES & DOORS TO SUIT NEW HARDWARE:

.1 Where indicated on the Door Schedule and Door Hardware Schedule, modify existing Hollow Metal Frames and Doors to suit proposed hardware.

.2 Verify existing field conditions, door and frame construction, existing reinforcements, and hardware preparations prior to commencing work.

.3 Remove existing hardware and fill, repair, and refinish abandoned holes, cut-outs, mortises, and preparations to restore surfaces to a neat and serviceable condition.

.4 Reinforce doors and frames as required to accommodate new hardware and to maintain the structural integrity of the assembly.

.5 Prepare doors and frames in accordance with the manufacturer's templates and hardware supplier's recommendations.

.6 Provide welded steel filler plates where existing preparations exceed the size required for new hardware. Grind welds smooth and refinish to match adjacent surfaces.

.7 Maintain the fire-resistance rating and listed performance of rated door and frame assemblies. Modifications shall comply with the requirements of the applicable listing agency and authority having jurisdiction.

.8 Adjust, align, and test modified assemblies to ensure proper operation, clearances, latching, locking, and closing performance.

.9 Touch up damaged finishes and refinish modified areas to match the existing adjacent finish.

3.7 FRAME AND SCREEN INSTALLATION

.1 Set frames and screens plumb, square, level and at correct elevation.

.2 Frame Tolerances: Install frames to tolerances listed in ANSI A250.11, and as follows:

.1 Squareness: Maximum (1/16”) 1.6 mm measured across opening between hinge jamb and strike jamb.

.2 Plumbness: Maximum (1/16”) 1.6 mm measured from bottom of frame to head level.

.3 Alignment: Maximum (1/16”) 1.6 mm measured offset between face of hinge jamb and strike jamb relative to wall construction.

.4 Twist: Maximum (1/16”) 1.6 mm measured from leading edge of outside frame rabbet to leading edge of inside frame rabbet.

.3 Coordinate with other trades as required for door hardware and any security installations required, and for tying-in to adjacent thermal, air and vapour control systems.

.4 Secure anchorages and connections to adjacent construction.

.5 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 4” (1200 mm) wide. Remove temporary spreaders after frames are built-in.

.6 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.7 Install hollow metal window frames and partition screens at interior locations as indicated.

.8 Install door silencers.

.9 Caulk perimeter of frames between frame and adjacent material.

3.8 DOOR INSTALLATION

.1 Fit hollow metal doors accurately in frames within clearances required for proper operation, shim as necessary for proper operation. Install as specified in ANSI A250.8

.2 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Division 08: Door Hardware.

.3 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.

.1 Hinge side: 1.0 mm.
.2 Latchside and head: 1.5 mm.
.3 Finished floor, top of carpet, non-combustible sill, or thresholds: 6 mm.

.4 Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

.5 Adjust operable parts for correct function.

3.9 FINISH REPAIRS

.1 Touch-up areas where galvanized coating has been removed or damaged with primer.

.2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.10 GLAZING

.1 Install glazing for doors and frames in accordance with Section 08 80 50 – Glazing.

3.11 ADJUSTING

.1 Adjust doors for smooth, easy, free-swinging operation and balanced door movement.

3.12 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.13 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.14 SCHEDULE

.1 Install as indicated; refer to Door Schedule on Drawings.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section specifies access door and panel requirements.

.2 Refer to Mechanical & Electrical Drawings.

1.2 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 06 10 00 – Rough Carpentry.

.3 Section 06 20 00 – Finish Carpentry and Casework.

.4 Section 09 21 16 – Gypsum Board Assemblies.

.5 Section 09 22 00 – Non-Structural Metal Stud Framing.

.6 Section 09 91 00 – Painting.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for access door components and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

.2 Drawings for Hinged Wood Slat Access Panel to show:

.1 location of each item, dimensioned plans and elevations, large scale details, attachment devices, and other components.

.2 Details of construction, profiles, jointing, fastening and other related details.

.3 All hardware components

.3 Submit catalogue details for each type of door illustrating profiles, dimensions and methods of assembly.

.4 Samples:

.1 Submit for review and acceptance of each unit.

.2 Samples will be returned for inclusion into work.

.3 Submit 1 of each type of hand entry access door.

.4 Submit one 300 x 300 mm corner sample of each type of body entry door.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 – Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for cleaning and maintenance of finishes for incorporation into manual.

1.5 MOCKUPS

.1 Construct mock-up for each type of wood grille access panel

.2 Construct full-size mock-up on site using specified materials and hardware required to complete the work, and as follows:

.1 Place mock-up in location

.2 Provide minimum 48 hours of notice in advance of mock-up review by consultant

.3 Demonstrate smooth operation of access panel, integration with surrounding wood slat ceiling to avoid conflicts, and meeting the Client's security standards.

.4 Obtain Consultant’s acceptance of mock-up, allow 48-hours after acceptance before proceeding with Work.

.5 Mock-up may form a part of the completed work when accepted by the Consultant.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect access doors from damage and nicks, scratches, and blemishes.

Part 2 Products

2.1 NON-RATED CONCEALED GLASS FIBER REINFORCED GYPSUM DOORS AND ACCESS PANELS FOR CEILINGS AND WALLS (GFRG)

.1 Architectural, flush mounting access panels for gypsum board installation, thickness and fire rating to match assembly, manufacturer’s standard sizes selected to suit project conditions and access requirements.

.2 Material: GFRG.

.3 Hinge: hidden continuous piano hinge.

.4 Lock / Latch: hex head cam lock.

.5 Finish: Factory prime painted.

.1 Ceiling: Finish to match adjacent surface.

.6 Gaskets: neoprene.

.7 Sizes:

.1 Fan access in scope 2: 24" x 24" (610mm x 610mm)

.2 FCU access in Scope 3: 60" x 24" (1524mm x 610mm)

.3 Above wood-slat access panels in Scope 3 ceiling: 24" x 12"

.4 Except as indicated otherwise, to be minimum sizes as follows:

.1 For body entry: 30” x 30” (760 x 760 mm).

.2 For hand entry: 24” x 24” (600 x 600 mm).

.8 Construction:

.1 Wall access doors:

.1 Material: GFRG.

.2 Style: seamless / concealed.

.3 Square corners, concealed hinges, hex head cam lock, able to open 180°.

.9 Standard of Acceptance:

.1 Best Access Doors,

.2 Castle Access Panels

.3 approved similar with same or better physical properties, appearance and functionality.

2.2 METAL ACCESS DOORS AND PANELS FOR CEILINGS AND WALLS

.1 Architectural, flush mounting access panels for gypsum board installation, thickness and fire rating to match wall assembly, manufacturer’s standard sizes selected to suit project conditions and access requirements, complete with extruded aluminum frame, concealed hinge and a removable door panel, airtight gasket and hex head cam lock mechanism.

.2 Fire resistance rated and regular as required to match rating of adjacent assembly.

.3 Material: 16-gauge cold rolled steel.

.4 Hinge: hidden continuous piano hinge.

.5 Lock / Latch: hex head cam lock.

.6 Primer: factory-applied white powder coat. Trade contractor to finish paint on site to colour to match adjacent surface.

.7 Gaskets: neoprene.

.8 Dielectric Separator / Isolation Coating: CRL Black Bituminous Paint – aerosol or paint, by C.R. Laurence of Canada, or approved equivalent.

.9 Sizes: Except as indicated otherwise, to be minimum sizes as follows:

.1 For body entry: 610 x 610 mm.

.2 For hand entry: 305 x 305 mm.

.10 Construction:

.1 Wall access doors:

.1 Material: Prime coated steel.

.2 Rounded safety corners, concealed hinges, screwdriver latch, and anchor straps, able to open 180°.

.11 Acceptable Materials:

.1 Acudoor Products Inc.

.2 Bauco Products Incorporated.

.3 Best Access Doors.

2.3 FIRE-RATED ACCESS PANELS FOR WALLS AND CEILINGS

.1 Fire-resistance rated access panel:

.1 Sizes: Except as indicated otherwise, to be minimum sizes as follows:

.1 For body entry: 30” x 30” (760 x 760 mm).

.2 For hand entry: 24” x 24” (600 x 600 mm).

.2 Fire-Rating: 1 hour.

.3 Standard of Acceptance:

.1 Best Access Doors, 36” x 36” Fire-Rated Access Panel Insulated – Mud Flange, BAC-FRI-DF-36-36.

.4 Construction: 16-gauge cold rolled steel door and 20-gauge galvannealed steel frame.

.1 Hinge: Continuous piano hinge

.2 Locking Mechanism: Self-latching tool-key operated slam and ring-operated slam latch; both included

.3 Flange: 1” exposed, perforated flanges of cold-rolled steel.

.4 Frame: 2-½" in depth made of cold rolled steel.

.5 Finish: High-quality white powder coat primer.

2.4 TORSION SPRING WOOD GRILLE CEILING ACCESS PANEL

.1 Description of work: Field modify existing prefabricated wood grille ceiling panel using a Torsion-spring access panel kit where wood grille ceiling assembly does not include Gypsum wallboard in the assembly.

.2 Standard of Acceptance: Armstrong Ceilings - Field Created Torsion Spring Access Door.

.3 Required Components (quantities listed per access panel):

.1 Torsion Spring Saddles (Item #7104): Quantity: 4

.2 Torsion Spring Bracket (Item #7105): Quantity: 4

.3 Torsion Springs (Item #7106): Quantity: 8

.4 #10 x 1/2" Wood Screw: Quantity: 4

.5 #8 x 3/4" Self Tapping Screw: Quantity: 4

.6 Safety Cable: Quantity: 2

.4 Follow manufacturer installation instructions for access panel under Armstrong's "Woodworks Grille - Forte, Assembly and Installation Instructions Manual"

2.5 HINGED WOOD GRILLE CEILING ACCESS PANEL.

.1 Description of work: Field modify existing prefabricated wood grille ceiling panel using a series of heavy duty mortise hinges, locking cleats, and a safety cable. For use in areas of wood grille ceiling assembly that does include gypsum wallboard in the ceiling assembly.

.2 Required Components

.1 (3/4") 19mm wide heavy duty mortise hinge, finish to match colour of support slat. Quantity: 3

.2 Screws and Hardware as required to suit hinge

.3 Heavy Duty Cam-lock: Quantity: 3. Load Capacity: 100lbs per lock.

.4 Safety Cable: Quantity: 2.

Part 3 Execution

3.1 ISOLATION COATING

.1 Apply isolation coating to contact surfaces in contact with cementitious materials, wood materials, and dissimilar metals.

.2 Apply isolation coating into all drilled holes, onto all fasteners (e.g., bolts, screws, rivets) and between all flat surfaces (e.g., behind door handles, hinges, lamp-housings, diamond plate, mirror housing, latches, brackets, door trim, frame rails, suspension mounts, etc).

.3 Generally, 2 – 3 mil thickness is required per application. Each application needs enough product applied so that excess isolation coating “oozes out” during assembly (this will ensure you have created a proper seal).

.4 Assemble and wipe away any excess product.

3.2 INSTALLATION

.1 Installation: Install GFRG, Metal Access Panels, Torsion Spring Wood Grille Access Panels and Hinged Wood Grille Access Panels in accordance with manufacturer’s printed installation instructions, installation details and illustrations, and technical datasheets.

3.3 LOCATIONS

.1 Locations: ensure that equipment is within view and accessible for operating, inspecting, adjusting, servicing without using special tools.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Construction Waste Management. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.6 SCHEDULE

.1 Consult Drawings and locate where access through walls and ceilings are required and/or shown. Exact locations determined by Consultant.

.2 Install GFRG access panels at gypsum board assemblies. Finish to match adjacent finish.

.3 Install metal access panels at gypsum board assemblies where indicated. Finish to match adjacent finish.

.4 Install fire-rated access panels at gypsum board assemblies. Finish to match adjacent finish.

.5 Install torsion-spring wood grille ceiling access panels at wood grille ceiling assemblies where indicated.

.6 Install hinged wood grille ceiling access panels at wood grille ceiling assemblies where indicated.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Fire-rated windows, including perimeter trim, accessories, shims and anchors, and perimeter sealing of framing.

.2 Required rating: as indicated on Drawings.

.3 Application: interior.

.4 Construction, finish and colour as per Drawings.

1.2 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 07 84 00 - Firestopping and Smoke Seals.

.3 Section 07 92 00 - Joint Sealants.

.4 Section 08 80 50 - Glazing.

.5 Refer to Drawings.

1.3 REFERENCES

.1 Aluminum Association (AA)

.1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 ASTM International (ASTM)

.1 ASTM A1008/A1008M-26, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.

.2 ASTM A1011/A1011M-25, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

.3 ASTM E119-26, Standard Test Methods for Fire Tests of Building Construction and Materials.

.3 American Welding Society (AWS)

.1 AWS D1.3/D1.3M:2025, Structural Welding Code - Sheet Steel.

.4 Builders Hardware Manufacturers Association (BHMA)

.1 BHMA A156 STANDARDS SET, Complete Set of 39 BHMA Standards (A156 Series).

.5 Fenestration & Glazing Industry Alliance

.1 AAMA 611-26, Specification for Anodized Architectural Aluminum.

.6 National Association of Architectural Metal Manufacturers (NAAMM)

.1 AMP 500-06, Metal Finishes Manual for Architectural and Metal Products.

.7 National Fire Protection Association (NFPA):

.1 NFPA (Fire) 80: Standard for Fire Doors and Other Opening Protectives, 2025 Edition.

.2 NFPA (Fire) 252: Fire Tests of Door Assemblies, 2022 Edition.

.3 NFPA (Fire) 257: Standard on Fire Test for Window and Glass Block Assemblies, 2022 Edition.

.8 UL Solutions (UL):

.1 ANSI/UL 9-09 (R2024): Standard for Fire Tests of Window Assemblies.

.2 ANSI/UL 10 B-08 (R2024): Standard for Fire Tests of Door Assemblies.

.3 ANSI/UL 10 C-16 (R2025): Positive Pressure Fire Tests of Door Assemblies.

.4 ANSI/UL 263-11 (R2025): Fire tests of Building Construction and Materials.

.5 ANSI/UL 752-2023: Ratings of Bullet-Resistant Materials.

.9 UL Solutions in Canada (ULC)

.1 ULC 101-14 (R2021), Standard Methods of Fire Endurance Tests of Building Construction and Materials (CAN-ULC-S101-14-REV3).

.2 ULC 104-15 (R2025), Standard Method for Fire Tests of Door Assemblies (CAN-ULC-104-2015-(R2025)).

.3 ULC 106-15 (R2025), Standard Method for Fire Tests of Window and Glass Block Assemblies (CAN-ULC-106-2015-(R2025)).

.10 American National Standards Institute (ANSI):

.1 ANSI Z97.1-2026: For Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

.11 Consumer Product Safety Commission (CPSC):

.1 CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials.

.12 American Society of Civil Engineers (ASCE)

.1 ASCE 7-22: Minimum Design Loads and Associated Criteria for Buildings and Other Structures.

1.4 DESIGN RESPONSIBILITY

.1 Drawings and details are diagrammatic and are intended to show design concept, configuration, components and arrangements; they are not intended to identify nor solve completely the problems of thermal and structural movements, air pressure equalization, air and vapour barriers, assembly framing, fixings and anchorages, moisture disposal, water penetration, orientation of walls, shading factors, size and shape of glazing, and problems at the glass line associated with glazing installation, movements, and pressure fracture.

.2 The design, engineering, procurement, fabrication and erection of the aluminum framing assemblies, as required to meet these performance specifications shall be the complete responsibility of the Contractor.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit required items in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and technical data sheet.

.2 Submit product data indicating construction details, material descriptions, dimensions of individual components and profiles, finishes, anchorage and fasteners, glass and infill, internal drainage details.

.3 Submit shop drawings:

.1 Submit shop drawings, signed and sealed (Engineer's Stamp) by the delegated design engineer licenced to practice in the Province of Ontario, detailing fabrication and assembly of glazed aluminum windows clearly indicating all construction details including; but not limited to, the following:

.1 Fully dimensioned layouts for positioning of secondary support members and anchorage of tie-back devices to structures;

.2 Large scale details of members and materials, of brackets and anchorage devices and of connection and jointing details;

.3 Fully dimensioned layouts for positioning of brackets and anchorage devices to structures;

.4 Dimensions, gauges, thicknesses;

.5 Type, size and spacing of fastening devices;

.6 Glazing details;

.7 Acoustic control details, aluminum alloy and temper designations, metal finishing specifications and other pertinent data and information;

.8 Show details of connecting work of this section with work of adjacent sections.

.4 Submit system test reports.

.5 Submit sealant compatibility and adhesion test report.

.6 Submit samples:

.1 Submit samples of materials for Consultant's verification of specified finishes including; but not limited to, the following:

.1 300 mm x 450 mm for sheets, plates and glass;

.2 300 mm long for extrusions and formed or rolled shapes;

.3 300 mm long for tapes and gaskets;

.4 150 mm long for sealants;

.5 Samples shall fully represent physical and chemical properties, finish, and colours of materials to be supplied.

.7 Information Submittals: Provide the following:

.1 Delegated Design Submittals: Submit letters of commitment and compliance as follows:

.1 Provide Letter of Commitment in conjunction with shop drawings, signed and sealed by the professional engineer required by the Work of this Section indicating the following are designed to the intent of the Building Code:

.1 Glazed aluminum framing connections to building structure.

.2 Glazed aluminum framing reinforcement.

.3 Deflection of members.

.4 Glass thickness as it relates to glass area.

.2 Provide Letter of Compliance, signed and sealed by the professional engineer required by the Work of this Section indicating that connections, reinforcement and deflection criteria, and glass thickness of installed system is in compliance with the intent of the Building Code and reviewed shop drawings before declaration of Substantial Performance.

.2 Engineering Calculations:

.1 Submit engineering calculations as described hereinafter and in the General Conditions.

.2 Engineering calculations shall be submitted concurrently with the corresponding Shop Drawings.

.3 Glass Structural Calculations shall include analysis of structural silicone secondary seals in consideration of pressure difference between surrounding atmosphere and cavity, using appropriate load combinations.

.4 All calculations shall bear the stamp of a professional engineer registered in the Province of Ontario.

.3 Sealant Data:

.1 Submit product information on the sealants to be used, complete with all recommendations and installation instructions, including cleaning and priming procedures.

.2 Submit sealant manufacturer's test reports on adhesion to metal and glass production samples tested in accordance with ASTM C794, 7-day cure and 7-day water submersion, tensile strength at 100% elongation and bite size of sealants.

.3 Submit sealant manufacturer's compatibility statement that all materials in contact with the sealants are compatible with the sealants in accordance with procedures of ASTM C1087.

.8 Submit sealant manufacturer's verification that sealants are suitable for purposes intended.

.9 Test Reports:

.1 Prior to commencement of the work of this Section, submit test reports showing compliance with specified performance characteristics and physical properties including air infiltration, water infiltration, structural performance and thermal cycling.

.2 Submit thermal simulation reports prepared by an NFRC certified modeller showing total system U-values. Provide reports for 2 representative areas of the Project as selected by the Consultant.

.10 Closeout Submittals: Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Submittals and as follows:

.1 Submit data for cleaning of aluminum finishes and maintenance of structural silicone glazing system and operational hardware;

.2 Instruction for replacement of glass units (insulating and structural glass).

1.6 MOCK-UPS

.1 Construct mock-up in accordance with Section 01 40 00 - Quality Requirements.

.2 Construct mock-up 10 m^2 minimum to indicate method of assembly, installation and fixing.

.3 Allow for inspection of mock-up by Consultant before proceeding with work.

.4 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.

1.7 QUALITY ASSURANCE

.1 Engage the services of a professional engineer (P.Eng.) licensed to practice in Ontario to design systems, and review installation, in accordance with the most recent published edition of the Ontario Building Code (OBC).

.2 Certifications: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Fire rated glass shall meet OBC requirements and requirements of authorities having jurisdiction.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect glass doors, partition panels, and guard panels from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.9 PROJECT CONDITIONS

.1 Obtain field measurements prior to fabrication of frame units. If field measurements will not be available in a timely manner coordinate planned measurements with the work of other sections.

.2 Note whether field or planned dimensions were used in the creation of the shop drawings.

.3 Coordinate the work of this section with others effected including but not limited to: other interior components and door hardware beyond that provided by this section.

1.10 WARRANTY

.1 Provide manufacturers written guarantee, signed and issued in the name of Owner, to replace the following items for defective material and workmanship for the time stated from date of Substantial Performance:

.1 Aluminum finish, meeting standard set out in AAMA 2605: 10 years.

.2 Framing, panels and glazing: failure of performance requirements specified in Contract Documents; 2 years.

.3 Sealants, caulking: failure to maintain seal; 5 years.

.4 Aluminum brake shapes: oil canning and delamination; 2 years.

.2 Provide Warranty for aluminum framing systems to include in maintenance manuals as specified in Section 01 78 00 – Closeout Submittals.

Part 2 Products

2.1 STANDARD OF ACCEPTANCE

.1 Manufacturer Glazing Material: "Pilkington Pyrostop®" 60-101 fire-rated glazing as manufactured by the Pilkington Group and distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 phone (800.426.0279) fax (425.396.8300) e-mail sales@fireglass.com, website http://www.fireglass.com

.2 Frame System: "Fireframes® Aluminum Series" fire-rated frame system as manufactured and supplied by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 phone (800.426.0279) fax (425.396.8300) e-mail sales@fireglass.com website http://www.fireglass.com

2.2 PERFORMANCE AND DESIGN CRITERIA

.1 Work of this Section includes supply and installation of fire rated glazed aluminum-framed screens and doors, and related accessories and Work as required for a complete installation. Refer to Drawings for required fire resistance ratings.

.2 System Description:

.1 Fire-rated glazed wall, window and door systems, dual aluminum cover cap format.

.2 Fire Rating Required: 60 minutes.

.3 Face width: 50 mm.

.4 Custom extruded aluminum cover caps.

.5 Duration: walls, windows and doors in fire rated assembly shall provide a fire resistance rating equal to that noted on Drawings.

.6 Glass, doors, screens, windows and door hardware in fire resistance rated assemblies must be supplied care of a single manufacturer, clearly labelled, with the resulting assembly and system meeting fire resistance rating requirements equal to that noted on the Drawings.

.3 Delegated Design: have work of this Section designed by a Professional Engineer (P.Eng.) licensed to design structures and registered in the Province of Ontario.

.4 Design Work of this Section to meet or exceed the requirements of the OBC, CSA A500, and requirements of authorities having jurisdiction.

.5 Structural Performance: where assemblies function as a ‘Guard’ as defined by the OBC, provide assemblies capable of withstanding the following minimum structural loads without exceeding allowable design working stress of materials for guards, anchors, and connections:

.1 Guard assembly shall withstand the following minimum loads:

.1 Concentrated load of 890 N applied at any point and in any direction.

.2 Uniform load of 730 N/m applied horizontally and vertically downward.

.3 22 N on 0.093m^2 perpendicular to guard at any location.

.4 Wind loads 1.2 kPa or as otherwise specified on structural Drawings.

.5 Concentrated and uniform loads above need not be assumed to act concurrently.

.6 Maximum deflection at top of guard is height/24.

.6 Minimum Erection Tolerances:

.1 Design and install assemblies to accommodate tolerances of related work not included in this section. This requirement is in addition to building structure movements and deflections.

.2 Fabricate components to provide a plumb, square, level and true installation, and to accommodate allowable tolerances for work of other sections upon which work of this section depends.

.3 Erection tolerances for frame assemblies relate to the structural grid of the building, and apply to each individual assembly as follows:

.1 Vertical position: +3 mm;

.2 Horizontal position: +3 mm;

.3 Deviation from plumb: 3 mm maximum each plane;

.4 Offset from true alignment between two identical members abutting end to end in line: 0.8 mm;

.5 Tolerances shall not be accumulative;

.6 Erection tolerances for operable elements: consistent with smooth operation and weatherproof performance.

.7 Design assemblies and connections to meet or exceed OBC requirements without failure or damage to any component in assembly.

.8 Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

.9 Maintain profiles indicated on Drawings. Strengths, thicknesses, supports and reinforcements indicated in Contract Documents are a minimum requirement; increase as necessary to support design loads.

.10 Make design and detail modifications only as may be necessary to meet performance requirements and to coordinate the work. Variations in details and materials that do not adversely affect appearance, durability or strength shall be submitted for review. Maintain the general design concept without altering profiles and alignments shown.

.11 Assemblies shall be designed, assembled and secured to the structure in a manner which will permit adequate freedom of movement to compensate for anticipated deflections as well as dimensional changes induced by building movements.

.12 Fabricate and finish assemblies to meet or exceed requirements of CISC Guide for Specifying Architecturally Exposed Steel: AESS 3 Feature Elements (see Table 1 – AESS Category Matrix).

2.3 ALUMINUM FRAMING

.1 Aluminum Framing System: 60 minutes minimum fire rating, and as indicated.

.1 Steel Frame - The steel framing members are made of two halves, nom. 1.9 in. wide (48.3 mm) with a nom. minimum depth of 1.38 in. (35 mm) with lengths cut according to glazing size.

.2 Aluminum Trim - Supplied with the steel framing members. Nom. 2 in. (50.8 mm) wide with a nom. depth of 1.54 in. (39 mm) with lengths cut according to glazing size.

.3 Stainless Steel Standoffs - Supplied with the steel framing members. Nom 5/16 in. (8 mm) diameter with a nom. minimum depth of 1 1/8 in. (28 mm) with depth adjusted to match Pilkington Pyrostop® Panel thickness.

.4 Stainless Steel Moment and Connecting Braces: - Supplied with the steel framing members. Nom 3/8 in. (10 mm) thick with a nom. minimum depth of 1 1/8 in. (28 mm) with depth adjusted to match Pilkington Pyrostop® Panel thickness.

.5 Framing Member Fasteners - Supplied with the steel framing members. Screws are M6 x16mm Button Head Socket Cap Screws for frame assembly and #6 x 1" Pan Head Sheet Metal Screws for door installation.

.6 Glazing Gasketing:

.1 Interior Gasketing-Supplied with the steel framing members. Nom. 3/4 in. (19 mm) x 3/16 (4.5 mm) black applied to the steel framing members to cushion and seal the glazing material when installed.

.2 Exterior Gasketing- Supplied with the steel framing members. Nom. 2 in. (50 mm) x 3/16 (4.5 mm) black applied to the steel framing members to cushion and seal the glazing material when installed.

.2 Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

.1 Extruded Bars, Rods, Shapes, and Tubes: to ASTM B221 (ASTM B221M).

.3 Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pre-treatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

.1 Structural Shapes, Plates, and Bars: ASTM A 36/A 36M Standard Specification for Carbon Structural Steel

.2 Cold-Rolled Sheet and Strip: ASTM A1008/A1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable

.3 Hot-Rolled Sheet and Strip: ASTM A1011/A1011M Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength

.4 Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding fasteners and accessories compatible with adjacent materials.

.1 Where fasteners are subject to loosening or turn out from structural movements, or vibration, use self-locking devices.

.2 Reinforce members as required to receive fastener threads.

2.4 GLASS

.1 Fire Rated Glazing: Composed of multiple sheets of Pilkington Optiwhite™ high visible light transmission, 60-101 glass laminated with an intumescent interlayer;

.1 Thickness: 22 mm (7/8”)

.2 STC 41

.3 Weight10.86 lbs/ft^2.

.2 Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201(Cat. I and II).

.3 Aluminum: to Aluminum Association alloy AA6063-T5 or -T6.

.4 Ceramic-frit pattern, refer to Section 08 80 50 – Glazing.

.5 Logo: Each piece of fire-rated glazing shall be labeled with a permanent logo including name of product, manufacture, testing laboratory (UL), fire rating period, safety glazing standards, and date of manufacture.

.6 Glazing Accessories: Manufacturer's standard compression gaskets, standoff, spacers, setting blocks and other accessories necessary for a complete installation.

2.5 ACCESSORIES

.1 Fasteners: Use fasteners fabricated from Type 304 stainless steel or as recommended by glazed aluminum framing manufacturer.

.2 Glazing Gaskets:

.1 Glazing gaskets for interior applications: ASTM C864 (extruded EPDM rubber that provides for silicone adhesion) or ASTM C1115 Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories (extruded silicone).

.3 Intumescent Tape: As supplied by frame manufacturer.

.4 Setting Blocks: ¼" Calcium silicate.

.5 Perimeter Anchors: Steel.

.6 Flashings: As recommended by manufacturer; same material and finish as cover caps.

.7 Silicone Sealant: One-Part Low Modulus, neutral cure High Movement-Capable Sealant: Type S; Grade NS; Class 25 with additional movement capability of 100 percent in extension and 50 percent in compression (total 150 percent); Use (Exposure) NT; Uses (Substrates) M, G, A, and O as applicable. (Use-O joint substrates include: Metal factory-coated with a high-performance coating; galvanized steel; ceramic tile.)

.1 Standard of Accpetance:

.1 Dowsil 790 Silicone.

.8 Intumescent Caulk: Single component, latex-based, intumescent caulk designed to stop passage of fire, smoke, and fumes through fire-rated separations; permanently flexible after cure; will not support mold growth; flame spread/smoke developed 10/10.

.1 Standard of Accpetance:

.1 3M CP-25 WP+.

2.6 MINERAL WOOL INSULATION

.1 Acceptable Manufacturers:

.1 Fibrex Insulations Inc.

.2 Owens Corning.

.3 Thermafiber.

.4 Rockwool.

.2 Unfaced, mineral wool board insulation: to ASTM C612, maximum flame-spread and smoke-developed indexes of 15 and 0, respectively; passing ASTM E136 for combustion characteristics; and of the following nominal density and thermal resistivity:

.1 Nominal density of 4 lb/cu. ft. (64 kg/cu. m), Types IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).

.2 Fiber Color: Regular color, unless otherwise indicated.

2.7 FABRICATION - GENERAL

.1 Custom-fabricate each window unit to match design intent as illustrated on the Drawings. Measure existing rough openings before fabrication. Provide detailed shop drawings for each unit.

.2 Provide engineered and stamped shop drawings for review by Consultant prior to fabrication.

.3 Fabrication Dimensions: fabricate fire-rated assembly to field dimensions.

.4 Factory prepared, fire-rated steel door assemblies to be pre-hung, prefinished with hardware preinstalled for field mounting.

.5 Attach fittings and components before shipping to site as recommended by manufacturer.

.6 Provide corrosion protection from direct contact with concrete with emulsified asphalt protective coating, to ASTM D1187/D1187M.

.7 Isolate dissimilar metals to prevent electrolytic action by applying emulsified asphalt protective coating to concealed surfaces of metal components, to ASTM D1187/D1187M.

2.8 FINISHING

.1 Aluminum Finishes:

.1 Exposed Aluminum:

.1 Powder-Coat Finish: Polyester Super Durable powder coating which meets AAMA 2604 for chalking and fading. Apply manufacturer's standard powder coating finish system applied to factory-assembled cover caps before shipping, complying with manufacturer's recommended instructions for surface preparation including pretreatment, application, and minimum dry film thickness.

.2 Color and Gloss: Charcoal. Match Architect's sample.

.1 Provide Samples of following RAL Colours for Consultant’s selection:

.1 RAL 7021 Black Grey.

.2 RAL 7016 Anthracite Grey.

.3 RAL 7024 - Graphite Grey.

.4 RAL 9004 Signal Black.

.3 Acceptable Manufacturers:

.1 Tiger Drylac

.2 Additional manufacturers as approved by TGP

.2 Unexposed aluminum: Mill finish.

.2 Galvanize after fabrication where possible. Follow standard precautions to avoid making the base metal brittle by over pickling, overheating or during galvanizing.

.3 Colour appearance to be uniform with no variations detectable by the naked eye at a distance of 1525 mm under natural lighting.

.4 Shop and touch up primer for steel components: SSPC 25 Paint red oxide.

.5 Touch up primer for galvanized steel surfaces: SSPC 20 Paint zinc rich.

.6 Concealed steel items: galvanized in accordance with ASTM A123 to 600 gm/m2.

.7 Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

.1 Standard of Acceptance:

.1 C.R. Laurence bituminous paint or aerosol.

Part 3 Execution

3.1 COMPLIANCE

.1 Comply with manufacturer's technical datasheets, printed installation instructions, and guide specifications and illustrative details.

.2 Meet or exceed OBC requirements.

.3 Meet requirements of authority having jurisdiction.

3.2 EXAMINATION

.1 Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions. Verify openings are sized to receive curtain wall system and sill plate is level in accordance with manufacturer's acceptable tolerances. Ensure 9.5 mm shim space at all walls,

.2 Notify Consultant of any conditions that jeopardize the integrity of the proposed fire wall / door system.

.3 Do not proceed until such conditions are corrected.

3.3 INSTALLATION

.1 Install fire-rated glazed aluminum framing system in accordance with manufacturer's published installation manual instructions and illustrative details. See Fireframes Aluminum Series Installation Manual

.2 Field-measure each location that is receiving screens and doors in order to establish the exact layout. Chip recess in concrete slab where required for concealed hardware. Grout solid after installation, smooth and level with adjacent slab finish.

.3 Install fire resistance rated glass partitions and doors as indicated complete with all fittings and components.

.4 Coordinate and cooperate with Work of other trades as required.

.5 Adjust operable parts for correct function and smooth operation.

3.4 REPAIR AND TOUCH-UP

.1 Powder Coated Finishes

.1 Limited to minor repair of small scratches. Use only manufacturer's recommended products.

.2 Such repairs shall match original finish for quality or material and view.

.3 Repairs and touch-up not visible from a distance of 5 feet. Owner and Consultant to approve.

.2 Remove and replace glass that is broken, chipped, cracked, abraded, or damaged.

3.5 PROTECTION AND CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Protect glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface`. Remove non-permanent labels, and clean surfaces.

.3 Do not clean with astringent cleaners. Use a clean "grit free" cloth and a small amount of mild soap and water or mild detergent.

.4 Do not use any of the following:

.1 Steam jets.

.2 Abrasives.

.3 Strong acidic or alkaline detergents, or surface-reactive agents.

.4 Detergents not recommended in writing by the manufacturer.

.5 Do not use any detergent above 77 degrees F.

.6 Organic solvents including but not limited to those containing ester, ketones, alcohols, aromatic compounds, glycol ether, or halogenated hydrocarbons.

.7 Metal or hard parts of cleaning equipment must not touch the glass surface.

.5 Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

.6 Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

.7 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.8 Repair damage to adjacent materials caused by Work of this Section.

3.6 WASTE MANAGEMENT AND DISPOSAL

.1 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.7 SCHEDULE

.1 Install as indicated.

END OF SECTION

1 GENERAL

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of the Contract, Supplementary Conditions, and the General Requirements of Division 1, form part of this section, and must be read in conjunction with the requirements of this section. The work of this section shall comply with all requirements of Division 1 – General Requirements.

.2 The Contractor shall, together with any and all Subcontractors involved in the work of this section, examine all surfaces or conditions relating to the Work, in order to determine the acceptability of such surfaces or conditions for the work of this section to commence.

.3 Subcontractors shall report in writing, any observed defects or deficiencies in any surfaces or conditions that would adversely affect the work of this section, to the Contractor for correction prior to commencing the work of this section.

.4 Commencement of the work of this section shall imply acceptance of all surfaces and conditions.

1.2 SECTION INCLUDES

.1 Provision of all labour, materials, equipment and incidental services necessary to supply finish hardware, including the following:

.1 Supply and delivery to the project all items of architectural finishing hardware specified herein.

1.3 REFERENCE STANDARDS

.1 Canadian Metric Guide for Steel Doors and Frames; Canadian Steel Door and Frame Manufacturers' Association.
.2 ANSI/DHI A115.1G-94; Installation Guide for Doors and Hardware.
.3 CAN/CGSB 69.18-M90/ANSI/BHMA-A156.1-2000; Butts & Hinges.
.4 ANSI/BHMA-A156.2-1996; Bored & Preassembled Locks & Latches.
.5 CAN/CGSB CAN/CGSSB-69.19-93/ ANSI/BHMA-A156.3-2001; Exit Devices.
.6 CAN/CGSB 69.20-M90/ANSI/BHMA-A156.4-2000; Door Controls – Closers.
.7 CAN/CGSB 69.21-M90/ANSI/BHMA-A156.5-2001; Auxiliary Locks.
.8 CAN/CGSB 69.22-M90/ ANSI/BHMA-A156.6-2001; Architectural Door Trim.
.9 CAN/CGSB 69.23-M90/ ANSI/BHMA-A156.7-2003; Hinge Templates.
.10 CAN/CGSB 69.24-M90/ ANSI/BHMA-A156.8-2000; Door Controls - Overhead Holders and Holders.
.11 CAN/CGSB 69.25-M90/ ANSI/BHMA-A156.9-2003; Cabinet Hardware.
.12 CAN/CGSB 69.26-96/ ANSI/BHMA-A156.10-1999; Power Operated Pedestrian Doors.
.13 ANSI/BHMA-A156.11-1999; Cabinet Locks.
.14 CAN/CGSB 69.28-M90/ ANSI/BHMA-A156.12-1999; Interconnected Locks & Latches.
.15 CAN/CGSB 69.29-93/ ANSI/BHMA-A156.13-2002; Mortise Locks & Latches.
.16 CAN/CGSB 69.30-93/ ANSI/BHMA-A156.14-2002; Sliding and Folding Door Hardware.

.17 CAN/CGSB 69.31-M89/ ANSI/BHMA-A156.15-2001; Closer Holder Release Devices.
.18 CAN/CGSB 69.32-M90/ ANSI/BHMA-A156.16-2002; Auxiliary Hardware.
.19 CAN/CGSB 69.33-M90/ ANSI/BHMA-A156.17-1999; Self Closing Hinges & Pivots.
.20 CAN/CGSB 69.34-93/ ANSI/BHMA-A156.18-2000; Materials & Finishes.
.21 CAN/CGSB 69.35-M89/ ANSI/BHMA-A156.19-2002; Power Assist and Low-Energy Power-Operated Doors.
.22 CAN/CGSB 69.36-M90/ ANSI/BHMA-A156.20-2001; Strap & Tee Hinges and Hasps.
.23 CAN/CGSB 69.37-93/ ANSI/BHMA-A156.21-2001; Thresholds.
.24 ANSI/BHMA-A156.22-2003; Gasketing and Edge Seal Systems.
.25 ANSI/BHMA-A156.23-1999; Electromagnetic Locks.
.26 ANSI/BHMA-A156.24-1999; Delayed Egress Locks.
.27 ANSI/BHMA-A156.25-2002; Electrified Locks.
.28 ANSI/BHMA-A156.26-2000; Continuous Hinges.
.29 ANSI/BHMA-A156.27-2003; Power and Manual Operated Revolving Pedestrian Doors.
.30 ANSI/BHMA-A156.28-2000; Keying Systems.
.31 ANSI/BHMA-A156.29-2001; Exit Lock and Alarms.
.32 ANSI/BHMA-A156.30-2002; Mortise Locks.
.33 ANSI/BHMA-A156.31-2001; Electric Strikes.

1.4 DEFINITIONS

.1 Architectural Hardware Consultant (AHC): person or persons skilled in selecting, coordinating and specifying architectural hardware, and certified by the Door and Hardware Institute.

.2 Hardware Supplier: company or group of companies whose purpose is the manufacture and supply of architectural finish hardware.

.3 Hardware Distributor: company whose purpose is the distribution of architectural finish hardware.

1.5 QUALITY ASSURANCE

.1 Products
  .1 Products specified herein are minimum standard. Products proposed as substitutions must be accepted by addenda prior to Bid Closing.

  .2 Hardware for doors in fire separations and exit doors must be certified by a Canadian Certification Organization accredited by Standards Council of Canada. Supply only ULC and/or CSA listed electrical components.

.2 Hardware Suppliers
  .1 Hardware Suppliers must have in their employ a certified Architectural Hardware Consultant (AHC) certified by the Door and Hardware Institute.

  .2 The Hardware Supplier will provide following services to the Contract:
    .1 preparation of the hardware schedule issued for tender,

.2 review of all shop drawings,
.3 provision of requested samples,
.4 review of hardware substitution submittals, and
.5 provision of all inspections and reports as specified herein.

.3 Hardware Distributors

.1 The Distributor must have a minimum of five (5) years documented experience in the supply of Finish Hardware for similar projects.

.2 Hardware Distributors must have in their employ a certified Architectural Hardware Consultant (AHC) certified by the Door and Hardware Institute.

.3 The Hardware Distributor will assume responsibility that the Products supplied under this section meet or exceed the minimum requirements of the specifications, the hardware schedule, and all authorities having jurisdiction.

.4 Installers

.1 Hardware Installers must have a minimum of five (5) years experience in installation of hardware. The Contractor shall provide verification of installer's qualification to the Consultant for approval. Installers to attend all review meetings with the Hardware Supplier and Distributor.

.5 Pre-installation Meeting

.1 Convene a pre-installation meeting for the work specified in this section. Attendees must include, as a minimum, representatives of the following:
.1 Contractor (Site Superintendent & Project Manager)
.2 Installation Subcontractor (Site Foreman & Project Manager)
.3 Hardware Supplier (AHC)
.4 Hardware Distributor (AHC and Installer)
.5 Related Subcontractors (ie. Electrical, Security Systems)
.6 Consultant

1.6 SUBMITTALS

.1 Updated Finish Hardware Schedule

.1 Prepare and submit complete six (6) copies of detailed hardware schedules prepared in 8.5"x11" DHI format, and submitted digitally.

.2 Product Data

.1 Provide in a three ring binder six (6) copies of product data sheets with the finish hardware schedule showing all items of hardware to be used on the project.

.3 Samples

.1 Provide duplicate samples of each hardware item complete with fasteners to the office of the Consultant. Samples to be clearly labeled with their hardware schedule designation and manufacturers' name and model number. Samples may be incorporated into the Work.

.4 Templates

.1 Provide other sections with two (2) complete sets of hardware templates for related fabricating and installation.

.5 Wiring Diagrams

.1 Provide a written description of the functional use of all electrical hardware. Include door and frame elevations showing the location of each item of electrical hardware to be installed, including a diagram showing number and size of all conductors. Include drawings showing all terminal connections. Where electrical hardware is to be supplied and installed provide the Contractor with riser diagrams listing the correct wire runs and back box sizes as well as 115V AC requirements.

.6 Operations and Maintenance Data

.1 Prior to Substantial Performance, provide two (2) copies of the following information for inclusion in Operation And Maintenance Manuals in accordance with Section 01 70 00 – Execution Requirements:

.1 Maintenance instructions for each hardware item,
.2 Catalogue cut sheets and Product Specifications or each product,
.3 Parts list for each product,
.4 Copy of final “as-built” finish hardware schedule, and
.5 Copy of final keying schedule.

.7 Maintenance Materials

.1 Provide the following maintenance materials in accordance with Section 01 70 00 – Execution Requirements:

.1 Five (5) of each installation tool used for locks/passage/privacy, all type of door closers, and all exit devices.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Deliver each hardware item in its original package complete with all fasteners, keys, templates, and installation instructions required for installation.

.2 Package hardware separately for each door or unit and state clearly on each package the number and description of the door or unit for which the hardware therein is intended. Group items accordingly.

.3 Clearly mark each container with the door opening number and the hardware schedule item or heading number.

.4 Store hardware in a locked room or other secure area, accessible by only the Contractor. Storage area must contain adequate storage provision to hold all hardware off the floor (temporary shelving or wood pallets). Ensure area is kept dry and clean.

.5 When requested, package items of hardware separately for delivery to other fabricators for their installation.

.6 Deliver and assist in unloading and sorting of hardware. All hardware must be checked in on site by the Contractor's Site Supervisor.

1.8 COORDINATION WITH OTHER TRADES

.1 Supply finish hardware to those who are to install it, complete with templates and other complete installation instructions in sufficient time to avoid delaying the progress of the work.

.2 Supply complete templates and instructions to all door and frame manufacturers for factory machining of products to receive Hardware.

1.9 INSPECTION

.1 Hardware Distributor must perform the following inspections:

.1 Check all hardware when it has been installed and notify the Consultant of improper installation, defective materials, or products installed that were not specified. Replace defective hardware promptly.

.2 Check all door closers after they have been installed to make sure that all adjustments such as back-checking degree have been properly made. Notify the Consultant of any closers which have not been properly adjusted.

1.10 MAINTENANCE

Maintenance Service

Following occupancy of the building by the Owner, arrange with the Owner's maintenance staff for instruction of proper use, servicing, adjusting and lubrication of all finish hardware. Submit to the Consultant a list of attendees and meeting date.

1.11 EXTENDED WARRANTIES

.1 Provide the following manufacturer's warranties beyond the date of expiration of the Contract warranty:

.1	Mortise Hinges	Lifetime
.2	Pivot Sets	2 yrs.
.3	Locks (ND Series)	N/A
.4	Keypad Locks	1 yr.
.5	Exit Devices	3 yrs.
.6	Door closers -mechanical	10 yrs.
.7	Overhead stops/holders	1 yr.
.8	Floor/Wall stops	1 yr.
.9	All other hardware items	1 yr.

2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

.1 Products listed listed below are acceptable for use in finishing hardware groups specified in this section:

HARDWARE ITEM	ACCEPTABLE MANUFACTURERS
Full Mortise Hinges	Ives, Stanley, Hagar
Locksets, Latchsets/Deadbolts	Marks
Exit Devices	Sargent
Keypad Locks	Eplex
Pivots	Ives, Rixson
Surface/Flush Bolts	Ives, Halsco
Door Closers	LCN
Overhead Door Holders/Stops	Glynn-Johnson, Rixson, Dorma
Door Pulls/Flatware	Canadian Builders Hardware, Gallery
Wall/Floor Stops	Canadian Builders Hardware, Ives, Gallery
Weather/Smoke/Sound Seals	KN Crowder, National Guard, Pemko
Door Sweeps/Thresholds	KN Crowder, National Guard, Pemko
Keyswitch/Magnetic Locks	Locknetics, Folger-Adam,
Electric Strikes	HES, RCI
Power Supplies	Locknetics, Von Duprin, Folger-Adam,

2.2 MATERIALS

.1 Fabricate all hardware to template. Provide templates and template hardware together with the instructions necessary for door and frame preparation.

.2 Supply all hardware with necessary screws, bolts or other fastening devices to anchor hardware in position neatly and properly in accordance with best practices.

.3 Only products listed in the hardware schedule or the approved alternates noted in the following list are to be used on this project.

.4 Use one manufacturer's products only for all similar items.

.5 All Locksets are to be supplied by the University of Waterloo and installed by this contractor.

2.3 FASTENINGS

.1 Supply all required bolts, screws, expansion shields, anchors, and other related accessories for satisfactory attaching or installing of all finish hardware.

.2 Exposed fasteners shall match finish of, and be of compatible material with hardware.

2.4 HARDWARE SCHEDULE

.1 HINGES

.1 All hinges shall be 2 or 4 race ball bearing. Interior hinges shall be satin chrome plated (C26D) sized according to door height and weight and frequency of operation. All exterior hinges shall be solid brass dull chrome plated or stainless steel complete with non removable pins (NRP). Concealed bearing hinges are not acceptable.

.2 Provide 4 hinges for doors with glazing and/or fire rated doors.

.3 Continuous Hinges: Full surface, heavy duty, 780-157HD, Hager.

.3 LOCKSETS

.1 All Locksets are to be Supplied by University of Waterloo and Installed by this contractor.

.2 All locks shall be Marks, Grade 1 with Grade 1 Latch, MK Series , biaxial cylinder, MK series latchbolt, ASA strike, 6 pin, dull chrome. This is a factory registered key system.
Classroom lock – MK-295S-26D-E7,
Entrance – MK-295AB-26D-E7,
Storeroom – MK-295F-26D-E7,
Privacy – MK-295L-26D
For other functions contact Building Supervisor.

.3 Passage Sets: to be supplied by UW and installed by Contractor. Marks, Grade 1 with Grade 1 Latch, 18 Series Cresent Design as per .4 above.
Passage set – MK-295N-26D

.4 Pushbutton Locksets: to be supplied by UW and installed by Contractor. Eplex 5031 – UE-E031-XS-WL-26D

.4 EXIT DEVICES

.1 All exit devices shall be Sargent 8800 Series complete with 16 prefix, cylinder dogging except where exits are specified on UL rated doors. All devices shall be stainless steel. Exit Device 16 8810 F 32D, 12 8813F ETL Less cylinder 32D. Powered Exit devices shall be 56 8810 F 23D.

.5 CYLINDER

.1 Provide Medeco blank cylinders per Owner requirements. Cylinders to be keyed by UW and returned to contractor to install.

.6 DOOR CLOSERS

.1 Door door closer **'LCN' #4011 series** handed to suit door for interior and exterior doors - hinge mounted (pull) side on new door c/w **'hold open track 401Tt-3038H'** . **'LCN' #4110 series** parallel arm (push side) mount.

.7 HOLD OPEN DEVICE

.1 Hold open arms for manual door closers:
LC-4010-3049-RH|LH
LC-4110-3049EDA-RH|LH for parallel mount

.2 LCN SEM 7830 Magnet Surface wall mounted c/w interrupt switch. Hold open device to be tied into fire alarm system.

.8 DOOR BUMPERS

.1 Glynn-Johson FB 13, 26D, for each new door.

.9 PUSH PLATES, DOOR PULLS

.1 Hagar #30S, 4” x 16” with screws, 630 finish and Hagar #9J, 630 finish.

.10 STAINLESS STEEL KICK PLATES

.1 All kick plates shall be stainless steel type 304, .050” material. All plates shall be mechanically fastened.

.11 THRESHOLDS

.1 Extruded aluminum, low profile.

.12 WEATHER-STRIPPING/SOUND SEALS

.1 Clear anodized aluminum, complete with snap-on cover to conceal fasteners and closed cell sponge neoprene.

.13 SURFACE BOLTS

.1 Glynn Johnson #1631 and 1632, mounted at top and bottom of door as indicated on drawing.

.14 FLUSH BOLTS

.1 Glynn Johnson #FB6 spring loaded snap action lever, 5/8" throw with a 7/8" vertical adjustment, made from forged brass, and shall bear UL and Warnock Hersey listing for labeled door.

.15 LOCK PROTECTORS

.1 Glynn Johnson model LP3, stainless steel finish.

.16 AUTOMATIC DOOR BOTTOMS

.1 Heavy duty K.N. Crowder Mfg. Inc., CT-52, semi-mortised, extruded anodized aluminum, c/w closed cell neoprene.

.17 BLANK-OUT KIT
.1 #161 Filler Plates, painted to match door.

.18 COAT HOOKS
.1 Standard Metal Products #308A, mounted on wall behind doors.

.19 KICK DOWN HOLDERS
.1 Glynn Johnson GJ 44, 26D.

.20 AUTOMATIC DOOR OPERATORS
.1 For Single Doors: Record HA9-SP complete with manual. Operator shall be installed by the authorized dealer.

.2 For Double doors: shall be Record HA-9SP complete with Automatic Operator on one end, manual LCN closer independent of motor or electronic controls. Operator shall be installed by the authorized dealer.

.21 ELECTRIC STRIKE
.1 HES 5000 series, 24 VDC, 630 satin stainless steel finish for hollow metal frames; or HES 5000 series, 24 VDC, 630 satin stainless steel finish for aluminum frame, complete with face plate to suit exit device or lockset. Optional feature – Fail Safe. Lockdoor Canada Ltd., Waterloo, ON, phone 519-880-9900, fax 519-747-3401. For fire-rated doors use HES 4500 series. When possible use power panic hardware in lieu of electric strikes

.22 EXTERIOR DOOR PULLS:
.1 Exterior Door Pulls: ¾” O.D. material x 12” c.c., Style 1180-1, stainless steel finish, by Gallery Specialty Hardware, Toronto, Ontario.

.2 Exteriors doors should normally have a removable mullion installed with side latching hardware.

2.5 Hardware shall be supplied by distributors that can comply with existing purchase order agreements and UW specific standards and regulations.

2.6 Hardware for rated doors shall conform to NFPA80, Standard for Fire Doors, latest edition.

2.7 Save, clean and reinstall existing locksets/passage sets removed during demolition.

2.8 FABRICATION

.1 STRIKES:

.1 Lock strikes shall be standard template box strikes, with extended lips to protect door frames and trim from marking with bolts, and shall be set flush in hollow metal door frames.

.2 Blank standardized template strikes for hollow metal door frames shall be supplied as scheduled for such doors without locks.

.2 DOOR CLOSERS:

.1 Door closers shall be rack and pinion type with back checking feature and shall be of proper sizes to operate each respective door efficiently. Shaft packing shall be leak proof. All door closers to be mounted to doors using through bolts (ATB). See Section 2.4.5 for appropriate models.

.3 KICK AND BUMPER PLATES:

.1 Kick and bumper plates and bumper plates shall be as scheduled with edges cut square and smoothed off and shall have countersunk holes and oval head screws which shall be placed at each corner and symmetrically arranged at a maximum spacing of 200 mm (8") along edges.

.2 1.2.3.2 Stainless steel kick plates shall be 1.27 mm (0.05") minimum thickness, satin finish, Type 304.

.4 THRESHOLDS:

.1 Supply thresholds complete with countersunk holes, and with screws and anchors as required for proper anchorage.

.5 FASTENERS:

.1 Supply hardware complete with screws, bolts, expansion shields and other fastening devices as required for satisfactory installation and operating of the hardware.

.2 1.2.5.2 Supply fastening devices of same finish as hardware which is to be fastened.

.3 1.2.5.3 Where pull is scheduled on one side of door, and push plate on other side, issue installation directions to trade responsible for fixing, so that the pull shall be secured through door from reverse side and push plate installed to cover screws. Flush pulls shall be supplied with machine screws for attaching as specified above.

2.9 FINISHES

.1 Unless Type and finish of hardware shall be equal in all respects to samples of hardware and finishes approved by Owner.

.2 Metal finishes shall be free from defects, clean and unstained, and of uniform colour.

.3 Finish hardware for fire rated doors shall meet requirements of ULC as part of fire rated door assembly and shall carry ULC or WH label.

3 EXECUTION

3.1 EXAMINATION

.1 Before furnishing any hardware, carefully check all architectural Drawings of work requiring hardware, verify door swings, door and frame material and operating conditions, and assure that hardware will fit work to which it is to be attached.

.2 Check shop drawings and frame and door lists affecting hardware type and installation, and certify to correctness thereof, or advise Owner in writing of required revisions.

.3 Templates: Check Hardware Schedule, Drawings and Specifications, and furnish promptly to applicable trades any templates, template information and manufacturer's literature, required for proper preparation for and application of hardware, in ample time to facilitate progress of work.

3.2 LOCATION OF HARDWARE

.1 Location of hardware as recommended by Door Hardware Institute (DHI)..

.2 Use 3 hinges for doors up to and including 2286mm (7’-6”). Add 1 hinge for each 762mm (2’-6”) in height or fraction thereof.

.3 HINGE LOCATION

.1 Ensure Interior Doors 1981 mm to 2286 mm (6'-6" to 7'-6") in height and requiring 3 hinges:

- Top Hinge: 298 mm (11-3/4") maximum from centreline of hinge to frame head rabbet.
- Centre Hinge: equal distance from centre line of top and bottom hinge.
- Bottom Hinge: 330 mm (13") maximum from centreline of hinge to bottom of frame.

.2 Ensure Interior Doors 2311 mm (7'-7") and over in height, and all exterior doors and requiring 4 or more hinges:

- Top Hinge: 298 mm (11-3/4") maximum from centreline of hinge to frame head of rabbet.
- Centre Hinge: symmetrically spaced between top and bottom hinge.
- Bottom Hinge: 330 mm (13") maximum from centreline of hinge to bottom of frame.

.4 LOCK LOCATION

.1 1024 mm (40-5/16") from centreline of lock to bottom of frame.

.5 DEADLOCK STRIKE LOCATION

.1 1219 mm (48") from centreline of strike to bottom of frame.

.6 DOOR PULLS

.1 2.2.4.1 1067 mm (42") from centreline of grip or push bar to bottom of frame.

.7 PUSH PLATES:

.1 1143 mm (45") from centreline of plate to bottom of frame.

.8 KICK PLATE: Within 6mm (1/4”) of door bottom

.1 Single Door Width: Push side; less 50 mm (2") of door width.
Pull side; less 25 mm (1") of door width.

.2 Double Door Width: Push side; less 25 mm (1") of door width.
Pull side; less 25 mm (1") of door width.

3.4 FIELD QUALITY CONTROL

.1 Perform bi-monthly on-site inspections during hardware installation and provide inspection reports listing progress of work, unacceptable work and corrective measures. Repair or replace as directed by the Consultant.

.2 Upon completion of hardware installation, arrange with the Owner to instruct the Owner's personnel in the proper operation, adjustment, and maintenance of all finish hardware supplied under this Contract.

.3 Before completion of the Work but after finish hardware installation has been completed, submit a certificate to the Consultant stating that final inspection has been made and that all hardware has been checked for installation and operation by representatives of both the Hardware Supplier and the Hardware Distributor, and that operation and maintenance of all hardware have been fully demonstrated to the satisfaction of the Owner's personnel.

3.5 ADJUSTING AND CLEANING

.1 Check and make final adjustments to each operating item of hardware on each door to ensure proper operation and function.

.2 All hardware to be left clean and free of disfigurements.

.3 Check all locked doors against approved keying schedule.

3.6 PROTECTION

.1 Protect hardware from damage during construction period by removing and reinstalling or where necessary, using temporary hardware to maintain finish in new condition and maintain manufacturers warranty.

3.7 SCHEDULES

.1 Abbreviations: Abbreviations used in Hardware Schedule are as follows:

.2 Finishes:

	CGSB	BHMA
Prime Coat	CP	600
Bright Brass (polished)	C3	605
Bright Nickel (polished)	C14	618
Dull Nickel	C15	619
Dull Nickel on Steel (hinges)	C15	646
Bright Chrome (polished)	C26	625
Dull Chrome	C26D	626
Satin Aluminum Anodized	C28	628
Bright Stainless Steel (polished)	C32	629
Dull Stainless Steel	C32D	630
Silver Aluminum Lacquer	SB/EN	628

.3 Doors:

HMD	Hollow Metal Door
PL	Plastic Laminate
Kal	Kalamein
WD	Wood Door

.4 Frames:

CIF	Channel Iron Frame
PSF	Pressed Steel Frame

.5 Fastenings:

ATMS	Arm Template Machine Screws
ATB	Arm Through Bolts
BS	Backset
MS	Machine Screws
NRP	Non Removable Pin
STS	Self Tapping Screws
STMS	Strike Template Machine Screws
TBGN	Through Bolts & Grommet Nuts
TMS	Template Machine Screws
WS	Wood Screws
WS/LS	Wood Screws/Lead Shields

.6 Keying

CMK	Construction Master Keyed
EK	Emergency Key
GMK	Grand Master Keyed
KA	Keyed Alike
KD	Keyed Different
MK	Master Keyed
SMK	Sub Master Key

3.8 HARDWARE SCHEDULE

Set: 1.0
Doors: D4322A, D4332A, D4334A
Description: Sliding x Storeroom

1	Cylinder (rim/mortise)	MEDECO PER OWNER REQUIREMENTS - PROVIDE BLANK CYLINDER. CYLINDER KEYED BY UW AND INSTALLED BY CONTRACTOR		OT
1	Ladder Pull	IN MATCHING FINISH TO DOOR FRAME BY DOOR SUPPLIER PER UW SPECIFICATION		OT
1	All Hardware	BY DOOR SUPPLIER PER UW SPECIFICATION		OT

Set: 2.0
Doors: D4320A, D4322B, D4330.3, D4332B, D4334B, D4335A, D4335B, D4335C
Description: Single x AL x Storeroom ES x CL x Seals

4	Hinges	BY DOOR SUPPLIER PER UW SPECIFICATION		OT
1	Lockset Storeroom	MK-295F-26D-E7 BY UW	US26D	MX
1	Cylinder (key in lever)	20W200V1-26-B3 - PROVIDE BLANK CYLINDER. CYLINDER KEYED BY UW AND INSTALLED BY CONTRACTOR		MC
1	Electric Strike	5000C	630	HS
1	Surface Closer	4011 .REGARM DROP PLATE TO SUIT	.689	LC

1	Floor/Wall Stop	441H / 403 TO SUIT	US26D	RO
1	Perimeter Gasketing	BY DOOR SUPPLIER PER UW SPECIFICATION		OT
1	Motion Sensor (REX)	BY UW IST		SU
1	Door Contract	BY UW IST		SU
1	Card Reader	BY UW IST		OT
1	Power Supply	BY UW IST		OT

Note - 4 hinges per leaf per for doors with glazing and/or fire rating per client direction.
Note - Lockset by door supplier.
Note - Verify electric strike compatibility with lock.
Note - Verify cylinder compatibility with lock/exit device.

Operational Narrative:
1. Door normally closed and secure.
2. Authorized access by card reader releasing electric strike. Strike can remain released for open access.
3. Egress free for immediate exit.
4. REX monitors exit. Door contact monitors door open/close status.
5. Electric strike remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 3.0
Doors: D3603A, D3603B, D4330A, D4330B, D4330C
Description: Single x AL x Passage x Seals

4	Hinges	BY DOOR SUPPLIER PER UW SPECIFICATION		OT
1	Passage Lock	BY DOOR SUPPLIER PER UW SPECIFICATION		OT
1	Floor/Wall Stop	441H / 403 TO SUIT	US26D	RO
1	Perimeter Gasketing	BY DOOR SUPPLIER PER UW SPECIFICATION		OT

Note - 4 hinges per leaf per for doors with glazing and/or fire rating per client direction.

Set: 4.0
Doors: D4310, D4312, D4320B, D4324, D4326, D4328
Description: Single x Existing x ES

3	Hinges	EXISTING		OT
1	Storeroom Lock (Cyl)	EXISTING		OT
1	Cylinder (key in lever)	20W200V1-26-B3 - PROVIDE BLANK CYLINDER. CYLINDER KEYED BY UW AND INSTALLED BY CONTRACTOR		MC
1	Electric Strike	5000C	630	HS
1	Closer	EXISTING		OT
1	Floor/Wall/Overhead Stop	EXISTING		OT
1	Perimeter Gasketing	EXISTING		OT
1	Motion Sensor (REX)	BY UW IST		SU
1	Door Contract	BY UW IST		SU
1	Card Reader	BY UW IST		OT
1	Power Supply	BY UW IST		OT

Note - Verify all exisitng hardware components listed above for specified doors are in good working order. Provide

replacement for any defective components.
Note - Verify electric strike compatibility with existing lock.
Note - Verify cylinder compatibility with lock/exit device.

Operational Narrative:
1. Door normally closed and secure.
2. Authorized access by card reader releasing electric strike. Strike can remain released for open access.
3. Egress free for immediate exit.
4. REX monitors exit. Door contact monitors door open/close status.
5. Electric strike remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 5.0
Doors: D4301B
Description: Single x Existing x ES 150

3	Hinges	EXISTING		OT
1	Storeroom Lock (Cyl)	EXISTING		OT
1	Cylinder (key in lever)	20W200V1-26-B3 - PROVIDE BLANK CYLINDER. CYLINDER KEYED BY UW AND INSTALLED BY CONTRACTOR		MC
1	Strike Latch Guard	150		HS
1	Electric Strike	5000C	630	HS
1	Closer	EXISTING		OT
1	Floor/Wall/Overhead Stop	EXISTING		OT
1	Perimeter Gasketing	EXISTING		OT
1	Motion Sensor (REX)	BY UW IST		SU
1	Door Contract	BY UW IST		SU
1	Card Reader	BY UW IST		OT
1	Power Supply	BY UW IST		OT

Note - Verify all exisitng hardware components listed above for specified doors are in good working order. Provide replacement for any defective components.
Note - Verify electric strike compatibility with existing lock.
Note - Verify cylinder compatibility with lock/exit device.

Operational Narrative:
1. Door normally closed and secure.
2. Authorized access by card reader releasing electric strike. Strike can remain released for open access.
3. Egress free for immediate exit.
4. REX monitors exit. Door contact monitors door open/close status.
5. Electric strike remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 6.0
Doors: D4333A
Description: Single x Existing x ES 150 x Seals

3	Hinges	EXISTING		OT
1	Storeroom Lock (Cyl)	EXISTING		OT
1	Cylinder (key in lever)	20W200V1-26-B3 - PROVIDE BLANK CYLINDER. CYLINDER KEYED BY UW AND INSTALLED BY CONTRACTOR		MC
1	Strike Latch Guard	150		HS

1	Electric Strike	5000C	630	HS
1	Closer	EXISTING		OT
1	Floor/Wall/Overhead Stop	EXISTING		OT
1	Gasketing	S773BL 1WIDTH x 2HEIGHT		PE
1	Door Bottom	412CRL WIDTH		PE
1	Motion Sensor (REX)	BY UW IST		SU
1	Door Contract	BY UW IST		SU
1	Card Reader	BY UW IST		OT
1	Power Supply	BY UW IST		OT

Note - Verify all exisitng hardware components listed above for specified doors are in good working order. Provide replacement for any defective components.
Note - Verify electric strike compatibility with existing lock.
Note - Verify cylinder compatibility with lock/exit device.

Operational Narrative:
1. Door normally closed and secure.
2. Authorized access by card reader releasing electric strike. Strike can remain released for open access.
3. Egress free for immediate exit.
4. REX monitors exit. Door contact monitors door open/close status.
5. Electric strike remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 7.0
Doors: D3679
Description: Single x Existing x ES 150 x DO

4	Hinges	EXISTING		OT
1	Storeroom Lock (Cyl)	EXISTING		OT
1	Cylinder (key in lever)	20W200V1-26-B3 - PROVIDE BLANK CYLINDER. CYLINDER KEYED BY UW AND INSTALLED BY CONTRACTOR		MC
1	Strike Latch Guard	150		HS
1	Electric Strike (fire rated)	4500C	630	HS
1	Door Operator	HA8-SP		RZ
1	Floor/Wall/Overhead Stop	EXISTING		OT
1	Gasketing	S773BL 1WIDTH x 2HEIGHT		PE
1	Door Bottom	412CRL WIDTH		PE
1	Motion Sensor (REX)	BY UW IST		SU
1	Door Contract	BY UW IST		SU
1	Card Reader	BY UW IST		OT
1	Relay	CX-33		CM
2	Actuator Switch	CM60/4		OT
1	Power Supply	BY UW IST		OT

DIVISION 26 TO PROVIDE 120VAC POWER TO FRAME HEADER, FINAL CONNECTION TO AUTO DOOR OPERATOR, ALL BACK BOXES, AND CONDUIT WITH LOW-VOLTAGE WIRING.

Note - Verify all exisitng hardware components listed above for specified doors are in good working order. Provide replacement for any defective components.
Note - Verify existing hinges are heavy weight (door operators need heavy weight hinges). Provide new heavy

weight hinges if existing are inadequate.
Note - Verify electric strike compatibility with existing lock.
Note - Verify cylinder compatibility with lock/exit device.
Note - 4 hinges provided per client request.

Operational Narrative:
1. Door normally closed and secure.
2. Authorized access by card reader releasing electric strike. Strike can remain released for open access.
3. ADA access by actuator switch. In locked condition, actuator energized only upon valid card reader presentation.
4. Egress free for immediate exit. ADA egress by actuator switch.
4. REX monitors exit. Door contact monitors door open/close status.
5. Electric strike remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 8.0
Doors: D3681A
Description: Pair x ED Nightlatch ES x DO - Mullion - STC

8	Hinge, Full Mortise, Hvy Wt	T4A3386 127 x 114 (NRP AT OUTSWING SECURE DOORS)	US32D	MK
1	Electrified Mullion	EL980 HEIGHT	PC	SA
1	Rim Exit Device, Exit Only	12 8810 EO	US32D	SA
1	Rim Exit Device, Classroom	12 LC 8813 ETP	US32D	SA
1	Cylinder (rim/mortise)	MEDECO PER OWNER REQUIREMENTS - PROVIDE BLANK CYLINDER. CYLINDER KEYED BY UW AND INSTALLED BY CONTRACTOR		OT
1	Cylinder	980C2	US26D	SA
1	Electric Strike	9500	630	HS
1	ElectroLynx Adaptor	2004M		HS
1	Surface Closer	4111 .SCUSH	.689	LC
1	Door Operator	HA8-SP		RZ
2	Kick Plate	K1050 200mm x WIDTH CSK	US32D	RO
2	Gasketing STC	S773BL + S44BL 1WIDTH x 2HEIGHT		PE
2	Door Bottom STC	CT-52 WIDTH		KN
1	Motion Sensor (REX)	BY UW IST		SU
2	Door Contract	BY UW IST		SU
1	Card Reader	BY UW IST		OT
1	Relay	CX-33		CM
2	Actuator Switch	CM60/4		OT
1	Power Supply	BY UW IST		OT

DIVISION 26 TO PROVIDE 120VAC POWER TO FRAME HEADER, FINAL CONNECTION TO AUTO DOOR OPERATOR, ALL BACK BOXES, AND CONDUIT WITH LOW-VOLTAGE WIRING.

Note - Verify existing hinges are heavy weight (door operators need heavy weight hinges). Provide new heavy weight hinges if existing are inadequate.
Note - 4 hinges per leaf per for doors with glazing and/or fire rating per client direction.
Note - Verify STC gasketing and door bottom with STC door and frame supplier.
Note - Verify electric strike compatibility with existing lock.
Note - Verify cylinder compatibility with lock/exit device.

Operational Narrative:
1. Door normally closed and secure.
2. Authorized access by card reader releasing electric strike. Strike can remain released for open access.
3. ADA access by actuator switch. In locked condition, actuator energized only upon valid card reader presentation.

4. Egress free for immediate exit. ADA egress by actuator switch.
4. REX monitors exit. Door contact monitors door open/close status.
5. Electric strike remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 9.0
Doors: D3681B
Description: Pair x ED Nightlatch ES x SCUSH - Mullion - STC

8	Hinge, Full Mortise, Hvy Wt	T4A3386 114 x 114 (NRP AT OUTSWING SECURE DOORS)	US32D	MK
1	Electrified Mullion	EL980 HEIGHT	PC	SA
1	Rim Exit Device, Exit Only	12 8810 EO	US32D	SA
1	Rim Exit Device, Classroom	12 LC 8813 ETP	US32D	SA
1	Cylinder (rim/mortise)	MEDECO PER OWNER REQUIREMENTS - PROVIDE BLANK CYLINDER. CYLINDER KEYED BY UW AND INSTALLED BY CONTRACTOR		OT
1	Cylinder	980C2	US26D	SA
1	Electric Strike	9500	630	HS
1	ElectroLynx Adaptor	2004M		HS
2	Surface Closer	4111 .SCUSH	.689	LC
2	Kick Plate	K1050 200mm x WIDTH CSK	US32D	RO
1	Gasketing STC	S773BL + S44BL 1WIDTH x 2HEIGHT		PE
2	Door Bottom STC	CT-52 WIDTH		KN
1	ElectroLynx Harness (in frame)	QC-CXXXXP LENGTH		MK
1	Motion Sensor (REX)	BY UW IST		SU
2	Door Contract	BY UW IST		SU
1	Card Reader	BY UW IST		OT
1	Power Supply	BY UW IST		OT

Note - 4 hinges per leaf per for doors with glazing and/or fire rating per client direction.
Note - Verify cylinder compatibility with lock/exit device.

Operational Narrative:
1. Door normally closed and secure.
2. Authorized access by card reader releasing electric strike. Strike can remain released for open access.
3. Egress free for immediate exit.
4. REX monitors exit. Door contact monitors door open/close status.
5. Electric strike remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 10.0
Doors: D3682
Description: Single x ED Storeroom ES x SCUSH - STC

4	Hinge, Full Mortise, Hvy Wt	T4A3386 114 x 114 (NRP AT OUTSWING SECURE DOORS)	US32D	MK
1	Rim Exit Device, Storeroom	12 LC 8804 ETP	US32D	SA
1	Cylinder (rim/mortise)	MEDECO PER OWNER REQUIREMENTS - PROVIDE BLANK CYLINDER. CYLINDER KEYED BY UW AND INSTALLED BY CONTRACTOR		OT
1	Electric Strike	9500	630	HS
1	ElectroLynx Adaptor	2004M		HS
1	Surface Closer	4111 .SCUSH	.689	LC
1	Kick Plate	K1050 200mm x WIDTH CSK	US32D	RO

1	Gasketing STC	S773BL + S44BL 1WIDTH x 2HEIGHT	PE
1	Door Bottom STC	CT-52 WIDTH	KN
1	ElectroLynx Harness (in frame)	QC-CXXXXP LENGTH	MK
1	Motion Sensor (REX)	BY UW IST	SU
1	Door Contract	BY UW IST	SU
1	Card Reader	BY UW IST	OT
1	Power Supply	BY UW IST	OT

Note - 4 hinges per leaf per for doors with glazing and/or fire rating per client direction.
Note - Verify cylinder compatibility with lock/exit device.

Operational Narrative:
1. Door normally closed and secure.
2. Authorized access by card reader releasing electric strike. Strike can remain released for open access.
3. Egress free for immediate exit.
4. REX monitors exit. Door contact monitors door open/close status.
5. Electric strike remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 11.0
Doors: D3603E, D4333B
Description: Single x Classroom ES x SCUSH - STC

4	Hinge, Full Mortise, Hvy Wt	T4A3386 114 x 114 (NRP AT OUTSWING SECURE DOORS)	US32D	MK
1	Lockset Classroom	MK-295S-26D-E7 BY UW		MX
1	Cylinder (key in lever)	20W200V1-26-B3 - PROVIDE BLANK CYLINDER. CYLINDER KEYED BY UW AND INSTALLED BY CONTRACTOR		MC
1	Strike Latch Guard	150		HS
1	Electric Strike	5000C	630	HS
1	Surface Closer	4111 .SCUSH	.689	LC
1	Gasketing STC	S773BL + S44BL 1WIDTH x 2HEIGHT		PE
1	Door Bottom STC	CT-52 WIDTH		KN
1	ElectroLynx Harness (in frame)	QC-CXXXXP LENGTH		MK
1	Motion Sensor (REX)	BY UW IST		SU
1	Door Contract	BY UW IST		SU
1	Card Reader	BY UW IST		OT
1	Power Supply	BY UW IST		OT

Note - Minimum stile width 114mm.
Note - 4 hinges per leaf per for doors with glazing and/or fire rating per client direction.
Note - Verify cylinder compatibility with lock/exit device.

Operational Narrative:
1. Door normally closed and secure.
2. Authorized access by card reader releasing electric strike. Strike can remain released for open access.
3. Egress free for immediate exit.
4. REX monitors exit. Door contact monitors door open/close status.
5. Electric strike remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 12.0

Doors: D4330.1, D4330.2, D4367A
Description: Single x Classroom ES x CL - STC

4	Hinge, Full Mortise, Hvy Wt	T4A3386 114 x 114 (NRP AT OUTSWING SECURE DOORS)	US32D	MK
1	Lockset Classroom	MK-295S-26D-E7 BY UW		MX
1	Cylinder (key in lever)	20W200V1-26-B3 - PROVIDE BLANK CYLINDER. CYLINDER KEYED BY UW AND INSTALLED BY CONTRACTOR		MC
1	Electric Strike	5000C	630	HS
1	Concealed Overhead Holder/Stop	1-X36	689	NO
1	Surface Closer	4111 .SCUSH	.689	LC
1	Surface Closer	4011 .REGARM DROP PLATE TO SUIT	.689	LC
1	Gasketing STC	S773BL + S44BL 1WIDTH x 2HEIGHT		PE
1	Door Bottom STC	CT-52 WIDTH		KN
1	Motion Sensor (REX)	BY UW IST		SU
1	Door Contract	BY UW IST		SU
1	Card Reader	BY UW IST		OT
1	Power Supply	BY UW IST		OT

Note - Minimum stile width 114mm.
Note - 4 hinges per leaf per for doors with glazing and/or fire rating per client direction.
Note - Verify cylinder compatibility with lock/exit device.

Operational Narrative:
1. Door normally closed and secure.
2. Authorized access by card reader releasing electric strike. Strike can remain released for open access.
3. Egress free for immediate exit.
4. REX monitors exit. Door contact monitors door open/close status.
5. Electric strike remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 13.0
Doors: D3603D, D4367B
Description: Single x AL x 4900 ES x CL x Seals

3	Hinges	EXISTING		OT
1	Deadlatch	4900	628	AD
1	Lever Operator	4600 01-Curve	US32D	AD
1	Cylinder (rim/mortise)	MEDECO PER OWNER REQUIREMENTS - PROVIDE BLANK CYLINDER. CYLINDER KEYED BY UW AND INSTALLED BY CONTRACTOR		OT
1	Electric Strike	7440M	628	AD
1	Push Bar	EXISTING		OT
1	Closer	EXISTING		OT
1	Perimeter Gasketing	EXISTING		OT
1	Motion Sensor (REX)	BY UW IST		SU
1	Door Contract	BY UW IST		SU
1	Card Reader	BY UW IST		OT
1	Power Supply	BY UW IST		OT

Note - Existing doors to be re-prepped per new hardware.

Note - Card reader on room side.
Note - Lockset by door supplier.

Operational Narrative:
1. Door normally closed and secure.
2. Authorized access by card reader releasing electric strike. Strike can remain released for open access.
3. Egress free for immediate exit.
4. REX monitors exit. Door contact monitors door open/close status.
5. Electric strike remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

Set: 14.0
Doors: D4301A
Description: Single x AL x 4900 ES x CL x Seals

3	Hinges	EXISTING		OT
1	Deadlatch	4900	628	AD
1	Lever Operator	4600 01-Curve	US32D	AD
1	Cylinder (rim/mortise)	MEDECO PER OWNER REQUIREMENTS - PROVIDE BLANK CYLINDER. CYLINDER KEYED BY UW AND INSTALLED BY CONTRACTOR		OT
1	Electric Strike	7440M	628	AD
1	Door Pull	GSH1180-1	C32D	GA
1	Closer	EXISTING		OT
1	Perimeter Gasketing	EXISTING		OT
1	Motion Sensor (REX)	BY UW IST		SU
1	Door Contract	BY UW IST		SU
1	Card Reader	BY UW IST		OT
1	Power Supply	BY UW IST		OT

Note - Existing doors to be re-prepped per new hardware.
Note - Lockset by door supplier.

Operational Narrative:
1. Door normally closed and secure.
2. Authorized access by card reader releasing electric strike. Strike can remain released for open access.
3. Egress free for immediate exit.
4. REX monitors exit. Door contact monitors door open/close status.
5. Electric strike remains locked (fail secure) in event of power loss. Keyed cylinder override for emergency access.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 05 50 00 – Metal Fabrications.

.3 Section 07 92 00 - Joint Sealants.

.4 Section 08 11 13 – Metal Doors and Frames.

.5 Section 08 51 13.13 – Fire-Rated Glazed Aluminum Windows.

.6 Section 10 22 23 – Moveable Partition System.

.7 Refer to Drawings.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI Z97.1-2026, Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

.2 ASTM International (ASTM).

.1 ASTM C542-05(2024) Standard Specification for Lock-Strip Gaskets.

.2 ASTM C716-06(2025), Standard Specification for Installing Lock-Strip Gaskets and Infill Glazing Materials.

.3 ASTM C920-18(2024), Standard Specification for Elastomeric Joint Sealants.

.4 ASTM C964-20(2025), Standard Guide for Lock-Strip Gasket Glazing.

.5 ASTM C1048-25, Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

.6 ASTM C1172-24e1, Standard Specification for Laminated Architectural Flat Glass.

.7 ASTM D2240-15 (2021), Standard Test Method for Rubber Property—Durometer Hardness.

.8 ASTM E119-26, Standard Test Methods for Fire Tests of Building Construction and Materials.

.9 ASTM E330/E330M-14(2021), Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

.3 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-12.1-2026, Safety glazing.

.4 CSA Group (CSA).

.1 CSA AAMA/WDMA/CSA 101/I.S.2/ A440:26, North American Fenestration Standard/Specification for windows, doors, and skylights..

.2 CSA A440S1:25. Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440:22. North American Fenestration Standard/Specification for windows, doors, and skylights.

.3 CSA A440.2:22/A440.3:22, Fenestration energy performance/User guide to CSA A440.2:19, Fenestration energy performance.

.4 CSA A440.4:19 (R2024), Window, door, and skylight installation.

.5 CSA Certification Program for Windows and Doors.

.5 Glass Association of North American (GANA)

.1 NGA's GANA Glazing Manual, International Year of Glass (IYOG Edition), 2022.

.2 GANA Laminated Glazing Reference Manual (2019 edition).

.6 National Fire Protection Association (NFPA):

.1 NFPA (Fire) 80: Standard for Fire Doors and Other Opening Protectives, 2025 Edition.

.2 NFPA (FIRE) 252, Fire Tests of Door Assemblies, 2022 Edition.

.3 NFPA (FIRE) 257, Fire Test for Window and Glass Block Assemblies, 2022 Edition.

.7 UL Solutions (UL):

.1 UL Environmental 2761-11, Sustainability for Sealants and Caulking Compounds, 1st Edition.

.8 UL Solutions in Canada (ULC)

.1 ULC 101-14 (R2021), Standard Methods of Fire Endurance Tests of Building Construction and Materials (CAN-ULC-S101-14-REV3).

.2 ULC 104-15 (R2025), Standard Method for Fire Tests of Door Assemblies (CAN-ULC-104-2015-(R2025)).

.3 ULC 106-15 (R2025), Standard Method for Fire Tests of Window and Glass Block Assemblies (CAN-ULC-106-2015-(R2025)).

1.3 PROJECT DRAWINGS AND DETAILS

.1 Project drawings and details are diagrammatic and are intended to show design concept, configuration, components and arrangements; they are not intended to identify nor solve completely the problems of structural movements, assembly framing, fixings and anchorages, size and shape of glazing pockets, and problems at the glass line associated with glass installation.

.2 Profiles, elevations and sizes shown on the drawings are approximate and show intent, but do not preclude the use of manufacturer's standard sections and glazing methods provided performance requirements are met.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings:

.1 Convene pre-installation meeting 1 week prior to beginning work of this Section, with Consultant in accordance with Section 01 10 00 - Summary to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Coordination with other building subtrades.

.4 Review manufacturer's written installation instructions and warranty requirements.

.2 Arrange for site visit with Consultant prior to start of Work to examine existing site

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications, standard details, and data sheets in accordance with Section 01 33 00 – Submittal Procedures.

.2 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

.1 Submit shop drawings for window glazing.

.2 Shop drawings shall be signed and sealed by a professional engineer qualified in the province of the Work, and who was responsible for their preparation.

.3 Submit shop drawings for ceramic window frit pattern.

.3 Submit samples for initial selection in accordance with Section 01 33 00 – Submittal Procedures.

.1 Submit 300 mm x 300 mm size of each glazing type. Consultant reserves the right to change colour of glass after review of submitted samples.

.2 Provide 300 mm x 300 mm minimum samples illustrating three alternative approaches for achieving the specified opacity gradient for the ceramic fritted glass sample. Each sample shall transition from approximately 80-90% opacity to 10-20% opacity across the sample area.

.1 Submit full-colour frit samples illustrating Density Gradient, Size Gradient, and Hybrid Gradient pattern options. Samples shall demonstrate the complete opacity transition range proposed for the project and include calculated frit coverage percentages at the opaque and transparent extents of the gradient.

.4 Certifications:

.1 Submit manufacturers' certification of compatibility of glass, glazing and sealant materials.

.2 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements

.5 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

.6 Warranties:

.1 Submit specified warranties.

.7 Closeout Submittals:

.1 Submit adequate written instructions for protection of completed work, for re-glazing, and for proper methods and materials to be used in cleaning for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

1.6 QUALITY ASSURANCE

.1 Manufacturer's technical recommendations:

.1 Perform glazing work in accordance with written recommendations from the glass manufacturer or glass fabricator.

.2 Certify glass compatibility with glazing materials (i.e. structural sealants and silicones, gaskets, setting blocks, etc.)

.3 Provide shop inspection for glass.

.2 Single-source fabrication responsibility: All fabricated glass shall be processed and supplied by a single fabricator.

.3 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.1 Provide testing and analysis of glass under provisions of Section 01 40 00 – Quality Requirements.

.2 Provide shop inspection and testing for glass.

.4 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.7 SITE CONDITIONS

.1 Environmental Requirements:

.1 Install glazing when ambient temperature is 10 °C minimum. Maintain ventilated environment for 24 hours after application.

.2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.8 WARRANTIES

.1 Provide manufacturers guarantee for the following types of glass listed, against defects in materials and workmanship for the period indicated, commencing from the date of Substantial Performance of Work.

.1 Flat Glass - General: Warrant that all flat glass products meet specified CGSB, ANSI, and ASTM standards, have been delivered to site with manufacturer's labels intact, and have been installed as required to meet or exceed OBC 2024 criteria.

.2 Coated Glass: Replace units that display peeling, cracking, and other deterioration in metallic coating under normal use: 10 Years.

.3 Laminated Glass: Replace units that display edge separation, delamination, and blemishes exceeding those allowed by ASTM C1172: 10 Years.

.4 Warrant that glazing work is free from distortion; that glazing materials will not be displaced, and will be free from permanent deformation under load; and that glass will not be broken, cracked or scratched by causes resulting from defects in material, workmanship or design of glazing installation.

.5 Cracked or scratched glass, shrinking, cracking, staining, hardening, sagging of glazing materials; loosening or rattling of glass; leaking of glazed joints will be considered defective work and Contractor shall replace with new Work at no cost to Contract.

Part 2 Products

2.1 DESIGN CRITERIA

.1 Design Requirements:

.1 Meet or exceed the requirements of the Ontario Building Code 2024 and amendments.

.2 Size glass to withstand dead loads and positive and negative live loads as measured in accordance with ANSI/ASTM E330.

.3 Safety Glass: shall meet or exceed criteria and standards established by CGSB 12.1 and ANSI Z97.1 Class A.

.4 Glazing installation shall meet or exceed requirements of Ontario Building Code 2024, with deflection less than 1/175.

.5 Glazing for Fire-Rated Door and Window Assemblies: Glass tested per NFPA 252 and NFPA 257, as applicable, for assemblies complying with NFPA 80 and listed and labelled per requirements of authorities having jurisdiction.

.6 Provide annealed, heat strengthened, and tempered lights where required by the building code.

.7 Glass thicknesses and glass types specified, indicated, or scheduled in the Contract Documents are minimums required. Glass designer/engineer to modify as required to satisfy design and building code requirements, and requirements of authorities having jurisdiction, and any such modifications shall be clearly indicated on shop drawings.

.8 Glazing systems shall be capable of withstanding normal thermal movements, without failure, including loss due to defective manufacture, fabrication and installation; deterioration of glazing materials; and other defects in construction.

.9 Provide glass Products of uniform appearance, reflectivity, hue, shade, visible light transmittance, and colour when viewed from distance of 3 m (10 ft) to 30 m (100 ft) perpendicular to the glass or from 45 degree angle to the glass

.2 Required Edge Treatments:

.1 Concealed edges: flat belt ground and seamed.

.2 Structural Silicone Glazed (SSG) edges: flat belt ground and seamed.

.3 Butt joined edges with silicone seal: flat ground with arris.

.4 Exposed edges: flat polish with arris.

2.2 FLAT GLASS MATERIALS

.1 Tempered Safety Glass: tempered glass to CAN/CGSB-12.1, transparent, glazing quality, thickness as required to meet ANSI Z97.1 Class A but not less than 6 mm thick. At locations where full-height glass panes are used (e.g., panes ≥ 2200 mm in height), minimum thickness shall be 10 mm.

.1 Design: to meet or exceed the requirements of Ontario Building Code 2024 and amendments, and CSA A500.

.2 Type: 1-tempered; Class: B float.

.3 Category: ANSI Z97.1 Class A.

.2 Acoustical Laminated Tempered Safety Glass: laminated to ASTM C1172, transparent, silvering quality, having minimal inclusions.

.1 Design: to meet or exceed the requirements of Ontario Building Code and amendments, and CSA A500.

.2 Tempered to CAN/CGSB-12.1.

.3 Laminated to ASTM C1172.

.4 Total laminated thickness: 12.8 mm.

.5 Standard of Acceptance:

.1 Pilkington Optiphon™ 12,8, by Pilkington, or approved equivalent.

2.3 FIRE RATED CERAMIC GLASS

.1 Fire Rated Glass: comprised of multiple layers of tempered glass ceramic, laminated with transparent intumescent materials, providing distortion free viewing through pane and as follows:

.1 Locations: fire rated door lights and sidelights, and fire rated glazing screens.

.2 Thickness: 7/8"

.3 STC: 41

.4 Impact Safety Rating: ANSI Z97.1 Class A.

.5 Weight Approx: 10.86lbs/sqft

.6 Fire Rating: 60 mins.

.7 Labelled: Permanent logo listing name of product, manufacturer, testing laboratory, fire rating period and safety requirements.

.8 Glass, doors and door hardware, glazed screens and windows in fire resistance rated assemblies shall be supplied care of a single manufacturer, clearly labelled, with the assembly and systems meeting fire resistance rating requirements indicated on Drawings.

.9 Standard of Acceptance:

.1 TGP - Pilkington Pyrostop 60-101

2.4 INTERIOR SCREENS AND GLAZING

.1 Clear laminated tempered or tempered safety glass to CAN/CGSB-12.1, transparent, glazing quality, thickness as required to meet ANSI Z97.1 Class A but not less than 10 mm thick. At locations where full-height glass panes are used (e.g., panes ≥ 2200 mm in height), minimum thickness shall be 12.7 mm.

.1 Performance Criteria: to meet or exceed the requirements of Ontario Building Code, and CSA A500.

.2 Type: 2 tempered; Class: B float.

.3 Category: ANSI Z97.1 Class A.

.4 Thickness: ≥ 10 mm.

2.5 CERAMIC FRITTED GLASS

.1 Where ceramic frit is specified and noted on Drawings, it shall meet the following minimum requirements:

.1 Heat-treated flat glass with factory-applied ceramic frit coating, to ASTM C1048.

.1 Kind: HS – heat-strengthened and FT – fully tempered as specified.

.2 Condition: B – full coverage spandrel and C – patterned partial coverage, as specified.

.3 Base coat, to ASTM C1036.

.2 Ceramic frit: lead-free, factory-applied by silkscreen process prior to heat treatment; frit permanently fused to glass surface; colour and pattern as indicated on drawings.

.3 Coating properties: expansion fit and porosity tested to ASTM C1048 requirements; resistance to alkali and acid tested to ASTM C1048 requirements.

.2 Pattern: as indicated on Drawings with gradient opacity/density.

.1 Silk-screen pattern should be no more than 1.6 mm off parallel from locating glass edge and no more than 0.32 mm from edges other than locating glass edge.

.2 There shall be a maximum of 0.8mm variation in dot, hole or line location.

.3 Pattern. 5 mm dots on a grid at 45 degrees rotation. Dot spacing will vary depending on specified opacity. Refer to drawings for set-out opacity and gradient datums.

.4 White ceramic frit dots.

.5 Acceptable manufacturers:

.1 Pilkington.

.2 Viracon.

.3 Prelco.

.3 Apply on fire-rated glass; refer to Section 08 51 13.13.

2.6 ACCESSORIES

.1 Glazing Film (warning dots): to item 2.1 SAFETY WARNING STRIPS of Section 08 87 53 – Glazing Films.

.2 Perimeter Joint Sealant: in accordance with Section 07 92 00 – Joint Sealants, compatible with secondary edge sealant.

.3 Glazing sealant: Type as recommended by glazing manufacturer as required to meet or exceed performance requirements. Verify compatibility with insulating glass unit secondary sealant.

.4 Sealant for glazing between edges of glass units: one component silicone base, non-acidic, non-corrosive qualifying to ASTM C920. DOWSIL 795 Silicone Building Sealant by Dow, SilPruf SCS2000 Series by Momentive (GE Silicones), or similar as required to meet performance requirements..

.5 Heel bead: DOWSIL 795 Silicone Building Sealant by Dow or SilPruf SCS2000 Series by Momentive (GE Silicones), or similar as required to meet performance requirements.

.6 Two-Part Structural Glazing Silicone Adhesive: ETA-approved and evaluated to a tensile strength of not less than 1.6 N/mm^2; approved and recommended by glass manufacturer.

.7 Setting blocks: Neoprene, 80-90 Shore A durometer hardness to ASTM D2240, to suit glazing method, glass light weight and area.

.8 Spacer shims: Neoprene, 50-60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self-adhesive on one face.

.9 Glazing tape:

.1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D2240; coiled on release paper; black colour.

.2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2%, designed for compression of 25%, to effect an air and vapour seal.

.10 Glazing compound for fire rated glazing materials:

.1 Glazing Tape: Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2%, designed for compression of 25% to affect an air and vapour seal.

.2 Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50% in both extension and compression (total 100%); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable.

.1 Standard of Acceptance:

.1 Dow, DOWSIL 795

.2 General Electric Co., Silglaze-II 2800

.3 Tremco Canada, Spectrum 2

.3 Setting Blocks: Hardwood, glass width by 100 mm x 5 mm thick.

.4 Spacers: Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness, adhesive-backed on one face only, tested for compatibility with specified glazing compound.

.5 Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

.11 Glazing splines: resilient polyvinyl chloride, extruded shape to suit glazing channel retaining slot, black colour.

.12 Glazing clips: manufacturer's standard type.

.13 Lock-strip gaskets: to ASTM C542.

.14 Other Glazing Accessories: to CAN/CSA A440.

.15 Screws, bolts and fasteners: ASTM F738M; Type 304 stainless steel.

.16 Glass presence markers: easily removable, non-residue depositing.

2.7 FABRICATION

.1 Verify glazing dimensions on Site.

.2 Clearly label each glass light with maker's name, weight, quality, type and certification number. Do not remove labels until after work has been reviewed by Consultant.

.3 Accurately size glass to fit openings allowing the clearances shown on the following tables:

.1 Minimum glass clearances:

Thickness	Edge Clearance	Face Clearance
2 mm	3 mm*	1.5 mm
3 mm	3 mm*	3 mm
4 mm	3 mm*	3 mm
5 mm	3 mm*	3 mm
6 mm	5 mm	3 mm
6 mm	6 mm	3 mm
over 6 mm	6 mm or 3/4 times the glass thickness, whichever is greater	

* = where any dimension of glass exceeds 760 mm increase minimum edge clearance by 1.5 mm.

.4 Bite of glass edge on stop:

.1 Up to 1270 mm united size: 6 mm minimum.

.2 1270 mm to 2540 mm united size: 10 mm minimum.

.3 Over 2540 mm united size: 13 mm minimum.

Part 3 Execution

3.1 COMPLIANCE

.1 Install work in accordance with the Quality Assurance provisions specified in this Section and manufacturer's printed instructions, data sheets, and standard details.

.2 Size glass to Ontario Building Code 2024 requirements, and verify glass for openings are correctly sized and are within allowable tolerances. Install glass with full contact and adhesion at perimeter. Maintain edge clearance recommended by glass manufacturer.

.3 Work shall meet or exceed requirements of CAN/CSA A440.4, GANA Glazing Manual, and GANA Laminated Glazing Reference Manual.

3.2 EXAMINATION

.1 Verify that openings for glazing are correctly sized and within tolerance.

.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

.3 Commencement of work means acceptance of existing conditions.

3.3 PREPARATION

.1 Ensure all wood backing rebates and stops properly primed and finished, coordinate with work of Division 06 and Division 08.

.2 Ensure all glazing rebates are smooth and true, free of projections nails, screws, with fastenings properly set to prevent contact with glass.

.3 Ensure all stops, splines, glazing accessories provided by others are accurately cut to length and proper size and type for specific glazing.

.4 Clean contact surfaces with solvent and wipe dry.

.5 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.6 Prime surfaces scheduled to receive sealant.

3.4 INSTALLATION - GENERAL

.1 Use method best suited to glass size, location and site conditions as recommended by GANA Glazing Manual.

3.5 INSTALLATION: INTERIOR - DRY METHOD (TAPE AND TAPE)

.1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.

.3 Place setting blocks at ¼ points, with edge block maximum 150 mm from corners.

.4 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.

.5 Place glazing tape on free perimeter of glazing in same manner described.

.6 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

.7 Knife trim protruding tape.

3.6 INSTALLATION: INTERIOR WET/DRY METHOD (TAPE AND SEALANT)

.1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.2 Cut glazing tape to length and install against permanent stops, projecting 1.6 mm above sight line.

.3 Place setting blocks at ¼ points, with edge block maximum 150 mm from corners.

.4 Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of light or unit.

.5 Install removable stops, with spacer shims inserted between glazing and applied stops at 600 mm intervals, 6 mm below sight line.

.6 Fill gaps between light and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.

.7 Trim protruding tape edge.

3.7 FIRE RATED GLASS

.1 Comply with GANA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.

.2 Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.

.3 Place hardwood setting blocks located at quarter points of glass with edge block no more than 150 mm from corners.

.4 Glaze vertically into labelled fire rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.

.5 Place glazing tape on free perimeter of glazing in same manner described above.

.6 Do not remove protective edge tape.

.7 Install removable stop and secure without displacement of tape.

.8 Do not pressure-glaze.

.9 Knife trim protruding tape.

.10 Provide minimum 5 mm edge clearance.

.11 Install vision panels in fire rated doors to requirements of NFPA 80.

.12 Install so that appropriate fire rating labels and markings remain permanently visible.

3.8 INSTALLATION: GLASS FILM

.1 Install plastic glass film, applied in accordance with film manufacturer's instructions.

.2 Place without air bubbles, creases or visible distortion.

.3 Fit tight to glass perimeter with razor cut edge.

3.9 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services: Upon Consultant's written request provide periodic site visits by manufacturer's field service representative.

3.10 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.1 Prevent overspray and/or splashes to adjacent surfaces.

.2 Clean spills, splashes and/or or overspray immediately using manufacturer's recommended cleaners and procedures.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.11 PROTECTION

.1 Protect installed products and components from damage during construction. After installation, mark light with an "X" by using removable plastic tape or paste. Do not mark heat absorbing or reflective glass units.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.12 SCHEDULE

.1 The following table establishes minimum glass thicknesses for interior glass sidelights, screens, windows and doors, or as otherwise required by OBC 2024 as amended. Where glass thickness is indicated on Drawings, the indicated thickness is the minimum thickness required.

Table A

Area	Framed Panel	Free Standing Glass or Glass Located within 1067 mm of floor.
≤ 3.7 m^2	6 mm annealed float glass	6 mm tempered
3.7 m^2 to 5.5 m^2	6 mm annealed float glass	10 mm tempered
5.5 m^2 to 11.1 m^2	10 mm annealed float glass	13 mm tempered
> 11.1 m^2	Design glass on an individual basis.	

.2 Schedule: as specified herein and as indicated on Drawings.

.3 Coordinate requirements with Section 08 11 13, Section 08 51 13.13 and Section 10 22 23.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the Contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 08 80 50 – Glazing.

.3 Refer to Drawings.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI Z97.1-2026, Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

.2 Consumer Product Safety Commission Publications (CPSC)/Code of Federal Regulations (CFR)

.1 CPSC, 16 CFR 1201 CAT I.
.2 CPSC, 16 CFR 1201 CAT II.

.3 General Services Administration (GSA)

.1 GSA-TS01-2003, Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings.

.4 International Window Film Association (IWFA)

.1 WFA Visual Quality Standard for Applied Window Film 1999.

.5 UL Solutions (UL)

.1 UL 972-06 (R2025), Burglary-Resisting Glazing Material.

.6 UL Solutions in Canada (ULC)

.1 ULC 332-93 (R2016), Standard for Burglary Resisting Glazing Material.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals shall meet the requirements of Section 01 33 00 – Submittal Procedures.

.2 Submit product data, including data sheets, installation instructions, standard details, and specifications.

.3 Submit samples:

.1 Submit one 500 x 500 mm sample of glazing film of each product colour specified.

.4 Submit warranty.

.5 Submit Closeout Submittals in accordance with Section 01 78 00 – Closeout Submittals.

.1 Provide operation and maintenance data for window film for incorporation into manual specified in Section 01 78 00 – Closeout Submittals.

.2 Follow manufacturers written instructions for care and maintenance of security and safety film.

.3 Use only cleaning solution recommended by manufacturer for regularly scheduled cleaning of security film.

1.4 QUALITY ASSURANCE

.1 Film installation Subcontractor to be factory approved and have a minimum of 3 years' documented experience on not less than 5 similar installations.

.2 Comply with requirements of the International Window Film Association (IWFA).

.3 Use adequate numbers of skilled workmen, thoroughly trained and experienced in the installation of this film system.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Provide and maintain dry, off-ground weatherproof storage.

.3 Store rolls of film flat on cross supports. Do not stand rolls of film on end.

.4 Remove from storage, in quantities required for same day use.

.5 Store materials in accordance with manufacturers written instructions.

1.6 WARRANTY

.1 Contractor hereby warrants that Security and Safety Film will stay in place without delaminating, peeling, or blistering for 10 years from date of Substantial Performance.

.2 Ensure warranty includes items as follows:

.1 Maintaining adhesion properties without blistering, bubbling, or delaminating from glass surface.

.2 Maintaining appearance without discolouration.

.3 Removing, replacing, and reapplying defective materials.

Part 2 Products

2.1 SAFETY WARNING STRIPS

.1 Decorative Pattern Film – Safety Warning Strips: polyester film adhered to face of glass, with the following minimum performance characteristics and material properties:

.1 Adhesive Colour: Clear

.2 Adhesive Type: Pressure-sensitive

.3 Applications: Windows/Glass surfaces

.4 Application Temperature (C): +10°C minimum (air and substrate)

.5 Two horizontal rows of translucent (frosted) series of shapes or patterns per Signage Drawings: one row at 1475 mm above finished floor. One row at 1170 mm above finished floor. Rectangles in row above to align with rectangles in row below.

.1 Pattern: series of rectangles

.2 Dimensions of rectangles to be 100 mm (4") high x 13 mm (1/2") wide, spaced at 25 mm (1") clear as indicated on each elevation.

.3 Applied to room side face of glass

.4 Review layout with Consultant prior to application.

.6 Provide full sheets for applications requiring the entire glass panel to receive privacy film. Refer to Drawings for locations.

.7 Manufacturer's Warranty: 15 years

.8 Opacity: 90% (10% Translucent)

.9 Removability: Permanent

.10 Removal Method: removable with a heat gun at 80°C – 100°C.

.11 Surface Finish: Matte

.12 Surface Type: Flat

.13 Thickness (film): 50 µm

.14 Acceptable Materials:

.1 3M Company.

.2 Llumar.

2.2 GLAZING FILM ACCESSORIES

.1 Tools and accessories: types as recommended by glazing film manufacturer.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Check and verify that no irregularities exist that would affect quality of execution of work specified.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's printed preparation and installation instructions, technical datasheets, and specifications.

3.2 PREPARATION

.1 A thorough cleaning of the glazing and frame systems before applying film and attachment is required to remove all foreign matter and contaminants such as adhesives, grease, oil, dust, water, surface dirt, old sealant or glazing compounds by using 3M Citrus Base Cleaner, alcohol or commercial cleaning solution. Detergent or soap and water treatments are not recommended for this step.

.2 Assess the type of glazing stop and with an Olfa knife, trim as much of the rubber as possible without disturbing the window seal or allowing the rubber to fall into the glazing channel.

.3 Spray the glazing bead, glass and frame surface with an appropriate cleaning product and remove with a lint free cloth. Repeat If necessary to remove all foreign materials from the glass and inside window frame surfaces. If the area is particularly dirty, a light scrub with a 3M 0000 Super Fine Synthetic Steel Wool Pad is recommended to loosen contaminates. Finish with a final cleaning if needed.

.4 Spray the glass with 3M Foaming Glass Cleaner or a soap and water solution. Flush the glazing bead to glass area starting at the top and working down to drain or remove any remaining contaminant from the area. Scrape the glass with a razor to remove all foreign matter. Thoroughly clean the glass a final time with soapy water and a window cleaning squeegee. Wipe around the glazing bead and frame area one final time to remove all of the soap and water solution.

3.3 SAFETY WARNING STRIPS APPLICATION PROCEDURE

.1 Install safety warning strips at height above finished floor as indicated, level, straight and true.

.2 Comply with glazing film manufacturer's written installation instructions.

.3 Application substrate is flat glass only and the recommended application temperature is from +12°C to +38°C (air and substrate).

.4 Handle with care since material is thinner and folded more easily than regular interior decorating films.

.5 Use the squeegee with appropriate hardness recommended by film manufacturer.

.6 Carefully clean the glass and frame before application to remove dusts from the surface (see item 'Preparation' above).

.1 Use the aqueous solution of mild detergent during application to make film alignment easier. Apply it evenly to the adhesive side and glass surface while using the aerosol can.

.2 Position the film onto the glass substrate. Due to the moisture it is possible to slight with the film to the right position. Apply the entire film to the glass with even pressure.

.3 Apply the aqueous solution again to the already fixed film. Start application with using the squeegee from the middle to the left and right. Use right pressure to be sure that all water is pressed out.

.4 Dry the whole application. Be careful within drying at the edges to avoid lifting.

3.4 APPLICATION PRECAUTIONS

.1 Do not overlap the films. The product will be out of warranty in case of overlapping application.

.2 Striking the film surface with hard objects could damage it. Do not scratch it with metal or other objects.

.3 Do not apply stickers or seals to the film or write on it with markers.

.4 When jointing films, there could be a slight difference in appearance in colour, etc., depending on the product lot, so do not use products from different lots next to each other.

.5 The surface of the film could be damaged by burrs on the ruler used during joint. Be sure to use a ruler that has no burrs. Further, take such measures as putting masking tape on the back of the ruler. Especially for black films, the scratches on them are highly visible.

3.5 INSTALLER'S INSPECTION

.1 Visual Inspection: in accordance with IWFA - Visual Quality Standard for Applied Window Film.

.2 Remove and replace film that continues to show blisters, bubbles, tears, scratches, edge defects, or vision distortion in film when viewed under natural daylight from 2 m minimum after 30-day period.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 - General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 - General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.1 Wash interior and exterior of each window, glass panel and film using cleaning solution recommended by glazing film manufacturer.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.8 SCHEDULE

.1 Install glazing films as inidicated.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 01 73 29 – Cutting and Patching.

.3 Section 02 41 20 - Selective Interior Demolition.

.4 Section 06 40 00 – Finish Carpentry and Casework.

.5 Section 07 92 00 - Joint Sealants.

.6 Section 09 21 16 – Gypsum Board Assemblies.

.7 Section 09 51 15 – Acoustical Panel Ceilings.

.8 Section 09 53 00.01 – Acoustical Suspension.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Construction Meetings: Meet on site at the location of required demolitions and repairs in accordance with Section 01 10 00 - Summary before ordering materials to review existing conditions affecting work of this Section, determine ceiling and framing and suspension systems types, patching and repair procedures and protection of existing interior components and installed new Work from damage during construction, attended by the following:

.1 Consultant.

.2 Contractor.

.3 Related trade(s).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures:

.1 Provide manufacturer's printed product literature, specifications and datasheets for ceiling and suspension system components and include product characteristics, performance criteria, physical sizes, thicknesses, finishes and limitations.

.2 Submit samples in accordance with Section 01 33 00 – Submittal Procedures:

.1 Submit sample of each component of ceiling system. Samples shall fully represent materials to be supplied in colour, texture, finish and construction.

.2 Submit samples, load test data and design tables for each type of insert to be used in the Work for hanger supports.

1.4 SITE CONDITIONS

.1 Commence installation after building is enclosed with windows and exterior doors in place and glazed, and roof watertight.

.2 Interior temperature of building to range from 15 °C (4 °F) to 30 °C, (86 °F) and relative humidity of not more than 70% before and during installation.

Part 2 Products

2.1 MATERIALS

.1 Provide all materials as required to perform ceiling repairs that provide a waterproof roof equal to or better in quality to the adjacent original ceiling.

.1 Materials: compatible with existing ceiling type(s).

.2 Accessories: compatible with existing ceiling type(s).

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Check and verify that no irregularities exist that would affect quality of execution of work specified.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 PREPARATION

.1 Building Protection: Provide tarps and hoarding as required to protect existing building finishes and assemblies from work of this Section; clean any spills and repair any damaged materials resulting from work of this Section.

3.3 COORDINATION AND SEQUENCING

.1 Coordinate and sequence work with work of other trades to ensure proper installations, maintenance of project construction schedule, and completion of necessary work that is required above suspended ceiling system. Do not install panels until work above ceiling panels has been reviewed by Consultant.

.2 Coordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

3.4 CEILING REPAIRS

.1 Remove existing ceilings and framing and suspension systems to accommodate new construction, demolition and relocations:

.1 Remove existing ceiling assembly to expose substrates.

.2 Clean and prepare surfaces ready for new materials.

.2 Provide and install new materials as required to form a complete and continuous ceiling assembly:

.1 Include additional trims and accessories.

.2 Complete work of this Section in accordance with original design intent of existing ceiling assembly.

.3 Tie-in to existing ceiling system components to remain in a manner that maintains integrity of system performance.

.3 Restore existing ceiling system components to original condition, remove construction debris and leave area of work in a condition acceptable to the Consultant; remove all traces of splashed or spilled materials.

.4 Restore existing ceiling system components to original condition, matching colour and profile where repairs are observable from grade or from other parts of the building.

.5 Where indicated, paint existing ceiling grids as indicated on Reflected Ceiling Plan and Finish Schedule.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Construction Waste Management. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This Section includes requirements for supply of equipment and services necessary for mechanical preparation of existing substrates to receive new flooring finishes.

1.2 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 02 41 20 – Selective Interior Demolition.

.3 Section 03 01 30.71 - Concrete Repairs and Finishing.

.4 Section 09 05 23 - Common Work Results for Flooring Preparation: Floor levelling and toppings required for improved floor flatness tolerances relating to applied finishes.

.5 09 65 16 – Resilient Flooring

.6 Refer to Drawings.

1.3 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM D4258-23, Standard Practice for Surface Cleaning Concrete for Coating.

.2 ASTM D4259-24, Standard Practice for Preparation of Concrete by Abrasion Prior to Coating Application

.2 International Concrete Repair Institute (IRCI)

.1 IRCI Technical Guideline No. 310.2R-2013, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate work of this Section with requirements of floor levelling and topping materials specified in Section 09 05 23 – Common Work Results for Flooring Preparation for surface profile.

.2 Pre-Construction Meetings: Conduct a pre-construction meeting to discuss existing concrete slab condition, procedures proposed for substrate preparation, surface profile requirements for installation of levelling products in accordance with Section 01 10 00 – Summary, attended by Consultant, Contractor, Subcontractor and other Subcontractors or Suppliers affected by work of this Section.

.1 Pre-existing Conditions – Hazardous Materials:

.1 Any work that involves contact with pre-existing hazardous materials shall meet Province of Ontario and Government of Canada requirements, and conform to the directions of authorities having jurisdiction and Owner's environmental consultant.

.3 Scheduling: Schedule work of this Section to occur during non-work hours in occupied buildings to minimize disturbance to adjacent spaces.

1.5 ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures:

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Product Data: Submit product data sheets describing mechanical preparation methods and cleaning methods and equipment proposed for use on project.

.3 Informational Submittals: Provide the following submittals before starting any work of this Section:

.1 Dust and Water Control Plan: Submit written description of materials and procedures used to control and remove dust and water from work area, methods to prevent spread of dust and water to adjacent occupied spaces and to prevent contamination of HVAC systems.

1.6 QUALITY ASSURANCE

.1 Qualifications: Provide proof of qualifications when requested by Consultant:

.1 Installer: Use installer having experience in preparation of flooring substrates of similar extent and complexity as required for this Project, using equipment and methods to reduce risk of damage to substrates.

Part 2 Products

2.1 EQUIPMENT

.1 Surface Preparation Equipment: Use equipment of type recommended by Subcontractor that minimizes dust and water generation, and that provides surface profiles required by subsequent floor levelling, and as follows:

.1 CSP 2 through CSP 4 Surface Profiling: Abrasive blast or grinding type equipment with vacuum recovery systems to control dust and collect surface aggregate.

.2 CSP 3 through CSP 8 Surface Profiling: Dry shot blast type equipment with vacuum recovery systems to contained blast materials and collect surface aggregate.

.3 CSP 2 through CSP 10 Surface Profiling: Mechanical impact or high or ultra-high pressure water jet type equipment with aggregate and effluent recovery system.

.2 Limitations: Notify and obtain acceptance from Consultant where surface profiling required by floor levelling use of high or ultra-high pressure water jet, or mechanical impact methods that have moderate to high potential to cause microcracking before starting work of this Section:

.1 Consultant may consider alternate methods of floor preparation when less damaging methods are not practical based on site conditions or timing of work required by this Section.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that work of others affected by this Section, or work required by this Section is complete before starting mechanical preparation and surface profiling and as follows:

.1 Confirm degree of floor profile require for installation of floor levelling specified in other Sections before starting work of this Section.

.2 Starting work of this Section denotes acceptance of site conditions and implementation of surface profile required of floor levelling required by other Sections.

3.2 PREPARATION

.1 Use methods that reduce potential for microcracking of concrete substrates, and that minimize the amount of water or residue clean-up.

.2 Prepare concrete substrate and create surface profile in accordance with ASTM D4259; clean concrete in accordance with ASTM D4258 using methods compatible with levelling, and as follows:

.1 Prepare surface profiles required by levelling in accordance with ICRI Technical Guideline No. 310.2.

.2 Acceptable substrate surfaces will be free of laitance, oil, grease, flooring adhesive, paint, and other surface contaminates capable of affecting bond of specified floor finishes to concrete substrate.

.3 Prepare surfaces to receive Self-Levelling Underlayment as specified in Section 09 05 23 - Common Work Results for Flooring Preparation to minimum CSP 3 or as otherwise required by Self-Levelling Underlayment manufacturer.

3.3 SITE QUALITY CONTROL

.1 Testing and Inspection Agency: Owner will appoint inspection and testing agency in accordance with Section 01 40 00 – Quality Requirements, and as follows:

.1 Notify Consultant, and inspection and testing agency with sufficient timing to allow reasonable opportunity for review; provide assistance and access to the Work.

.2 Inspection and testing will include visual inspection of completed substrate preparation to verify that contamination is removed and specified ICRI surface profile are achieved using ICRI standard rubber mold for visual comparison.

.2 Non-Conforming Work: Repair work that does not meet specified ICRI surface profile at no additional expense to the Owner.

3.4 PROTECTION

.1 Protect prepared substrates from contamination; re-clean substrates that are contaminated by construction operations prior to installation of specified floor levelling.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This Section includes requirements for preparation of existing slabs to receive applied flooring for installation required flatness, and levelness.

1.2 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 09 05 13 – Mechanical Preparation of Flooring Substrates: Preparation of concrete substrates to receive self-levelling underlayments.

.3 Section 09 65 00 – Resilient Flooring: Coordination with minimum requirements for substrate flatness, levelness and patching of surface imperfections that prevent achieving specified installation.

.4 Division 21 – Fire Suppression: Coordination of pipes and pipe fittings and other materials penetrating floor assemblies.

.5 Division 22 – Plumbing: Coordination of pipes and pipe fittings and other materials penetrating floor assemblies.

.6 Division 23 – Heating, Ventilation and Air Conditioning: Coordination of ductwork and other materials penetrating floor assemblies.

.7 Division 25 – Integrated Automation: Coordination conduit and other materials penetrating floor assemblies.

.8 Division 26 – Electrical: Coordination conduit and other materials penetrating floor assemblies.

.9 Division 27 – Communications: Coordination conduit and other materials penetrating floor assemblies.

.10 Division 28 – Electronic Safety and Security: Coordination conduit and other materials penetrating floor assemblies.

1.3 REFERENCES

.1 Southern Coast Air Quality Management District (SCAQMD):

.1 SCAQMD Rule 1113-16, Architectural Coatings.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate compatibility of products specified in this Section with adhesive products specified in Section 09 65 00 - Resilient Flooring, submit Compliance Certification in accordance with items below.

.2 Pre-Construction Meetings: Arrange for Pre-Construction Meeting in accordance with Division 01 – General Requirements, Standard Documents Package, with Construction Manager, Subcontractor, Subcontractors or suppliers affected by the Work of this Section, and Consultant to discuss installation requirements and site reviews required by the Consultant.

.1 Pre-existing Conditions – Hazardous Materials:

.1 Any work that involves contact with pre-existing hazardous materials shall meet Province of Ontario and Government of Canada

requirements, and conform to the directions of authorities having jurisdiction and Owner's environmental consultant.

.3 Provide minimum 72 hours to Consultant before starting Work of this Section; increase notice period where time period spans weekends or statutory holidays.

1.5 PERFORMANCE REQUIREMENTS

.1 Volatile Organic Compound (VOC) Limitations: Provide products for each site applied coating used within the building envelope (interior side of weatherproofing system) complying with the VOC Limits established by South Coast Air Quality Management District Rule #1113, Architectural Coatings.

1.6 ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

.1 Provide required information in accordance with Section 01 33 00 – Submittal Procedures.

.2 Action Submittals: Provide the following submittals before starting any Work of this Section:

.3 Product Data: Submit product data for products specified indicating physical properties, performance characteristics, acceptability of substrates, application limitations and test results.

.1 Submit all documentation and calculations as required to confirm project compliance.

1.7 QUALITY CONTROL

.1 Qualifications: Provide proof of qualifications during the course of the Work of this Section:

.1 Manufacturer: Obtain specified products through one source from a single manufacturer or using materials from a secondary source that are acceptable to the manufacturer.

.2 Installer: Install using personnel experienced in installation of flooring preparation products specified in this Section who are trained, licenced or otherwise approved by the manufacturer.

.2 Certifications: Provide proof of the following during the course of the Work:

.1 Compliance Certification: Provide letter from flooring adhesive manufacturers stating that product selected from Acceptable Products specified in this Section is compatible with flooring adhesives specified in Sections listed in Related Requirements.

1.8 SITE CONDITIONS

.1 Ambient Conditions: Maintain air temperature and substrate temperature in accordance with manufacturer's printed installation instructions.

Part 2 Products

2.1 MANUFACTURERS

.1 Acceptable Products Manufacturers: Subject to compliance with requirements specified in this Section; where multiple listings of manufacturers occur, use any of the following listed manufacturers' Products in accordance with Division 01 – General Requirements:

.1 Ardex Engineered Cements.

.2 Custom Building Products,

.3 MAPEI Canada Inc.

.4 Sika Canada Ltd.

.5 W.R. Meadows of Canada.

.2 Unsolicited Substitutions: Consultant may consider additional manufacturers having similar products to Acceptable Products Manufacturers listed above during the construction period, provided they meet the performance requirements established by the named Products and provided they submit requests for substitution in accordance with Section 01 25 00 – Substitution Procedures, Standard Documents Package, before starting any work of this Section:

.1 Do not use substitute materials to establish Bid Price.

.2 Apparent Substitutions that appear as a part of the Project without review and acceptance by the Consultant will be rejected, and replaced with one of the specified Products.

2.2 PATCHING AND LEVELLING MATERIALS

.1 Underlayment: Cementitious, self-levelling, single component, polymer modified underlayment with manufacturer's recommended primer and crack repair materials; for application thicknesses to a minimum feather edge to 13 mm; interior grade and as follows:

.1 Standard of Acceptance:

.1 K 15 Premium Self Levelling Underlayment, Ardex.

.2 CustomTech TechLevel 150, Custom Building Products

.3 Novoplan® 2 Plus, MAPEI.

.4 Sikafloor Level 125, Sika.

.5 Sure-Flo ST, W.R. Meadows.

.2 Patching and Flash Patching Materials: Cementitious based, polymer modified, fine aggregate, single component, rapid curing, early strength floor patching compounds having high adhesion with manufacturer's recommended primer and surface profile; for application in thicknesses from 4 mm to 25 mm, and as follows:

.1 Standard of Acceptance:

.1 SD-P, Ardex.

.2 CustomTech TechPatch MP, Custom Building Products

.3 Mapecem 101, MAPEI.

.4 SikaQuick 1000, Sika.

.5 Sealtight Meadow-Crete H, W.R. Meadows.

.3 Fine Finish Flash Patching Materials: Cementitious based, polymer modified, fine aggregate, single component, ultra-fast drying, early strength floor patching compounds having high adhesion with manufacturer's recommended primer and surface profile; for application in thicknesses from 0 mm to 6 mm, and as follows:

.1 Standard of Acceptance:

.1 SD-F Feather Finish®, Ardex.

.2 CustomTech Silk Patch, Custom Building Products

.3 Planipatch®, MAPEI.

.4 Sika® Level SkimCoat CA, Sika.

.5 Sealtight Meadow-Patch® T1, W.R. Meadows.

2.3 ACCESSORIES

.1 Primer: Product compatible with and as recommended by patching and levelling product manufacturer.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: Verify concrete substrates before beginning of installation of Products specified in this Section.

.1 Ensure concrete floors are dry by using test methods recommended by flooring manufacturer, and exhibit negative alkalinity, carbonization or dusting.

.2 Installation of products specified in this Section will denote acceptance of site conditions.

3.2 PREPARATION

.1 Surface Preparation – General:

.1 All substrates must be structurally sound, dry, solid and stable.

.2 Substrate must be clean and free of dust, dirt, oil, grease, paint, curing agents, concrete sealers, latex compounds, loosely bonded toppings, loose particles, laitance, adhesive residue, and any other substance or condition that may prevent or reduce adhesion.

.3 Ensure substrates are sound, level, free of cracks greater than 3 mm in width, and changes in elevation that may adversely affect installation.

.4 Ensure concrete is free of any negative hydrostatic pressure and excessive moisture.

.2 Surface Preparation – Underlayments and Overlayments:

.1 Prepare and mechanically profile concrete slabs in accordance with Section 09 05 13 - Mechanical Preparation of Flooring Substrates.

.1 Ensure substrate and ambient room temperatures are between 10°C and 35°C before application and for 72 hours after application.

3.3 INSTALLATION – UNDERLAYMENTS

.1 Mixing:

.1 Mix in a clean mixer in accordance with manufacturer's written instructions. Use appropriate mixing and delivery method in accordance with area to receive underlayment.

.2 If pump mixing is being used, periodically clean pump in accordance with manufacturer's written instructions.

.1 Do not overwater.

.2 Thoroughly mix with high-speed mixer (at about 1100 rpm) to a homogenous, smooth, lump-free consistency.

.3 Do not overmix; which could cause air to become trapped, shortening the pot life or cause pin holing during application and curing.

.3 Application:

.1 Place Product in a ribbon pattern to achieve a continuous flow of wet material to avoid trapping air or creating a cold joint.

.2 Set width of pour that is ideal for maintaining a wet edge throughout placement; adjust width of pour to maintain wet edge.

.3 Immediately after placing Product, spread with gauge rake; smooth surface after achieving required thickness.

3.4 INSTALLATION – PATCHING AND FLASH PATCHING PRODUCTS

.1 Mixing:

.1 Mix in a clean container in accordance with manufacturer's written instructions.

.2 Do not overwater.

.3 Thoroughly mix with low-speed mixer (at about 300 rpm) to a smooth, lump-free consistency.

.4 Do not mix more material than can be applied within eight to ten minutes.

.5 Avoid air entrapment and prolonged mixing, which will shorten pot life.

.2 Application:

.1 Select an appropriate flat-edge steel trowel.

.2 Immediately apply mixed patching and levelling products to substrate, according to the desired thickness. Do not exceed manufacturer's maximum single-coat thickness.

.3 Blend into the surrounding area and finish to the required smoothness

3.5 PROTECTION

.1 Protect from traffic dirt or dust from other trades until the final installation of the floor covering.

.2 Allow for extended periods of cure and protection when temperatures drop below 16°C and/or when relative humidity is higher than 70%.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the Contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 05 50 00 – Metal Fabrications.

.3 Section 06 10 00 – Rough Carpentry.

.4 Section 08 40 00 – Finish Carpentry and Casework.

.5 Section 07 84 00 – Firestopping and Smoke Seals.

.6 Section 07 92 00 – Joint Sealants.

.7 Section 09 22 00 – Non-Structural Metal Stud Framing.

.8 Section 09 84 10 – Acoustic Treatment.

.9 Section 09 84 53 – Sound Barrier Mullion Trim Cap.

.10 Coordinate with other Sections as required for finishes and built-in blocking and supporting structures.

.11 Drawings.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM A653/A653M-25a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM C475/C475M-17(2022), Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.3 ASTM C557-03(2026), Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.

.4 ASTM C645-24, Standard Specification for Nonstructural Steel Framing Members.

.5 ASTM C840-25, Standard Specification for Application and Finishing of Gypsum Board.

.6 ASTM C954-22, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.

.7 ASTM C1002-22, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.8 ASTM C1047-19, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

.9 ASTM C1396/C1396M-24, Standard Specification for Gypsum Board.

.10 ASTM C1325-25, Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units.

.11 ASTM C1658/C1658M-19(2024), Standard Specification for Glass Mat Gypsum Panels.

.12 ASTM D3273-21, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

.13 ASTM D6464-03a(2017), Standard Specification for Expandable Foam Adhesives for Fastening Gypsum Wallboard to Wood Framing.

.2 CSA Group (CSA)

.1 CSA O86:24, Engineering design in wood, Includes Update No. 1 (2025) and Errata (2025).

.3 Gypsum Association (GA):

.1 GA-214-2022, Levels of Finish for Gypsum Panel Products.

.2 GA-216-2024, Application and Finishing of Gypsum Panel Products.

.4 UL Solutions in Canada (ULC)

.1 ULC 101-14 (R2021), Standard Methods of Fire Endurance Tests of Building Construction and Materials (CAN-ULC-S101-14-REV3).,

.2 ULC 102-18 (R2024), Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies (CAN-ULC-102-2019-(R2024)).

.3 ULC 702.1:2021, Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification (CAN-ULC-S702.1-2021).

.4 ULC 702.2-15 (R2023), Standard for Mineral Fibre Thermal Insulation for Buildings, Part 2: Installation (ULC-S702.2-15-(R2023)

.5 ULC 114-18 (R2024), Standard Method of Test for Determination of Non-Combustibility in Building Materials (CAN-ULC-114-2018-9R2024)).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet for each product specified.

.3 Shop Drawings:

.1 Submit shop drawings showing elevations, sections and details of construction.

.2 Delegated Design Requirements:

.1 For suspended ceiling applications, fire resistive rated walls, for walls exceeding 3050 mm in height, exterior soffits, locations with two or more thicknesses of gypsum board, and acoustical ceilings (with 2 layers of gypsum board and insulation), submit shop drawings designed and sealed by a Professional Engineer (P.Eng.) licenced to practice in the Province of Ontario, showing elevations, plans, sections and details, including engineering calculations.

.2 Submit confirmation of stud thicknesses and spacings to suit spans and conditions as required to satisfy OBC and L/240 maximum deflection.

.3 Submit STC assembly listing for each STC rated assembly for the work of this section.

1.4 QUALITY ASSURANCE

.1 Delegated Design: Subcontractor shall engage the services of a Professional Engineer (P.Eng.) licenced to practice in Ontario to design and seal shop drawings in accordance with the requirements of Section 01 35 01 – Delegated Design.

.2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.4 Fire-Test-Response Characteristics: For fire resistance-rated assemblies that incorporate non-loadbearing interior steel framing, provide materials and construction identical to those tested in assembly indicated according to ULC 101.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in original packages, containers or bundles bearing manufacturers brand name and identification.

.2 Store materials inside, level, under cover. Keep dry. Protect from weather, other elements and damage from construction operations and other causes.

.3 Handle gypsum boards to prevent damage to edges, ends or surfaces. Protect metal accessories and trim from being bent or damaged.

1.6 SITE ENVIRONMENTAL REQUIREMENTS

.1 Maintain temperature minimum 10 degrees C, maximum 21 degrees C for 48 hours prior to and during application of gypsum boards and joint treatment, and for at least 48 hours after completion of joint treatment.

.2 Apply board and joint treatment to dry, frost free surfaces.

.3 Ventilation: Ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

1.7 WARRANTIES

.1 The standard warranty of General Conditions of Contract is extended to 2 years from date of Substantial Performance.

.2 Submit manufacturer's standard limited warranty for each product supplied.

Part 2 Products

2.1 MANUFACTURERS

.1 Acceptable Manufacturers:

.1 National Gypsum Company (Gold Bond Building Products, LLC).
.2 CertainTeed Gypsum Canada Inc.
.3 CGC Inc.
.4 Georgia-Pacific Canada, Inc.
.5 Custom Building Products Ltd.

2.2 GYPSUM MATERIALS

.1 Standard Board: to ASTM C1396/C1396M and as follows:

.1 Type: regular and type X or C as required to suit assembly.
.2 Size: 1200 mm x maximum practical length.
.3 Thickness: as indicated on Drawings.
.4 Ends: square cut.
.5 Edges: tapered.
.6 Acceptable materials:
.1 Gold Bond® Fire-Shield® Gypsum Board, National Gypsum Company.
.2 ProRoc Wallboard (Type X), CertainTeed.
.3 Sheetrock (Firecode), CGC Inc.
.4 Toughrock Gypsum Wallboard (Fireguard), Georgia-Pacific Canada, Inc.
.5 Cabot Regular Board and Cabot Type X Light.

.2 Moisture and Mould Resistant Gypsum Board: to ASTM C1396 and as follows:

.1 Type: regular and fire resistant.
.1 Size: 1200 mm x maximum practical length.
.2 Thickness: as indicated on Drawings.
.3 GREENGUARD® Gold Certified.
.4 Achieves best possible score of 10 for mould resistance per ASTM D3273.
.5 Achieves best possible score of 0 for mould resistance per ASTM G21.
.6 Less than 5% water absorption by weight after 2-hour immersion per ASTM C473 test method.
.7 Acceptable materials:
.1 CGC Fiberock Aqua-Tough Interior Panels.
.2 CertainTeed M2Tech® Gypsum Board.
.3 Georgia Pacific Canada, ToughRock® Mold-Guard™ Gypsum Board.

.3 Acoustically Rated Board: to ASTM C1396/C1396M and as follows:

.1 Thickness: as indicated on Drawings.
.2 Edges: tapered.
.3 Acceptable materials:
.1 QuietRock as distributed by CertainTeed.

.4 High-Impact Gypsum Board (Abuse Resistant): high density, paperless gypsum panels with cellulose fibre reinforced facers and reinforcing fiber mesh to ASTM C1629/C1629M and ASTM C1278/C1278M and as follows:

.1 Locations: all Gypsum board exposed to corridors, and as indicated.
.2 Type: regular and fire resistant as required.
.3 Thickness: as indicated on Drawings.
.4 Surface Abrasion: Level 1 classification in accordance with ASTM C1629.
.5 Indentation Resistance: Level 1 classification in accordance with ASTM C1629.
.6 Soft Body Impact Resistance: Level 3 classification in accordance with ASTM C1629.

.7 Hard Body Impact Resistance: Level 3 classification in accordance with ASTM C1629.

.8 Locations: refer to item 3.19 BOARD SCHEDULE of this Section.

.9 Standard of Acceptance:

.1 Fiberock VHI Aqua-Tough Abuse Resistant Interior Panel (Type FRX), CGC Inc., or similar to same effect, with same or better physical properties and ASTM classifications.

.2 CertainTeed Extreme Impact Resistant Gypsum Board.

.3 CertainTeed, ProRoc Abuse Resistant Gypsum Board.

.5 Flexible Gypsum Board: Required for use at curved bulkhead and curved wall corners.

.1 Size: 1200 mm x maximum practical length.

.2 Thickness: 6.4 mm (1/4")

.3 GREENGUARD Gold Certified.

.4 Standard of Acceptance:

.1 CGC Sheetrock® Brand Flexible Gypsum Panels

.2 CertainTeed ¼" Flex Drywall Panel

2.3 FRAMING MATERIALS

.1 Metal stud framing, suspension systems and framing accessories and ancillary products: as specified in Section 09 22 00.

.2 Submit engineering report, prepared by Subcontractor's Delegated Design Engineer, for each floor, confirming steel thicknesses and sizes to suit spans and conditions.

.3 Provide engineered shop drawings as specified.

2.4 INSULATION MATERIALS – INTERIOR WALLS AND CEILINGS

.1 Mineral wool insulation for fire and smoke rated assemblies: un-faced preformed GreenGuard™ certified formaldehyde-free fibrous insulation meeting the requirements of ULC 702.1; having maximum flame spread and smoke developed of 20/20 in accordance with ULC 102 and being non-combustible in accordance with ULC 114, and as follows:

.1 Thickness: as indicated on Drawings, or, if between studs, then minimum full depth of stud cavity space.

.2 Standard of Acceptance:

.1 JM Mineral Wool Sound Attenuation Fire Batt (SAFB) Insulation, by Johns Manville, a Berkshire Hathaway company.

.2 Rockwool AFB®, by Rockwool International A/S.

.3 Thermafiber® SAFB™ Mineral Wool Acoustic Batt Insulation, by Thermafiber, Inc.

.4 Thermafiber® Fire & Sound Guard™, by Thermafiber, Inc.

.3 Additional Acceptable Products – Fibrous Glass Acoustical Insulation:

.1 EcoTouch® QUIETZONE® PINK® FIBERGLAS® Acoustic Insulation, Owen-Corning Canada Inc.

.2 Insulation for non-rated assemblies:

.1 Thickness: as indicated on Drawings; if between studs, then the minimum insulation thickness shall be as required to completely fill stud cavity.

.2 Standard of Acceptance – Mineral Wool Insulation:

.1 JM Mineral Wool Sound Attenuation Fire Batts (SAFB), by Johns Manville.

.2 Rockwool ComfortBatt® SS, by Rockwool International A/S.

.3 Thermafiber® UltraBatt™ Mineral Wool Thermal Batt Insulation, by Thermafiber, Inc.

.3 Additional Acceptable Products – Fibrous Glass Acoustical Insulation:

.1 NoiseReducer, Sound Control Fibre Glass Batts, CertainTeed.

.2 Sound Shield Glass Fibre Batts, Johns Manville.

.3 Quietzone Acoustic Insulation, Owen-Corning Canada Inc.

.4 EcoTouch® QUIETZONE® PINK® FIBERGLAS® Acoustic Insulation, Owen-Corning Canada Inc.

2.5 CEILING/WALL ACCESS DOORS

.1 Architectural, flush mounting access panels for gypsum board installation, thickness, and fire rating to match wall assembly, manufacturer's standard sizes selected to suit access requirements, complete with extruded aluminum frame, concealed hinge and a removable door panel, airtight gasket, and cylinder keyed latch mechanism. Confirm proposed location and number of access doors with Consultant prior to ordering and installation.

.1 Refer to Section 08 31 00 - Access Doors and Panels; Contractor shall determine trade allocation of scopes of work required and sequencing to maintain project schedule.

2.6 TRIM AND PROFILES

.1 Standard of Acceptance Manufacturer: Fry Reglet, products as follows:

.1 Reveal Moulding (Mid-Wall Reveal): DRM-625-75.

.2 Ceiling Trim (Gypsum Board to Gypsum Board): DRMCT-625-75.

.3 'J' Moulding (Edge Protection): JDM-625.

.4 "F" Moulding (Ceilings – Gypsum Board to Other Materials): DRMF-625-75.

.5 "Z" Moulding (Doors and Screens): DRMZ-625-75.

.2 ½" Architectural Z Shadow Bead: for drywall ceilings, where drywall ceiling it being met with brick wall.

.1 Standard of Acceptance: Trim-tex ½" x ½" Z Shadow, Trim-Tex AS5510.

.3 5/8" Architectural Reveal Bead:

.1 Standard of Acceptance: 5/8" x ½" Reveal – Trim-Tex AS5810.

.4 Other trim and mouldings as indicated, by Bailey Metal Products Limited, or equivalent.

2.7 ACCESSORIES

.1 Dielectric Separator / Isolation Coating: CRL Black Bituminous Paint – aerosol or paint, by C.R. Laurence of Canada.

.2 Screws: to ASTM C1002; for gypsum board to steel stud: bugle head, Philips drive, fine thread, self-tapping, Type S or S-12 point to suit stud gauge, with corrosion resistant finish. Screw sizing:

.1 #6 x 25 mm (1") for single thickness board fastening.

.2 #6 x 32 mm (1-1/4") for single thickness 15.9 mm (5/8") board fastening.

.3 #7 x 41 mm (1 5/8") for double thickness board fastening.

.3 Screws; for cement board: Wafer head, Type S-12 point or 'Hi-Lo', self-tapping, with corrosion resistant polymer finish.

.4 Drywall wood screws: to ASTM C1002.

.5 Hanger Wire: to Section 09 22 00 – Non-Structural Metal Stud Framing.

.6 Tie wire: 1.6 mm (0.063") diameter galvanized soft annealed steel wire.

.7 Steel Holdown connectors: Simpson Strong-Tie Company Inc., Holdown.

.8 Stud adhesive: to CAN/CGSB-71.25.

.9 Laminating compound: Green Glue Soundproofing compound, by Soundproofing Company Inc., or approved equivalent soundproofing adhesive.

.10 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, metal, zinc-coated by hot-dip process, 0.5 mm base thickness, perforated flanges, one-piece length per location. Gypsum board corner bead vertical corners shall be 3/4" round. Provide transition caps at the base and head, by Trim-Tex or similar.

.11 Strippable Edge Trim: Extruded PVC with pre-masked L-shaped tape on trim with tear away protective serrated strip for removal after compound and paint is applied, for use at areas where gypsum butts aluminum frames and where gypsum butts concrete or concrete block.

.12 TRIM-TEX 093V 10' Expansion/Control joint.

.13 Sound Barrier Materials: Flexible, decoupled barrier composite material for reducing breakout noise in pipes and ducts. Thickness: 0.250”.

.1 Standard of Acceptance:

.1 AcoustiGuard, Barymat BM-1A.

.14 Soundproofing clips and channels:

.1 Standard of Acceptance:

.1 Resilient IB-1 Sound Isolation Clips, by Soundproofing Company Inc., or approved equivalent.

.2 Use with 25 gauge 7/8" Drywall Furring Channels Only.

.15 Continuous acoustic gasket tape (isolation gasket tape or acoustic foam tape): peel-and-stick membrane applied directly to framing profiles (wood or steel) or perimeter tracks before the gypsum board is installed. It acts as an airtight seal and structural decoupler, which prevents airborne sound and structural vibrations from transmitting through the wall assembly.

.1 Acceptable Materials:

.1 Norseal V730 Acoustical Sealant Tape.

.2 SoundAway Neoprene/Integrity Gasket Tape.

.16 7/8" Drywall Furring Channels: D-1001 Drywall Furring Channel, minimum .033-inch material thickness, by Bailey Metal Products Ltd., or approved equivalent.

.1 Z275 hot dipped galvanized steel furring channels, 7/8” or 1-1/2” as required; refer to drawings.

.17 Acoustic sealant: non-hardening, non-skinning, permanently flexible and having VOC content less than the VOC limits of State of California's South Coast Air Quality Management District Rule #1168.

.18 CertainTeed ProRoc® Brand Level V Wall and Ceiling Primer / Surfacer, or approved equivalent.

.19 Joint Treatment Materials: Provide joint compound and accessory materials in accordance with ASTM C475 and as follows:

.1 Joint Tape:

.1 Interior Gypsum Board: Paper.

.2 Exterior Gypsum Soffit Board: Fibreglass mesh tape.

.3 Tile Backing Panels: As recommended by panel manufacturer.

.2 Joint Compound for Interior Gypsum Board: Vinyl based, non-asbestos, low dusting type compatible with other compounds applied on previous or for successive coats, and as follows:

.1 Pre-filling: Setting type taping compound.

.2 Embedding and First Coat: Drying type compound.

.3 Fill Coat: Drying type compound.

.4 Finish Coat: Drying type, sandable topping compound.

.5 Skim Coat: Drying type, sandable topping compound.

.1 Acceptable Materials:

.1 CertainTeed Dust Away.

.2 CGC Dust Control.

.3 Joint Compound for Tile Backing Panels:

.1 Gypsum based tile backing board: Use setting type taping and setting type, sandable topping compounds.

.4 Joint Compound for Interior Mould Resistant Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

.1 Pre-filling: Setting type joint compound.

.2 Embedding and First Coat: Setting type joint compound.

.3 Fill Coat: Setting type, sandable topping compound.

.4 Skim Coat: Setting type joint compound, sandable topping compound.

.20 Aluminum Foil Tape, 2 Mil, high strength aluminum foil coated with an aggressive, high temperature acrylic adhesive system.

2.8 FINISHES

.1 Wood Wall Paneling: to Section 06 40 00 – Finish Carpentry and Casework.

.2 Painting: to Section 09 91 00 – Painting.

.3 Other finishes as indicated.

Part 3 Execution

3.1 COMPLIANCE AND GENERAL PROVISIONS

.1 Comply with manufacturer's printed installation instructions and illustrations, technical datasheets and specifications.

.2 Install and finish gypsum board in accordance with ASTM C840 and GA-216, except where specified otherwise.

.3 Install gypsum sheathing assemblies in accordance with ASTM C1280, except where specified otherwise.

.4 Install hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C840, except where specified otherwise.

.5 Work shall meet or exceed Ontario Building Code 2024 requirements.

.6 Acoustic walls shall achieve a minimum Sound Transmission Class (STC) ratings as noted on Drawings. Erect, soundproof, and acoustically seal as required to meet this minimum requirement.

3.2 ISOLATION COATING

.1 Apply isolation coating to contact surfaces in contact with cementitious materials, wood materials, and dissimilar metals.

.2 Apply isolation coating into all drilled holes, onto all fasteners (e.g., bolts, screws, rivets) and between all flat surfaces (e.g., behind door handles, hinges, lamp-housings, diamond plate, mirror housing, latches, brackets, door trim, frame rails, suspension mounts, etc).

.3 Generally, 2 – 3 mil thickness is required per application. Each application needs enough product applied so that excess isolation coating "oozes out" during assembly (this will ensure you have created a proper seal).

.4 Assemble and wipe away any excess product.

3.3 ERECTION

.1 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.2 Install work level to tolerance of 1:1200.

.3 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.

.4 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.

.5 Furr gypsum board faced vertical bulkheads within and at termination of ceilings.

.6 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

.7 Install wall furring for gypsum board wall finishes in accordance with ASTM C840, except where specified otherwise.

.8 Furr openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.9 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

.10 Erect drywall resilient furring transversely across studs and joists spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 25 mm drywall screw.

.11 Install 150 mm continuous strip of 12.7 mm gypsum board along base of partitions where resilient furring installed.

3.4 APPLICATION

.1 Do not apply gypsum board until bucks, anchors, blocking, sound attenuation, electrical and mechanical work are approved.

.2 Before application of gypsum board commences, ensure that internal services have been installed, tested, and approved; that conduits, pipes, cables, and outlets are plugged, capped, or covered; and that fastenings and supports installed by others are in place.

.3 Unless otherwise specified, erect gypsum board vertically or horizontally, whichever results in the fewest end joints.

.4 Apply single or double layer gypsum board as indicated to metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm on centre.

.1 Single-Layer Application:

.1 Apply gypsum board on ceilings prior to application of walls in accordance with ASTM C840.

.2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.

.2 Double-Layer Application:

.1 Install gypsum board for base layer and exposed gypsum board for face layer.

.2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250 mm.

.3 Apply base layers at right angles to supports unless otherwise indicated.

.4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 250 mm with base layer joints.

.5 Apply gypsum board to concrete and concrete block surfaces, where indicated, using laminating adhesive.

.1 Comply with gypsum board manufacturer's recommendations.

.2 Brace or fasten gypsum board until fastening adhesive has set.

.3 Mechanically fasten gypsum board at top and bottom of each sheet.

.6 Apply mould-resistant gypsum board adjacent to slop sinks and janitor’s closets, in kitchen areas and washrooms (except where tile backer boards are used at tile locations). Apply mould-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads. Do not apply joint treatment on areas to receive tile finish.

.7 Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts, in partitions where perimeter sealed with acoustic sealant.

.1 Refer to Section 07 92 00 – Joint Sealant for sealant to be used.

.8 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.

.9 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.

.10 Install gypsum board with face side out.

.11 Do not install damaged or damp boards.

.12 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.5 SOUNDPROOFING REQUIREMENTS

.1 Acoustical sealant and plaster:

.1 Apply two bead caulking system around horizontal and vertical perimeters of partitions. Apply continuous sealant beads at each side of horizontal runner tracks and vertical end studs, between gypsum board and adjacent construction.

.2 Apply bead of acoustic sealant to seal intersections with sound-isolating partitions that are extended to reduce sound flanking paths.

.3 Apply bead of acoustic sealant to seal joint between penetrations and gypsum board at concealed and non-rated installations only. Where exposed, use interior sealant in accordance with Section 07 92 00.

.4 Completely seal objects at wall and gypsum board penetrations (such as electrical boxes) with heavy coating of premixed perlite plaster.

.5 Apply sealant to clean, dry surfaces.

.2 Sound attenuation insulation:

.1 Install sound attenuation insulation wherever insulation in partitions is indicated.

.2 Install sound attenuation insulation in partitions so indicated by filling voids with batts of specified thickness.

.3 Maintain air space between backs of sound attenuation insulation and back of opposite face layer, as applicable.

.4 Pack sound attenuation insulation against ducts, conduits and services passing through acoustic wall assemblies.

.5 Extend acoustic wall assemblies to underside of structure. Incorporate approved provision to prevent transmittance of structural deflection to partition assembly.

.6 Install insulation by friction fit.

.7 Where studs are not faced with gypsum board on both sides, mechanically fasten wire mesh to non-faced side of stud to retain insulation.

.8 Mechanically attach sound attenuation insulation in wall assemblies where cavity of wall assembly is greater than 150 mm.

.9 Secure insulation in such a manner that it will not sag.

.3 Sound Flanking Paths:

.1 Where sound rated partition walls intersect non-rated gypsum board partition walls, extend sound rated construction to completely close sound flanking paths through non-rated construction.

.2 Seal joints between face layers at vertical interior angles of intersecting partitions.

.3 Provide acoustic insulation to fill steel deck flutes where acoustic wall assemblies abut steel floor or roof deck. At non-fire rated partitions, seal gap between gypsum board assemblies and underside of deck with sealant.

3.6 ACCESSORIES

.1 At external corners install corner bead trim secured to framing at 230 mm on centre on both flanges using screw fasteners.

.2 Secure casing trim at board edges where exposed to view, where board abuts against other materials that have no trim to conceal junction, and where indicated. Secure metal reveal trim where gypsum board abuts dissimilar materials at walls and ceilings. Fasten at maximum 230 mm on centre using screw fasteners.

.3 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 150 mm on centre.

3.7 INSTALLATION – GENERAL

.1 Install insulation, to CAN/ULC-S702.2, and as specified by insulation manufacturer in their published data sheets and specifications.

.2 Install casing beads around perimeter of suspended ceilings.

.3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.5 Install shadow mould at gypsum board/ceiling juncture as indicated. Minimize joints; use corner pieces and splicers.

.6 Construct control joints of preformed units or two back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint.

.7 Provide continuous polyethylene dust barrier behind and across control joints.

.8 Locate control joints where indicated and at changes in substrate construction at approximate 10 m spacing on long corridor runs at approximate 15 m spacing on ceilings.

.9 Install control joints straight and true.

.10 Extend board into door, window, and other openings, reveals, behind fitments, and other applied items and on metal stud partitions to structure above unless indicated otherwise.

.11 Locate joints on opposite sides of partitions on different studs, and at least 305 mm (12”) from opening jambs.

.12 Install board to minimize joints and align end joints to be the least objectionable (where they are unavoidable), according to the indicated lighting design. Locate joints in ceilings where least prominently discerned, and never line them up with opening edges.

.13 Form smooth joints at ends and at field cut edges of board panels.

.14 Fasten board to metal support members by metal gypsum board screws, 9.5 mm (0.374”) minimum to, and 12.7 mm (1/2”) maximum from, center of joints. Space screws:

.1 At fire rated board as per fire-rated assembly.

.2 At typical board walls at 305 mm (12”) on centre at edges and field unless otherwise required.

.3 At typical board ceilings at 305 (12”) on centre at edges and field unless otherwise required.

.15 Offset gypsum board seams from corners of openings.

.16 Unless otherwise shown or specified, extend gypsum board on both side of partitions to underside of structural slab above. Fasten gypsum board to studs, not to top channel. Allow for minimum 20 mm deflection.

.17 Extend gypsum board close to floor with gap between board and floor not exceeding 5 mm and with bottom edge of board straight and unbroken.

.18 Provide metal mouldings and trim at corners and terminations. Fastened with drywall screws. Provide corner beads at external corners. Provide casing beads around openings and reveal trim where gypsum board abuts dissimilar materials and construction.

.19 Adhesive bonded gypsum board; apply 13 mm x 13 mm ribbons of laminating adhesive to back side of board, parallel to long dimension; space adhesive ribbons at maximum 150 mm on centre. Temporarily brace boards until complete adhesive bond develops.

.20 Where double layer gypsum board is required, screw fasten second layer through first, into framing, offset joints.

.21 Install self-sticking resilient sponge isolation tape at edges of wall board in contact with aluminum curtainwall, aluminum windows and exterior door frames to provide a thermal break. Adhere isolation tape to casing bead and compress during installation.

3.8 INTERIOR MOISTURE-RESISTANT GYPSUM BACKING

.1 Install in accordance with manufacturer’s specifications.

.2 Section 09 30 00 to install tile setting material over tape installed by this section. Install mesh tape centred over tile backer board joints.

.3 Apply tile backer board full height unless otherwise indicated, and in accordance with manufacturer’s installation instructions. Install water barrier sheeting over gypsum board substrates, where applicable.

.4 Fastener spacing:

.5 Walls: fasten at 150 mm (6”) on centre at vertical butt joints and 210 mm (*”) on centre in field.

.6 Ceilings: fasten at 150 mm (6”) on centre.

.7 Maintain 6 mm (1/4”) gap between board and tub or shower base as applicable

3.9 CONTROL, EXPANSION AND RELIEF JOINTS

.1 Control joints:

.1 Review proposed location of all control joints in situ using a string line with Consultant prior to installation

.2 Provide continuous polyethylene dust barrier behind and across control joints.

.3 Provide control joints set in gypsum board facing. Support control joints with studs or furring channels on both sides of joint.

.4 Provide control joints where indicated, where directed by Consultant, and as follows:

.1 Partitions: 7500 mm on centre, maximum

.2 Ceilings: 10 m on centre, maximum.

.5 In addition, provide control joints in locations, in consultation with Consultant, where:

.1 Partition or furring abuts a structural element (except floor) or dissimilar wall or ceiling;

.2 Ceiling abuts a structural element, dissimilar wall or partition or other vertical penetration;

.3 Construction changes within the plane of the partition or ceiling;

.4 Partition or furring run exceeds 10 m (30');

.5 Ceiling dimensions exceed 15 m (50') in either direction with perimeter relief, 10 m (30') in either direction without.

.6 Wings of "L", "U", and "T" shaped ceiling areas are joined;

.7 Expansion or control joints occur in the base exterior wall.

.6 Line up control joints with joints in other construction or with center lines of mullions, columns, piers, or similar building elements, and where accepted by Consultant.

.7 Install control joints straight and true.

.8 Ceiling height door frames may be used as control joints. Less than ceiling height frames should have control joints extending to the ceiling from both corners. If control joints are not used, additional reinforcement is required at corners to distribute concentrated stresses.

.9 Construct through wall control joints at fire-rated assemblies in accordance with fire-rated assemblies in accordance with assembly listing requirements.

.2 Expansion joints:

.1 Provide expansion joints in gypsum board elements located at building expansion joints.

.2 Unless otherwise shown, form expansion joint by terminating gypsum board edged with casing bead on both sides of joint and backed by minimum 2.5 mm thick aluminum plate fastened on one side only. Fabricate to align with adjacent floor expansion joint cover.

.3 Relief joints:

.1 Provide relief joints where indicated and where gypsum board assemblies abut dissimilar construction.

.2 Where indicated, provide other mouldings, reveals, and feature strips. Install in accordance with manufacturer's directions, plumb, level, accurately aligned at joints, and securely fastened to supporting work.

.3 At exterior wall, where gypsum board abuts curtainwall, window, and door frames, provide isolation tape between casing bead and frame.

3.10 FIRE SEPARATIONS

.1 Coordinate with the requirements of Section 07 84 00 – Firestopping and Smoke Seals.

.2 Install fire-rated assemblies in accordance with assembly listing requirements in order to obtain fire ratings indicated and as required by authorities having jurisdiction.

.3 Vertical bulkheads in ceiling spaces over fire rated partitions, doors and the like shall have same fire rating as the partition over which they occur. Such bulkheads shall be of gypsum board construction unless otherwise indicated.

.4 Use fire rated gypsum wallboard as specified.

.5 Where lighting fixtures, diffusers, and the like are recessed into fire rated ceilings or bulkheads, provide enclosure to maintain required fire rating. Form removable panel to give access to fixture outlet box.

.6 Where fire hose cabinets or other fixtures or equipment are recessed in fire rated walls or partitions, provide gypsum board enclosure or backing to maintain required fire rating, unless otherwise detailed.

.7 Construct non-rated fire separations to same requirements as rated assembly but use standard gypsum board.

3.11 ACCESS DOORS

.1 Install access doors to mechanical and electrical fixtures specified in respective sections.

.2 Install access doors as specified in Section 08 31 00 in locations determined by coordination with trades installing mechanical, electrical and other building services and consultation with Consultant.

.3 Rigidly secure frames to furring or framing systems.

.4 Some access panels require gypsum board infill, coordinate with electrical and mechanical for type and location.

.5 Coordinate with electrical and mechanical trades.

3.12 FINISHING

.1 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with Gypsum Association GA-214, Recommended Levels of Gypsum Board Finish:

.1 Levels of finish – General Instructions:

.1 Level 1 for non-exposed areas: Embed tape for joints and interior angles in joint compound. Surfaces to be free of excess joint compound; tool marks and ridges are acceptable and for plenum areas above ceilings, in attics or in concealed spaces.

.2 Level 2: Embed tape for joints and interior angles in joint compound and apply one separate coat of joint compound over joints, angles, fastener heads and accessories; surfaces free of excess joint compound; tool marks and ridges are acceptable and when gypsum is used as a substrate for tile.

.3 Level 3: Embed tape for joints and interior angles in joint compound and apply two separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges and where areas are to receive a heavy coating of textured material.

.4 Level 4 for exposed areas: Embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges and where light textures or wall coverings are to be applied.

.5 Level 5: Embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; apply a thin skim coat of manufacturer's recommended compound to entire surface; surfaces smooth and free of tool marks and ridges.

.1 Use this level of finish to minimize joint photographing, in long corridors, and where severe lighting occurs as directed by Consultant.

.2 Use this level of finish for fibreglass mat faced (paperless) gypsum board applications not receiving wall tiles, but to be finished with paint.

.3 Use this level of finish at cement backer board locations not receiving wall tile, but to be finished with paint.

.4 Use this level of finish for the radiused gypsum board bulkhead ceiling, and adjoining drywall ceilings in Scope 4.

.5 Use where specified / recommended by Section 09 91 00.

.2 Vacuum clean after sanding to remove all sanding dust, ready for prime coat and finish painting.

3.13 LEVEL 5 APPLICATION

.1 Product required: CertainTeed ProRoc® Brand Level V Wall and Ceiling Primer / Surfacer, or approved equivalent.

.2 Preparation for New Gypsum Board Substrate:

.1 Finish gypsum board to a Level 4 finish prior to commencing Level 5 finish work. Allow Level 4 work to fully cure, sand as per normal practice, and vacuum clean, removing all dust from surface.

.2 Surface must be clean, dry, sound and properly cured.

.3 Surface must be completely dry before application.

.4 As with most paint, product should acclimate for 12 hours to the same temperature as the walls.

.3 Preparation:

.1 Product is bucket ready. No need to dilute. Product may be diluted one quart to one five-gallon pail if desired.

.2 Walls need to be dust free, dry and ready for paint.

.3 You must mask the same as you would for paint.

.4 Remove heavy dust residue from bottom of wall so dust doesn't blow upward on the wall. Wipe or sponge down paper fuzz prior to application.

.5 Tip sizes: 517 - 621

.6 Use a 30 mesh filter for your airless and REMOVE THE GUN FILTER.

.4 Roll-On Application:

.1 For roll-on application, apply with 3/8-inch nap roller.

.2 Lightly sand with 150-220 grit.

.5 Spray-On Application:

.1 Apply with airless sprayer at 6 wet mils, not to exceed 15 wet mils.

.2 Allow to completely dry 4 to 6 hours dependent on relative humidity.

.3 Lightly sand with 150-220 grit to smooth fall out imperfections.

.1 An alternate method in lieu of light sanding would be to spray at 6 wet mils and backroll. Product applied at 6 wet mils will dry to 3 mils.

.4 For spray-on application, use airless with output of 1/ 2 gallon per minute (3300 psi). Respirator not required but recommended.

.5 Clean tools, equipment and skin with soapy water and rinse.

.6 Product should be applied to walls first to eliminate fallout on the sanding fuzz. While the wall is wet, spray the ceilings so the fallout will soak into wet material.

.6 Vacuum clean after sanding to remove all sanding dust, ready for prime coat and finish painting.

3.14 TRIM

.1 Use same fasteners to anchor trim accessory flanges as required to fasten gypsum board to supports, unless otherwise recommended by trim manufacturer.

.2 Install metal corner beads at external corners.

.3 Install metal casing bead trim whenever edge of gypsum base would otherwise be exposed or semi exposed, and where gypsum base terminates against window, door, and curtainwall frames.

.4 Erect beads plum or level, with minimum joints.

.5 Provide metal reveal trim where gypsum board wall or ceiling abuts dissimilar materials and where indicated.

.6 Provide aluminum reveal trim at perimeter of aluminum screens and where indicated.

3.15 SPECIAL CLEANING

.1 Clean up and remove surplus materials and rubbish resulting from the work of this section on completion and when directed.

.2 Clean off beads, casings, joint compound droppings and the like, leave the work of this section ready for painting trades.

3.16 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.1 Prevent overspray and/or splashes to adjacent surfaces.

.2 Clean spills, splashes and/or or overspray immediately using manufacturer's recommended cleaners and procedures.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.17 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.18 BOARD SCHEDULE

.1 Use fire-rated Type X or C board as required at fire rated wall and ceiling assemblies; refer to Drawings for wall and ceiling types and locations.

.1 Standard Board: typical, unless otherwise specified.

.2 Moisture and Mould Resistant Gypsum Board: kitchens, plumbing walls, service rooms. Apply a Level 5 skim coat over entire board face after installation of board in accordance with board manufacturer's printed instructions.

.3 High-Impact Gypsum Board: at indicated rooms and corridors to 2440 mm above finished floor level, except where Cementitious Backer Board is required at tile locations.

.4 Acoustically Rated Board: at acoustically rated assemblies as required or as otherwise indicated to achieve indicated STC rating.

.5 Flexible Gypsum Board at radiused bulkhead and curved wall corners.

.6 Other Work as indicated and required for a complete installation; refer to Drawings

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Interior non-load-bearing (non-structural) steel stud framing for partitions, furring, and suspended ceiling support systems, including shaft wall framing and acoustic wall and ceiling assemblies.

1.2 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 05 50 00 – Metal Fabrications.

.3 Section 09 21 16 – Gypsum Board Assemblies.

.4 Refer to and coordinate with other Sections as required for in-wall blocking and support structures.

1.3 REFERENCES

.1 ASTM International (ASTM).

.1 ASTM A641/A641M-19(2025), Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

.2 ASTM A653/A653M-25a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM C645-24, Standard Specification for Nonstructural Steel Framing Members.

.4 ASTM C754-20, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.5 ASTM D1761-20 (2025), Standard Test Methods for Mechanical Fasteners in Wood and Wood-Based Materials

.6 ASTM E90-23, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

.7 ASTM E413-22, Classification for Rating Sound Insulation.

.8 ASTM F1667/F1667M-21a, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.2 Canadian Sheet Steel Building Institute (CSSBI)

.1 CSSBI 58-2024, Lightweight Steel Framing, Member Selection Guide and Tables.

.2 CSSBI 51-06, Lightweight Steel Framing Design Manual – 2nd Edition

.3 CSSBI 51-06E, Lightweight Steel Framing Design Manual – 2nd Edition Errata.

.4 CSSBI S18-19, Guide Specification for Non-Loadbearing Steel Framing.

.5 CSSBI Technical Bulletin Vol. 7, No. 1 Maximum Height Tables for Interior Non-Loadbearing Partitions.

.3 CSA Group (CSA)

.1 CSA S136-16 (R2026), North American specification for the design of cold-formed steel structural members.

.4 National Association of Architectural Metal Manufacturers (NAAMM)

.1 ANSI/NAAMM HMMA 840-24, Guide Specifications for Receipt, Storage and Installation of Hollow Metal Doors and Frames (Seventh Edition).

.5 Underwriters Laboratories of Canada (ULC)

.1 ULC 101-14 (R2021), Standard Methods of Fire Endurance Tests of Building Construction and Materials (CAN/ULC-S101-14-REV3).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Convene pre-installation meetings one week prior to beginning work of this Section in accordance with Section 01 10 00 - Summary to:

.1 Verify project requirements.

.2 Review installation conditions.

.3 Coordinate with other building trades.

.4 Review manufacturer's instructions.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and technical datasheets for each type of product indicated.

.3 Shop Drawings:

.1 Submit shop drawings showing elevations, sections and details of construction.

.2 Delegated Design Requirements:

.1 For suspended ceiling applications, fire rated assemblies, for walls exceeding 3050 mm in height, locations with two or more thicknesses of gypsum board, wall supporting cabinetry and/or equipment, submit shop drawings designed and sealed by a Professional Engineer (P.Eng.) licenced to practice in the Province of Ontario, showing elevations, plans, sections and details, including engineering calculations.

.2 Submit confirmation of stud thicknesses and spacings to suit spans and conditions as required to satisfy OBC and L/240 maximum deflection.

1.6 QUALITY ASSURANCE

.1 Delegated Design: Subcontractor shall engage the services of a Professional Engineer (P.Eng.) licenced to practice in Ontario to design and seal shop drawings specified per item 1.3.3 of this Section in accordance with the requirements of Section 01 35 01 – Delegated Design.

.2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.4 Fire-Test-Response Characteristics: For fire resistance-rated assemblies that incorporate non-loadbearing interior steel framing, provide materials and construction identical to those tested in assembly indicated according to CAN-ULC-S101.

.5 STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413.

Part 2 Products

2.1 DESIGN CRITERIA

.1 Design to meet or exceed the requirements of CSA S136 and OBC.

.2 For interior non-loadbearing studs, conform to the minimum design thickness outlined in CSSBI Lightweight Steel Framing Design Manual and CSSBI Member Selection tables.

.3 A non-loadbearing (non-structural) member is defined as a member in a steel-framed system which is limited to transverse (out-of-plane) load of not more than 480 Pa, a superimposed axial load, exclusive of sheathing materials, of not more than 1460 N/m, or a superimposed axial load of not more than 890 N.

.4 A loadbearing (structural) stud may be used in a non-loadbearing application; however, nonloadbearing members (studs or track) may never be used in a loadbearing (axial and/or wind loading) applications.

.5 Connections between light steel framing members shall be by sheet metal screws, welding or crimping.

.6 Provide 20 gauge studs where High-Impact Gypsum Boards (Abuse Resistant) are to be installed.

.7 Meet or exceed the applicable criteria and design recommendations of CSSBI Lightweight Steel Framing Architectural Design Guide, and applicable requirements of CSA S136 and OBC.

2.2 CEILING SUPPORT MATERIALS AND SYSTEMS

.1 General: Size ceiling support components to comply with ASTM C754 and OBC unless otherwise indicated.

.2 Protective Coating: to ASTM A653 G60 (Z275) hot dipped galvanized.

.3 Main Runners: steel channels, Z275 hot dipped galvanized.

.4 Hanger Wire: to ASTM A641, soft, Class 1 galvanized generally, stainless steel in high-humidity environments (e.g. shower rooms, other wet areas and outdoors); minimum 4.064 mm (8 IWG).

.5 Hanger Rods and Flats: mild steel with zinc coating.

.6 Hanger anchoring devices:

.1 Screws, clips, bolts, concrete inserts or other devices applicable to the indicated method of structural anchorage for ceiling hangers and whose suitability for use intended has been proven through field-tested and conventional construction practices or by certified tests data. Size devices for 4X calculated load supported except size direct pull-out concrete inserts for 5X calculated loads.

.2 Interior concrete ceiling applications:

.1 Duynabolt Sleeve Anchor TW-1614 or Readi-Tie-Drive TD4-112 tie-wire anchor by ITW Ramset/Red Head.

.2 Trubolt or Dynabolt anchors by ITW Ramset/Red Head.

.3 Kwik-Bolt II HCKB ¼ tie-wire anchor by Hilti Corporation.

.4 Kwik-Bolt II anchors by Hilti Corporation.

.3 Fasteners exposed or concealed in ceiling assemblies in high-humidity environments (e.g. shower rooms, other wet areas and outdoors):

.1 Wood ceiling anchor substrate: ITW Buildex Climaseal coated steel in applicable product lines specified in preceding paragraphs.

.2 Concrete ceiling anchor substrate: ITW Readhead Dynabolt 304 Stainless Steel with minimum 1.22 mm Z275 galvanized clip angles.

.4 Powder actuated fastening systems not permitted.

.5 Fasteners exposed to weather, condensation, corrosive conditions (e.g., exposed to de-icing salts or air-borne de-icing salt overspray from passing vehicles), high-humidity environments (e.g. shower rooms, other wet areas and outdoors): Z275 hot dipped galvanized or type 316 stainless steel fasteners in applicable product lines specified in preceding paragraphs.

.7 Tie-Wire:

.1 Minimum 12 gauge (2.68 mm diameter) galvanized steel wire, complying with ASTM C636.

.2 Wire shall be pre-straightened; kinked, bent, or spliced wire shall not be used unless a single splice is installed per ASTM C636 and develops not less than 50% of the wire's allowable load.

.3 Provide galvanized finish consistent with the anchor finish and the environmental conditions of the ceiling space.

.8 Furring anchorages: 16-gauge galvanized tie-wires, manufacturer's standard wire type clips, bolts, nails (to ASTM F1667/F1667M) or screws as recommended by furring manufacturer and complying with ASTM C754.

.9 Runner (Carry) Channels: 1.6 mm thick cold rolled steel, zinc coated for interior locations, Z275 coated where exposed to weather, condensation, corrosive conditions (e.g., exposed to de-icing salts or air-borne de-icing salt overspray from passing vehicles), or high-humidity environments (e.g. shower rooms, other wet areas and outdoors):

.1 38 mm x 13 mm where supported at centres of 914 mm maximum spacing.

.2 38 mm x 19 mm where supported at centres of 1220 mm maximum spacing.

.10 Curved Framing: Standard C-shaped flexible steel track with banded flanges and screw attachments. Zinc galvanized, G60, 20 ga. and 18 ga.

.1 Standard of Acceptance:

.1 Ready-Track® by Simpson Strong-Tie.

.2 Flex-C Trac by Flex-C Inc.

2.3 MATERIALS

.1 Maximum permitted deflection: L/240; L/360 for walls receiving ceramic or porcelain tile applications, or other brittle cladding or wallcovering materials.

.2 All lightweight steel stud framing and bridging, bracing, connectors and other metal parts and components shall be hot dipped galvanized to Z275 (G90).

.3 Coordinate with other trades as required.

.4 Refer to Partition Types on Drawings for minimum stud sizes and spacings, modified as follows:

.1 Design Thickness, to CSA S136, and Stud Spacing:

.1 Stud thicknesses and spacings to suit spans and conditions of assemblies as required to satisfy OBC and L/240 maximum deflection limits; L/360 deflection limits for partition walls to receive ceramic or porcelain (hard) tiles (use stud thicknesses, spacings and cross-bracing as required to satisfy deflection criteria)

.2 Non-rated Partitions: fabricated from minimum 0.85 mm thick (20 ga.) material for 150 mm and smaller studs, 1.12 mm (18 ga.) for 200 mm studs, and to CSA S136 for studs larger than 200 mm.

.1 High Span Requirements: Provide 1.12 mm thick (18 ga.) stud framing at high-span areas where span requires thicker stud framing materials.

.3 Fire-Rated Partitions: fabricated from minimum 0.84 mm thick material (20 gauge).

.4 At wall-mounted millwork and cabinetry, acoustical panels, storage shelving, furniture and equipment, kitchen equipment and services, and other items requiring blocking and support to resist loads, supply and install the following as required to provide adequate support to resist loads:

.1 Backer Plates: 150 mm wide x 1.2 mm thick (minimum) steel backer plates in wall cut to fit and fixed to studs as required.

.2 Studs: fabricated from 0.84 mm thick material, minimum.

.3 Space studs at 300 mm on centre, or less as required.

.5 Single jamb studs at openings: fabricated from 0.85 mm thick (20 ga.) material, minimum.

.1 Provide double stud framing at jambs.

.5 Studs shall be hot dipped galvanized steel; roll formed with knurled flanges, services and bracing cut outs.

.6 Knock-out service holes at 460 mm centres.

.7 Runners: Width, gauge and galvanizing to match steel studs, and as follows:

.1 Double Runner Deflection Track: Outside runner using 50 mm flanges; inner runner 33 mm; maintaining 25 mm minimum deflection space.

.2 Slotted Deflection Track for Fire Separations: Premanufactured slotted top runner with 63 mm down standing legs and having 6 mm wide x 38 mm high slots spaced at 25 mm on centre along length of runner; tested and certified for use in fire rated wall construction:

.1 Acceptable materials:

.1 Brady Construction Innovations, SliptrackSystems.

.2 Dietrich Metal Framing, SLP-TRK.

.2 Base Runner: Bottom track with 33 mm upstanding legs.

.8 Flat Strap and Backing Plate

.1 Sheet steel for blocking and bracing in length and width indicated.

.2 Minimum base steel thickness is 0.455 mm.

.9 Channel bridging shall comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) and shall have a minimum base steel thickness of 0.455 mm with minimum 12.7 mm wide flanges and depth of 19.1 mm.

.10 Hat-shaped, rigid furring channels shall comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) and shall have minimum base steel thickness of 0.455 mm, a minimum depth of 22.2 mm. The minimum width of furring attachment flanges shall be 12.7 mm.

.11 Resilient clips and channels as required: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board. Resilient furring channels are designed to reduce sound transmission and shall have a minimum depth 12.7 mm.

.12 Furring channels shall comply with the AISI North American Standard for Cold-Formed Steel Framing (Product Data) and shall have a minimum 0.75 mm core thickness and with minimum 12.7 mm wide flanges and a depth of 19.1 mm.

.1 Furring Brackets: adjustable, corrugated-edge of steel sheet with minimum base steel thickness of 0.79 mm.

.2 Tie wire shall comply with ASTM A641/A641M zinc-coated, soft-annealed, 1.21 mm minimum diameter, or of material and size having equivalent corrosion resistance and strength.

.13 Z-shaped Furring: with slotted web or non-slotted web, face flange of 31.8 mm, wall attachment flange of 22.2 mm, and depth steel thickness of 0.455 mm, and depth required to fit insulation thickness indicated.

.14 Fasteners for Metal Framing: of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates in accordance with ASTM C1002.

.15 Acoustical sealant: to Section 07 92 00.

.16 Insulating strip: rubberized, moisture resistant 3 mm thick cork or foam strip, 12 mm wide, with self sticking adhesive on one face, lengths as required.

.17 Fasteners for Metal Framing: Type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

.18 Bracing (Strap) Channel: 19 mm cold-rolled galvanized steel channel, minimum 0.5 mm base steel thickness, to ASTM C645.

Part 3 Execution

3.1 GENERAL

.1 Stud end bearing shall be a minimum of 25 mm.

.2 Limiting heights shall be calculated using ICC-ES AC86.

.3 Non-structural sections shall comply with ASTM C645.

.4 General spacing of studs shall be maximum 400 mm on centre, and tighter spacings at fire rated assemblies, at doors, and when supporting wall-hung cabinetry as required to support loads.

3.2 ERECTION

.1 Install steel studs to ASTM C754 and to Ontario Building Code 2024 and amendments.

.2 Predrill holes for gypsum board installation where stud material thickness is too great to accept typical self-tapping screw installation methods.

.3 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum.

.4 Install damp proof course under stud shoe tracks of partitions on slabs on grade.

.5 Place studs vertically at 400 mm on centre, or as otherwise indicated or specified elsewhere in this Section, and not more than 50 mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross-brace steel studs as required to provide rigid installation to manufacturer's instructions.

.6 Erect metal studding to tolerance of 1:1000.

.7 Attach studs to bottom track using screws; allow for 25 mm deflection at top track, or as otherwise stipulated by the structural drawings.

.8 Coordinate simultaneous erection of studs with installation of service lines. When erecting studs, ensure web openings are aligned.

.9 Coordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.10 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.11 Install 1.438 mm thick (Design Thickness) single jamb studs at openings.

.12 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.

.13 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.14 Provide 40 mm stud or Backer Plates secured between studs for attachment of kitchen accessories, and other fixtures, attached to steel stud partitions.

.15 Install steel studs or Backer Plates between studs for attaching electrical and other boxes.

.16 Unless otherwise indicated or as otherwise required by OBC., partitions, together with gypsum board facings, shall extend above ceilings to underside of structural slab or deck above (with allowances for structural movement).

.17 Minimize removal of existing fireproofing spray to create attachment at underside of structure by spanning track elements between studs where feasible.

.18 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use 50 mm leg ceiling tracks. Use double track slip joint as indicated.

.19 Install continuous insulating strips to isolate studs from uninsulated surfaces.

.20 Install two continuous beads of acoustical sealant or continuous insulating strip under studs and tracks around perimeter of sound control partitions.

.21 Maintain clearance to avoid transference to structural loads to studs.

.22 At fire rated and sound rated partitions, offset framing around beams and, if necessary, around ductwork running above top of partitions in order to maintain required separation.

.23 At locations where partitions extend higher than 420 mm, provide diagonal stud framing to laterally brace partition framing above ceilings.

.24 Lateral Support Bracing Channels:

.1 Stiffen partitions over 3 meters in vertical span at mid-height to maximum vertical spacing of 2400 mm on centre with at least one 19 mm horizontal bracing channel extending full length of partition, overlapping at least two stud spaces at ends of bracing channels. Secure bracing to stud framing.

.2 Stiffen partitions at not more than 150 mm from the top and bottom of openings and across two full stud spaces at each side of openings with horizontal bracing channel.

.25 Double studs with continuous wood blocking at jambs of openings.

.26 Blocking:

.1 Attach adequate backer plates to framing as required to support the load of, and to withstand the withdrawal and shear forces imposed by, items stalled upon the work of this Section, including but not necessarily limited to the following conditions:

.1 Cabinet work and finish carpentry.

.2 Miscellaneous specialties.

.3 Additional items indicated to be mounted on gypsum board partitions.

.27 Provide custom-shaped solid blocking, backing, or infill within trapezoidal, triangular, or other irregular voids created by wall framing as required to provide continuous support for the specified finish materials and to achieve a true, smooth, and flush finished surface.

3.3 INSTALLATION: CEILING SUPPORT MATERIALS AND SYSTEMS

.1 Arrange hangers for suspended gypsum board ceilings to provide support independent of walls, columns, pipes, ducts; erect plumb, and securely anchored to structural frame, or embed in concrete slabs.

.2 Keep lateral braces at hangers back 450 mm (18”) unless otherwise noted.

.3 Space hangers at 914 mm (36”) on centre maximum along runner channels, and not more than 150 mm (6”) from ends.

.4 Space runner channels at 1220 mm (48”) on centre, maximum, and not more than 150 mm (6”) from boundary walls, interruptions of continuity, and changes in direction. Run channels transversely to structural framing members.

.5 Where splices are necessary, lap members at least 200 mm (8”) and wire each end with 2 loops. Avoid clustering or lining up of splices.

.6 Attach to rod hangers by bending hanger sharply under bottom flange of runner, and securely wiring in place with saddle tie.

.7 Where hangers are suspended from steel roof deck, make holes through both sides of deck troughs and pass hanger wire through and down both sides of trough. Wrap around vertical hanger rod.

.8 Erect cross furring channels transversely across runner channels at 400 mm (16”) on centre maximum, 305 mm (12”) on centre at fire rated assemblies, at not more than 150 mm (6”) from boundary wall openings, interruptions in ceiling continuity, and changes in direction.

.9 Secure furring channels to each support with purpose-made slips or wire tie. Splice joints by lapping channels and tying together.

.10 Install proprietary ceiling systems in accordance with manufacturer’s printed directions.

.11 Level cross furring channels to maximum tolerance of 3 mm in 3 m (1/8” in 10 ft.).

.12 Where ductwork, piping, and other elements within ceiling spaces interfere with direct suspension of ceiling from structure, install additional framing securely fastened to main structure to accommodate proper hanging of ceiling.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Provision of all labour, materials, equipment and incidental services necessary to provide acoustic tile ceiling systems including the following:

- .1 Acoustic ceiling tiles
- .2 Suspension grid systems and accessories
- .3 Hangers and inserts

1.2 RELATED REQUIREMENTS

.1 The General Conditions of the Contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 09 21 16 – Gypsum Board Assemblies.

.3 Section 09 53 00.01 - Acoustical Suspension.

.4 Division 23 – Mechanical.

.5 Division 26 – Electrical.

.6 Refer to Finish Schedule and Legends on Drawings.

1.3 REFERENCES

.1 ASTM International (ASTM)

- .1 ASTM C423-23e1, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- .2 ASTM C635/C635M-22, Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- .3 ASTM C636/C636M-19(2025), Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- .4 ASTM E84-26a, Standard Method for Surface Burning Characteristics of Building Materials.
- .5 ASTM E1110-06(2019), Standard Classification for Determination of Articulation Class.
- .6 ASTM E1111/E1111M-14(2022), Standard Test Method for Measuring the Interzone Attenuation of Open Office Components.
- .7 ASTM E1264-23, Standard Classification for Acoustical Ceiling Products.
- .8 ASTM E1414/E1414M-21a, Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
- .9 ASTM E1477-98a(2022), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
- .10 ASTM F1667/F1667-21a, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.2 CISCA Ceiling Systems Installation Handbook.

.3 CSA Group (CSA)

- .1 CSA O141:23, Canadian standard lumber.

.4 UL Solutions in Canada (ULC)

.1 ULC 102-18 (R2024), Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies (CAN-ULC-102-2019-(R2024)).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meeting

.1 Convene a pre-installation meeting for the Products specified in this section. Attendees must include, as a minimum, representatives of the following:

.1 Contractor (Site Superintendent & Project Manager),

.2 Installation Subcontractor (Site Foreman & Project Manager),

.3 Product Manufacturer and/or Distributor (Technical Representatives),

.4 Related Subcontractors (i.e. Mechanical and/or Electrical), and

.5 Owner.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Manufacturer's Data: Submit manufacturer's Product data, specifications, and installation instructions for each acoustical material, suspension system and other products required, including certified laboratory test reports and other data as may be required to show compliance with the Contract Documents.

.3 Samples:

.1 Submit duplicate 300 mm x 300 mm samples of each type of acoustical unit. Samples shall fully represent materials to be supplies in colour, texture, finish and construction.

.2 Submit sample of each component of ceiling system. Provide 200 mm samples of exposed wall moulding and suspension systems, including main runner and 4-foot cross tees.

.3 Samples shall fully represent materials to be supplied in colour, texture, finish and construction.

.4 Submit samples, load test data and design tables for each type of insert to be used in the Work for hanger supports.

.4 Shop Drawings.

.1 Submit Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling mounted items indicating the following:

.1 Ceiling suspension system members - proposed layout.

.2 Method of attaching suspension system hangers to building structure.

.3 Transitions to: different ceiling types; adjacent wall surfaces.

.2 Ceiling mounted items including light fixtures; air outlets and inlets; speakers; projectors; projector screens; and special mouldings at walls, column penetrations, and other junctures of acoustic ceilings with adjoining construction.

.5 Certifications: submit manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material shall carry an approved independent laboratory classification of NRC, CAC, and AC.

.6 Closeout Submittals:

.1 Letters of assurance:

.1 A letter of assurance is required for the work of this section as related to the suspension systems.

.2 The contractor shall retain the services of an Owner approved testing and inspection company or independent structural engineer, licensed in the place of work, specialized in suspension system installation design.

.3 Upon completion of suspension system installation, provide written report complete with engineer's seal, including dates, test references and any other information required by standard applicable to reporting of tests and inspections.

1.6 QUALITY ASSURANCE

.1 Single-Source Responsibility: Provide perimeter trim components, panels and grid components by a single manufacturer.

.2 Applicator Qualifications

.1 Work of this section shall be performed by applicators having a minimum of 5 years documented experience in the installation of acoustic tile ceiling systems. Submit proof of experience to Owner.

.3 Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to applied fireproofing, insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

.4 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.5 Provide certificate of compliance stating that the suspension system provided, including materials and installation, comply with the requirements of the Contract.

.6 Products shall meet or exceed Building Code requirements.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect acoustical ceiling tiles and tracks from nicks, scratches, and blemishes, and other types of damage that may impair installation processes, resultant functionality, or durability of installation.

.3 Replace defective or damaged materials with new.

1.8 SITE CONDITIONS

.1 Commence installation after building is enclosed with windows and exterior doors in place and glazed, and roof watertight.

.2 Interior temperature of building to range from 15 °C (4 °F) to 30 °C, (86 °F) and relative humidity of not more than 70% before and during installation.

.3 Store materials in work area 48 hours prior to installation.

1.9 EXTRA MATERIALS

.1 Provide extra materials of acoustic units in accordance with Section 01 78 00 – Closeout Submittals.

.2 Deliver for maintenance use, 5% of each ceiling type required for project, but no less than 2 boxes. Store where directed.

.3 Ensure extra materials are from same production run as installed materials.

.4 Clearly identify each type of acoustic unit, including colour and texture.

.5 Deliver to Owner upon completion of the work of this section.

1.10 WARRANTIES

.1 Construction Manager agrees to correct any deficiencies in labour or material found in the work performed for a period of 2 years from date of Substantial Performance.

.2 Submit manufacturer's warranty in accordance with the requirements of Section 01 78 00 – Closeout Submittals, made out in Owner's name, for each Product specified.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Design suspension system to support safely, and without distortion, the superimposed loads of:

.1 Air supply diffusers and return grilles.

.2 Lighting fixtures according to electrical utility regulation and submit certification in accordance with Canadian Electrical Code - Rule 30-302(1).

.2 Coordinate installation and cooperate with mechanical and electrical Subcontractors, to accommodate mechanical and electrical items, or any other work required to be incorporated in or coordinated with the ceiling system.

.3 Maximum deflection: 1/360th of span to ASTM C635 deflection test.

2.2 ACCEPTABLE MANUFACTURERS

.1 CGC Inc.

.2 Armstrong World Industries.

.3 CertainTeed Corporation.

2.3 MATERIALS

.1 Refer to Section 09 21 16 – Gypsum Board Assemblies for gypsum board ceilings.

.2 Refer to drawings and finish schedule for locations of each type of tile.

.3 **C-1A:** 24" x 48" x 5/8" (610 mm x 1220 mm x 16 mm) and 1' x 4' x 3/4" x 5/8" (305 mm x 1220 mm x 16 mm) Acoustic Panels: conforming to ASTM E1264: Long-lead Item: Made to Order Sizes need 4 to 6 weeks lead time.

.1 Standard of Acceptance: Armstrong Dune™ (1851) and Custom size (1' x 4").

.1 Classification: Type A, Form A1.2, Pattern E.
.2 Material: wet-formed mineral fibre.
.3 Surface Finish: Factory applied latex paint.
.4 Texture: fine
.5 Edge: square lay-in 15/16".
.6 Colour: white.
.7 Noise Reduction Coefficient (NRC): Up to 0.50.
.8 Fire Class: Class A.
.9 Thermal Resistance: R-1.6.
.10 Ceiling Attenuation Class (CAC): 30.
.11 Light Reflectance (LR): 0.81.

.4 **C-1B:** 24" x 48" x 5/8" (610 mm x 1220 mm x 16 mm) Acoustic Panels: conforming to ASTM E1264:

.1 Standard of Acceptance: Armstrong Dune™ (1851).

.1 Classification: Type A, Form A1.2, Pattern E.
.2 Material: wet-formed mineral fibre.
.3 Surface Finish: Factory applied latex paint.
.4 Texture: fine
.5 Edge: square lay-in 15/16".
.6 Colour: white.
.7 Noise Reduction Coefficient (NRC): 0.50.
.8 Fire Class: Class A.
.9 Thermal Resistance: R-1.6.
.10 Ceiling Attenuation Class (CAC): 30.
.11 Light Reflectance (LR): 0.81.

.5 **C-2:** 24" x 72" x 7/8" (610 mm x 1829 mm x 22 mm) Acoustic Panels: conforming to ASTM E1264:

.1 Standard of Acceptance: Armstrong Lyra® Vector® (8496).

.1 Classification: Type B, Form B2, Pattern G.
.2 Material: Fibreglass with acoustically transparent membrane.
.3 Surface Finish: Acoustically transparent membrane with factory applied latex paint.
.4 Texture: smooth
.5 Edge: 15/16" Vector with ¼" reveal.
.6 Colour: white.
.7 Noise Reduction Coefficient (NRC): 0.90.
.8 Fire Class: Class A.

.9 Thermal Resistance: R-3.5.

.10 Ceiling Attenuation Class (CAC): N/A.

.11 Light Reflectance (LR): 0.88.

.6 **C-3:** 24’ x 42’x 1” (610 mm x 1067 mm x 25 mm) Acoustic Panels: conforming to ASTM E1264:

.1 Standard of Acceptance: Armstrong Optima® (3280) with Techzone® Ceiling System.

.1 Classification: Type B, Form B2, Pattern E.

.2 Material: Fibreglass with DuraBrite® acoustically transparent membrane.

.3 Surface Finish: DuraBrite® Scrim with factory applied latex paint.

.4 Texture: fine.

.5 Edge: 9/16” square tegular.

.6 Colour: white (WH).

.7 Noise Reduction Coefficient (NRC): 0.90.

.8 Fire Class: Class A.

.9 Thermal Resistance: R-2.2.

.10 Ceiling Attenuation Class (CAC): 2635.

.11 Light Reflectance (LR): 0.88.

.2 4” wide Techzone® ceiling system between each 42” (1067 mm) panel.

2.4 TRANSITION TRIM

.1 Pre-finished aluminum edge trim, including channels, factory-mitred inside and outside corners, inside and outside corner posts, alignment clips, hanging clips, T-Bar connection clips, splice plates, and other accessories as recommended by the manufacturer to achieve design intent and accommodate project conditions. Refer to Drawings.

.1 Standard of Acceptance: Axiom Transitions, by Armstrong, type as required to suit site conditions.

.1 Acoustical-to-Acoustical Panel Transition (type varies based on base panel)

.1 w/ ½” reveal

.2 Acoustical-to-Drywall Transition (type varies based on base panel)

.1 Tight joint, no reveal.

.2 with ½” reveal.

.3 Acoustical-to- Recessed Cove Light Transition

.1 Axiom Vector Perimeter Trim w/ Spring Border Clip (Scope 4)

.1 AXIOM Vector Straight - AX4VESTR WH 4" Straight

.2 Finish: White (WH)

2.5 SUSPENSION SYSTEMS

.1 Acoustical suspension system: to Section 09 53 00.01 – Acoustical Suspension specifications

.2 Accessories: manufacturer’s supplied or recommended accessories as required for complete installations.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Check and verify that no irregularities exist that would affect quality of execution of work specified.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's printed preparation and installation instructions, technical datasheets, and specifications.

3.3 COORDINATION AND SEQUENCING

.1 Coordinate and sequence work with work of other trades to ensure proper installations, maintenance of project construction schedule, and completion of necessary work that is required above suspended ceiling system. Do not install panels until work above ceiling panels has been reviewed by Consultant.

.2 Coordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

.3 Work of Section 09 53 00.01 - Acoustical Suspension shall be coordinated, and in place as required, ready for installation of panels.

3.4 INSTALLATION

.1 Suspension systems: to Section 09 53 00.01 – Acoustical Suspension specifications.

.2 Install acoustical panels and tiles in ceiling suspension system in accordance with manufacturer’s printed installation instructions and details.

.3 Install acoustical units parallel to building lines with edge unit not less than 50% of unit width with directional pattern running in same direction. Refer to reflected ceiling plan.

.4 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding.

.5 At perimeter of ceilings with tegular panels where panel module does not align with perimeter, cut edge to match tegular edge and paint edge to match face.

3.5 MODIFICATION OF EXISTING ACOUSTICAL PANEL CEILINGS:

.1 Review Owner-provided Designated Substances Report prior to commencement of Work affecting existing ceiling materials and assemblies, and comply with requirements of authorities having jurisdiction and Division 01.

.2 Remove, modify, trim and reinstate existing acoustical panel ceiling systems as required to accommodate new construction, including extension of existing partition walls from underside of suspended ceilings to underside of structure. Perform Work in a manner that minimizes disturbance to adjacent ceiling areas scheduled to remain.

.3 Provide new ceiling panels, suspension system components, edge trim and accessories required to complete Work. Match existing ceiling panel size, thickness, texture, pattern,

colour, profile and exposed grid type to maintain a uniform appearance with adjacent existing ceilings.

3.6 COORDINATION OF CEILING-MOUNTED EQUIPMENT

.1 Coordinate locations of projectors, projector screens, monitors, speakers, security devices, lighting fixtures, and other ceiling-mounted equipment requiring structural support.

.2 Provide supplementary framing, blocking, hangers, threaded rods, and attachments required to support loads from structure above independently of acoustical ceiling suspension systems.

.3 Do not support projectors, projection screens, audiovisual equipment, or other equipment exceeding the design capacity of the ceiling suspension system from ceiling grid members.

.4 Coordinate support locations, access requirements, ceiling penetrations, and clearances with architectural, structural, electrical, mechanical, and audiovisual work.

.5 Coordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, etc., to be built into acoustical ceiling components.

3.7 INSPECTION AND CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Thoroughly inspect all ceiling tiles and remove any chipped, marked, scratched, stained, discoloured or otherwise damaged units, and replace with new units. Do not take replacement units from maintenance materials.

.3 Thoroughly inspect all ceiling grid and remove any marked, scratched, dented or otherwise damaged pieces, and replace with new.

.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.5 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.8 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the Contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 09 21 16 – Gypsum Board Assemblies.

.3 Section 09 51 13 – Acoustical Panel Ceilings.

.4 Division 23 – Mechanical.

.5 Division 26 – Electrical.

.6 Refer to Finish Schedule and Legends on Drawings.

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM)

.1 ASTM A641/A641M-19(2025), Standard Specification for Zinc–Coated (Galvanized) Carbon Steel Wire.

.2 ASTM C635/C635M-22, Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

.3 ASTM C636/C636M-19(2025), Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

.2 UL Solutions in Canada (ULC)

.3 ULC 102-19 (R2024), Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies (CAN-ULC-102-2019-(R2024)).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for acoustical suspension and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

.2 Submit reflected ceiling plans for special grid patterns as indicated.

.3 Indicate lay-out, insert and hanger spacing and fastening details, splicing method for main and cross runners, location of access splines, change in level details, access door dimensions, and locations, acoustical unit support at ceiling fixture, proposed attachment to existing structure, and lateral bracing and accessories.

.4 Samples:

.1 Submit for review and acceptance duplicate samples of each unit.

.2 Samples will be returned for inclusion into work.

.3 Submit duplicate representative model of each type ceiling suspension system, and new components for existing ceiling suspension systems proposed to be modified.

.4 Ceiling system to show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes, acoustical unit installation.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 – Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for acoustical suspension for incorporation into manual.

1.5 MOCK-UPS

.1 Coordinate and sequence mock-up requirements with Section 09 51 13 – Acoustical Panel Ceilings.

.2 Erect mock-up in accordance with Section 01 40 00 – Quality Requirements.

.3 Construct in locations acceptable to Consultant a typical sample installation. Modify sample as directed and as required to obtain approval. Upon acceptance retain sample as standard of quality for acoustical ceiling.

.4 Allow 48 hours advance notification for review of mock-up by Consultant.

.5 Do not begin fabrication and erection of remainder of ceiling system until sample installation has been reviewed and accepted. Accepted sample to become a part of the final Work, subject of approval of Consultant.

1.6 QUALITY ASSURANCE

.1 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.2 Coordinate and sequence work to permit electrical, mechanical and fireproofing work to be performed before installing suspension systems. Coordinate installation and anchors and tie wire with fireproofing to ensure applied fireproofing is not compromised by installation work.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.1 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect acoustical ceiling tiles and tracks from nicks, scratches, and blemishes, and other types of damage that may impair installation processes, resultant functionality, or durability of installation.

.3 Replace defective or damaged materials with new.

1.8 WARRANTIES

.1 Contractor agrees to correct any deficiencies in labour or material found in the work performed for a period of 2 years from date of Substantial Performance.

Part 2 Products

2.1 DESIGN CRITERIA

.1 Design Requirements: maximum deflection: L/360 of span to ASTM C635/ASTM C635M deflection test.

.2 Subject to the requirements of Division 01 – General Requirements, refer to schedules on Drawings suspension system requirements. Coordinate with Drawings.

.3 Design suspension system to support safely, and without distortion, the superimposed loads of:

.1 Air supply diffusers and return grilles.

.2 Lighting fixtures according to local building regulations and submit permits as required under the OBC 2024 and Canadian Electrical Code.

.4 Coordinate installation and cooperate with mechanical and electrical Subcontractors, to accommodate mechanical and electrical items, or any other work required to be incorporated in or coordinated with the ceiling system.

.5 Coordinate ceiling suspension systems with structural supports provided for projectors, projection screens, monitors, speakers, security devices and similar equipment.

2.1 ACCEPTABLE MANUFACTURERS

.1 CGC Inc.

.2 Armstrong World Industries.

.3 Chicago Metallic.

2.2 METAL SUSPENSION SYSTEMS

.1 Dielectric Separator / Isolation Coating: asphaltic paint or similar.

.2 Concrete hanger anchors; post installed: Anchors suitable for installation through existing metal deck into concrete floor slab above. Provide minimum embedment into concrete and installation in accordance with anchor manufacturer's tested requirements. Do not rely on metal deck alone for support of suspended ceiling assemblies. Coordinate anchor locations with existing deck profile and structure. Repair spray-applied fire-resistive material disturbed by installation to maintain the existing fire-resistance rating.

Steel eye bolts and nuts to suit ceiling hangers with capability to sustain, without failure, a load equal to 4 times that imposed by ceiling construction, as determined by testing per ASTM E488, conducted by a qualified independent testing laboratory.

.1 Dynabolt Sleeve Anchor 'TW-1614' or Readi-Tie-Drive 'TD4-112' tie wire anchor by ITW Ramset/Red Head.

.2 Kwik-Bolt II 'HCKB 1/4' tie wire anchor by Hilti Corporation.

.3 Fasteners exposed to weather, condensation, and corrosion: Zinc-plated or stainless steel fasteners in applicable product lines specified in preceding paragraphs.

.3 Hangers: Galvanized wire, typically, special stainless steel (see item 2.2.5 below) at natatorium and any room or space contiguous with the natatorium, recommended by manufacturer of suspension system, minimum 2.66 mm diameter.

.4 Tie Wire: 1.519 mm diameter, galvanized steel wire.

.5 Metal Finish: Metal exposed in finished work shall have a pre-coated baked enamel finish in non-yellowing, flat white. Submit paint formulation of grid system to lighting fixture, speaker grille, sprinkler and diffuser manufacturers to ensure consistency of colour, sheen and texture of all exposed metal components in the ceiling assemblies.

.6 Standard Suspension systems:

.1 Standard of Acceptance for Ceiling Types:

.1 **C-1A** and **C-1B**: Prelude® XL® 15/16”.

.2 **C2**: Prelude® 15/16”.

.3 **C3**: Silhoutte ¼” Reveal 9/16”.

.4 **C-4** and **C-4A**: Refer to Requirements outlined in 09 54 00 - Wood Grille Ceilings

.2 Standard grid system description:

.1 Main tees: 38 mm high x 25 mm exposed face bulb section, minimum 0.5 mm thick cold rolled galvanized steel.

.2 Cross tees: 25 mm wide, minimum 0.5 mm thick cold rolled galvanized steel; profile designed to limit deflection to 1/360 of span; designed to have suitable detail to rest on, automatically engage, level and lock to main tee.

.3 Wall moulding: pre-finished 25 mm exposed face galvanized steel shadow moulding with 13 mm reveal, #7875 by Armstrong or equal. Use preformed corner mouldings.

.4 Wall mouldings at round corners: Extruded aluminum with white finish to match ceiling grid, Fry Column Collar for acoustic ceilings with white PVC spacer.

.5 Hangers: minimum 2.5 mm galvanized steel wire.

.6 Carrying channels: minimum 1.5 mm thick cold-rolled galvanized steel channels 50 x 25 mm.

.3 Unless otherwise specified or indicated on drawings, finish for exposed metal surfaces: satin enamel Blizzard White, matching acoustic panels.

.4 Provide hot dipped galvanized suspension system for <u>all</u> areas. Provide white enamel finish on exposed surfaces.

.5 Suspension system accessories: Splices, clips, and perimeter shadow moulding, of manufacturer's standard type to suit the applicable conditions unless special conditions and access area are shown or specified.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Check and verify that no irregularities exist that would affect quality of execution of work specified.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's printed preparation and installation instructions, technical datasheets, recommended details and specifications.

3.3 ISOLATION COATING

.1 Apply isolation coating to contact surfaces in contact with cementitious materials, wood materials, and dissimilar metals.

.2 Apply isolation coating into all drilled holes, onto all fasteners (e.g., bolts, screws, rivets) and between all flat surfaces.

.3 Generally, 2 – 3 mil thickness is required per application. Each application needs enough product applied so that excess material “oozes out” during assembly (this will ensure you have created a proper seal).

.4 Assemble and wipe away any excess product.

3.4 INSTALLATION - GENERAL

.1 Do not start installation until exterior glazing has been completed and exterior openings are closed in. Ensure wet work is completed and dried out to a degree acceptable to panel manufacturer before installation is commenced. Maintain uniform temperatures of at least 16 °C for 72 hours prior to commencement of the work of this section and maintain temperature until completion of the work of this section.

.2 Install ceiling panels and metal suspension system in accordance with manufacturer's directions. Where manufacturer's directions are at variance with Contract Documents, notify Consultant before proceeding with installation.

.3 Do not commence installation until all work above suspended ceiling has been completed, inspected and accepted.

.4 Ensure that work to be concealed by ceiling systems has been installed, tested, inspected, and approved before starting work.

.5 Lay out ceilings in accordance with reflected ceiling plans and symmetrical within each area to obtain uniform borders. Where layout is not shown, install ceilings as directed by Consultant.

.6 Coordinate ceiling suspension systems with structural supports provided for projectors, projection screens, monitors, speakers, security devices and similar equipment.

.7 Map out attachment locations to structural decking/ selected support substrate and ensure attachment locations are free and clear of fireproofing spray to facilitate installation.

.8 Do not impose loads on acoustical suspension systems beyond those permitted by manufacturer's recommendations and applicable codes.

3.5 INSTALLATION - SUSPENSION SYSTEM

.1 Install suspension system rigid, secure, square, level and plumb, framed and erected to maintain dimensions and contours indicated, and in accordance with ASTM C636, CISCA installation standards and any other applicable national or local code requirements. Make allowance for thermal and structural movement.

.2 Suspend ceilings directly from structural members and not from ducts, pipes, conduits.

.3 Where ductwork, piping and other elements within ceiling spaces interfere with direct suspension of ceiling from structure, install additional framing securely fastened to main structure to accommodate proper hanging of ceiling.

.4 At light fixtures occurring on and in suspended ceilings, provide suspension hanger at each corner of fixture and at maximum 610 mm on centre around perimeter of fixture.

.5 Attach hangers to structure with inserts and hanger supports. Do not use powder activated fasteners.

.6 Support hangers for suspended ceiling grid independent of walls, columns, pipes and ducts.

.7 Space hangers for ceilings at maximum 1220 mm (48") on centre in both directions. Provide additional hangers as required.

.8 Locate hangers at not more than 150 mm (6") from ends of main tee members.

.9 Erect suspension systems at required heights and water tube, transit, or laser beam level to tolerance of 1:1200.

.10 Allowable tolerances: to ASTM C636.

.11 Design suspension systems for a maximum mid-span deflection not exceeding L/360.

.12 Install exposed tee members to pattern indicated. Securely attach hangers to main tee members.

.13 Exposed tees shall be as long as possible to minimize joints. Make joints square, tight, flush and reinforce with splines. Distribute joints to prevent clustering in one area.

.14 Space tee bars to suit ceiling panels and as detailed, and to accommodate lighting fixtures, diffusers and return grilles.

.15 Cooperate in the installation of ceiling systems, making adjustments where required to ensure that the lighting fixtures, supply diffusers, exhaust grilles and other built-in items properly fit into ceiling module and finish flush with rest of ceiling.

.16 Restrict creep inside module panels so that in all cases strips are centred on module lines.

.17 Install perimeter shadow moulding where ceiling abuts vertical surfaces and abuts adjacent gypsum board ceiling system. Mitre all corners, use maximum lengths to minimize joints. Make joints square, tight and flush.

.18 Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing mouldings.

.19 Screw attach mouldings to substrates at intervals not more than 400 mm (16") on centre and not more than 210 mm (8") from ends, levelling with suspension system to tolerance of 3 mm in 3660 mm (1/8" in 12'-0"). Mitre corners accurately and connect securely.

.20 Provide metal edge trim at perimeter of floating acoustic ceiling system at required locations, as detail. Provide concealed connections to suspension system and prefabricated covers.

3.6 MODIFICATION OF EXISTING ACOUSTICAL PANEL CEILING SUSPENSION SYSTEMS:

.1 Refer to Section 09 51 13 - Acoustical Panel Ceilings, item 3.5 MODIFICAITON OF EXISTING ACOUSTICAL PANEL CEILINGS.

.2 Provide and install new suspension systems elements as required to modify existing acoustical panel ceiling to suit proposed construction per 3.5 INSTALLATION - SUSPENSION SYTEM of this Section.

.3 New elements visible to view upon completion of installation to match profiles, finishes, and textures of existing construction.

3.7 INSTALLATION - TILES

.1 Take precautions during installation to ensure tile edges are not chipped or otherwise damaged.

.2 Install acoustical tiles to form horizontal and level ceiling with all parts flush and joints butted tightly to hairline appearance.

.3 Distribute variations in colour and texture of panels to obtain a uniform appearance.

.4 Minimize field cutting. Where necessary, match factory cut edge and colour.

.5 Install tiles so that work is clean and unmarked.

.6 Neatly cut and fit tiles as required to suit ceiling layout and to accommodate other work.

.7 Recessed items shall replace or be centred on tile unless otherwise indicated.

3.8 INSPECTION AND CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Thoroughly inspect all ceiling tiles and remove any chipped, marked, scratched, stained, discoloured or otherwise damaged units, and replace with new units. Do not take replacement units from maintenance materials.

.3 Thoroughly inspect all ceiling grid and remove any marked, scratched, dented or otherwise damaged pieces, and replace with new.

.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.5 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.9 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the Contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 06 10 00 – Rough Carpentry.

.3 Section 08 13 00 – Access Doors and Panels.

.4 Section 09 22 00 – Non-Structural Metal Framing.

.5 Division 23 Mechanical: HVAC.

.6 Division 26 Electrical: Lighting.

.7 Legends and Finish Schedule on Drawings.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM A641/A641M-19(2025), Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

.2 ASTM A653/A653M-25a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM A1008/A1008M-26, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.

.4 ASTM C423-23e1, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by Reverberation Room Method.

.5 ASTM C635/C635M-22, Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

.6 ASTM C636/C636M-19(2025), Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

.7 ASTM E84-26a, Standard Test Method for Surface Burning Characteristics of Building Materials.

.8 ASTM E1264-23, Standard Classification of Acoustical Ceiling Products.

.2 UL Solutions in Canada (ULC)

.1 ULC 102-19 (R2024), Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies (CAN-ULC-102-2019-(R2024)).

.2 ULC 702.1-21, Standard for Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification (CAN-ULC-S702.1-2021).

.3 ULC 702.2-15 (R2023), Standard for Mineral Fibre Thermal Insulation for Buildings, Part 2: Installation (ULC S702.2-15-(R2023)).

.3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Woodwork Institute (WI)

.1 North American Architectural Woodwork Standards, (NAAWS 5.0).

.4 Ceilings and Interior Systems Construction Association (CISCA)

.1 CISCA Ceiling Systems Installation Handbook.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate ceiling work with installers of related work including, but not limited to building insulation, gypsum board, acoustic ceilings, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals shall comply with requirements of Section 01 33 00 – Submittal Procedures.

.2 Datasheets:

.1 Submit manufacturer's product data sheets for ceiling units and suspension system including manufacturer's written installation instruction.

.3 Shop Drawings:

.1 Wood Grille Ceiling Structural Support and Connections to Structure: Submit engineered shop drawings for each ceiling type, designed and sealed by a Professional Engineer licenced to practice in Ontario showing details of construction and attachment to structure sufficient to withstand loads calculated to OBC 2024 criteria.

.2 Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling mounted items indicating the following:

.1 Ceiling Panel system layout: inclusive of prefabricated panel layout, individual wood slats on each panel, backer slats location.

.2 Ceiling suspension system members: proposed layout.

.3 Method of attaching suspension system hangers to building structure.

.4 Ceiling Transition details: Provide cross section details showing transitions to different ceiling types; adjacent wall surfaces; curtain walls.

.5 Access panel details: Cross-section details in 2 directions demonstrating operation of proposed access panels, inclusive of all required hardware components to facilitate installation.

.6 Coordination Details: Provide 1 reflected ceiling plan detail and 1 cross-section detail at each unique ceiling mounted item condition including: light fixtures, air outlets and inlets, air outlet and inlet blank-offs.

.4 Samples.

.1 Submit a 300mm x 450mm (12"x18") sample of each specified finished wood grille ceiling panel assembly inclusive of entire assembly from slat to suspension system.

.2 Submit 200mm long samples of exposed wall mouldings and suspension system including main runner and yoke system.

.3 Submit samples of all required hardware to facilitate access panels.

1.5 EXTRA MATERIALS

.1 Ceiling Unit: Provide full-sized unit equal to 5% of amount installed.

.2 Exposed Suspension System Components: Provide exposed suspension components equal to 2% of amount installed.

.3 Ensure extra materials are from same production run as installed materials.

.4 Clearly identify each type of acoustic unit, including colour and texture.

.5 Deliver to Consultant, upon completion of the work of this section.

1.6 QUALITY ASSURANCE

.1 Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to applied fireproofing, insulation, gypsum board, light fixtures, mechanical systems, and fixtures, electrical systems, sprinklers and painting.

.2 Installers: Use installers having proven experience in completing acoustical wood ceilings having similar material, design, and complexity as that required for this project and having a record of successful in-service performance for the previous 2-years.

.3 Manufacturers: Obtain materials from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties.

1.7 MOCK-UPS

.1 Construct mock-up 10 m^2 minimum of each type of wood grille panel ceiling. Mock-up to include the following:

.1 One inside corner and one outside corner

.2 Two consecutive panel joints in the long axis of the panels, and two consecutive panel joints in the short axis of the panels

.3 An integrated light fixture of every kind used in the ceiling type

.4 An integrated air diffuser used in the ceiling type - inclusive of interface between suspension system and Supply Air /Return Air diffuser boot.

.5 One operable access panel per ceiling type mock-up (one torsion spring type, one hinge type)

.2 Construct mock-up where directed.

.3 Allow 72-hours for inspection of mock-up by Consultant before proceeding with ceiling work.

.4 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Store materials in original, undamaged containers or wrapping with manufacturer’s seals and labels intact.

.2 Store materials in a dry interior location at room temperature and in a flat horizontal position.

.3 Handle units to avoid chipped edges.

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Perform installation when heating and cooling systems are operational, and temperature and humidity closely approximate the interior operating conditions required for the final construction; allow wood materials to acclimate and stabilize to site conditions a minimum of 72 hours before installation when site is free of wet and dusty work, and above ceiling work including lighting and other electrical and mechanical devices are completely installed.

1.10 WARRANTY

.1 Provide and submit longest available manufacturer's warranty (minimum 2 year) in accordance with the requirements of Section 01 78 00 – Closeout Submittals, made out in Owner's name, for each Product specified.

Part 2 Products

2.1 INTERIOR WOOD CEILINGS

.1 **C-4**, Wood Grille Ceiling System:

.1 Wood Species: Solid Western Hemlock.
.2 Slat Orientation; Vertical Slat
.3 Panel size: 12" x 96" x 4" deep – 3 slats per 12" wide.
.4 Panel Configuration: ¾" x 3 ¼" slat size, 4" on centre.
.5 Space between slats: 3-1/4".
.6 Backer: Cross Wood Backer Painted Black.
.7 Flame Spread Rating: Maximum of 25 per CAN/ULC S102.
.8 Acoustical Backer: Black Acoustical Woven Material.
.9 Installation: Direct screw to wood backing strips.
.10 Finish:
.1 Standard of Acceptance: Clear 20 Sheen Low VOC.
.1 Shop Finishing: Panels shall be shop-finished with selected stain and clear, semi-gloss post-catalyzed lacquer per colour selection by consultant.
.2 Closest to Natural. Provide three different finish samples for Consultant's review and acceptance.
.11 Fire Treatment: Class A.
.12 Standard of Acceptance/ Basis of Design:
.1 Geometrik Geopanel Grille.

.2 **C-4A**, Wood Grille Ceiling System with Gypsum Board Backer:

.1 Similar to C-4 with the following modifications:
.1 Replace Acoustical Backer Material with 12 mm gypsum panel, finished to level 4 finish, painted black to match paint colour of cross wood backer.

.3 Alternate Wood Grille Ceiling System:

.1 Standard of Acceptance Materials:

.1 USG/CGC Inc., True™ Wood Grille Ceiling (Modular Grille).

.1 Solid Wood slat version only, to meet all prescriptive performance requirements noted for C4 and C4A ceiling assemblies

.4 Suspension System (Interiors):

.1 Heavy-duty Armstrong 15”/16” Prelude® XL® HD (#7301) T-bar grid system or Donn DX/DXL 15”/16” Suspension System, to ASTM C635/ASTM C635M; hot dip galvanized, and powder coated matte black; complete grid, including main runners, cross-tees, wall angles and other related hardware and accessories as required for a complete installation.

.1 Provide Prelude XL YOKE at all interfaces between main beams, cross tees and mechanical diffuser plenums. Height of XL YOKE to suit proposed plenum design, coordinate sizing with mechanical requirements.

.2 Provide Armstrong DW90C to attach main beams, field trim as required.

.2 Attachment Devices: Size for five times design load indicated in ASTM C635, Table 1, direct hung unless otherwise noted.

.3 Hanger wire: galvanized soft annealed tight 3-wrap steel wire:

.1 Minimum wire performance requirements:

.1 Wire: manufactured to ASTM A641.

.2 Tight 3 wrap wire, to ASTM C636: wire tie failure / pullout load: ≥ 160 kilogram-force.

.3 Yields: ≥ 190 kilogram-force.

.4 Ultimate load: ≥ 250 kilogram-force.

.5 Tensile strength: maximum 80 Ksi.

.2 3.6 mm diameter for access tile ceilings.

.3 2.6 mm diameter for other ceilings.

.4 Hanger inserts: purpose-made.

.5 Anchors: suitable to substrate and load requirements. Powder-actuated fasteners in concrete or steel not permitted.

.4 Suspension grid components shall be powder coated black. Remaining suspension system shall be painted matte black, to Section 09 91 00 – Painting and Coating.

2.2 ACCESSORIES

.1 Matching perimeter trim to be supplied by wood ceiling manufacturer.

.2 Manufacturer’s recommended fasteners.

.3 Touch-up finish: Type and Colour to match acoustic wood panels.

.4 Wood backer clips.

.5 Anchors of type to suit substrate (expansion type or chemical anchor system).

.6 Dielectric Separator / Isolation Coating.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's printed installation instructions, technical datasheets, details and specifications.

.2 Comply with OBC and requirements of authority having jurisdiction.

3.2 EXAMINATION

.1 Examine substrates and structural framing for compliance with requirements specified in this and other work that affect ceiling installation, anchorage, and other conditions affecting performance of wood panel ceiling.

.2 Installation of ceiling system indicates acceptance of conditions.

3.3 PREPARATION

.1 Ceiling Layout: Measure each ceiling area and establish the layout of wood ceiling panels conforming to the layout shown on reflected ceiling plans, in accordance with wood ceiling manufacturer's approved Shop Drawings. For custom factory cut to size panels: field dimension shall be verified prior to manufacture of wood ceiling panels.

.1 Avoid using panels less than 1/2 of panel width at borders without consultant approval.

.2 Coordination: Provide the layout for supports that shall be installed for suspension of ceilings. Provide and install concrete inserts, steel deck hanger clips, or similar devices for installation, in time to coordinate the work. Coordinate the installation of the ceiling panels with other construction elements that penetrates ceiling; including light fixtures, HVAC equipment, fire-suppression system components, partition assemblies and all perimeter conditions.

3.4 ISOLATION COATING

.1 Apply isolation coating to contact surfaces in contact with cementitious materials, wood materials, and dissimilar metals.

3.5 INSTALLATION

.1 Install wood grille ceilings in accordance with manufacturer's written installation instructions, reviewed shop drawings, and Contract Documents.

.2 Install ceiling suspension systems in accordance with ASTM C636, Ontario Building Code requirements, and manufacturer's recommendations.

.3 Secure hangers to overhead structure using attachment methods in accordance with engineered, stamped shop drawings, Ontario Building Code requirements, and to the acceptance of authorities having jurisdiction.

.4 Suspend suspension system from overhead construction with anchors and hanger wires spaced maximum 914 mm on centre and within 150 mm of ends of main tees. Comply with engineered, stamped shop drawings.

.5 Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or ceiling suspension system.

.6 Modify and coordinate suspension system layout as required to accommodate supply air plenum boots, return air plenum boots, ductwork, and associated mechanical components while maintaining required ceiling alignment, structural performance, and manufacturer's installation requirements.

.7 Install access panels in accordance with manufacturer's instructions, and in locations indicated on Drawings. Refer to Section 08 31 00 – Access Doors and Panels.

.8 Coordinate location of light fixtures, air devices, speakers, access panels, ceiling-mounted equipment, and other penetrations with reviewed shop drawings and reflected ceiling plans.

.1 Align penetrations and fixtures with ceiling module and slat layout as indicated on Drawings.

.2 Locate penetrations either on centreline between adjacent slats or on centreline of omitted slats as detailed.

.3 Misaligned fixture, penetration, and device layouts will not be accepted.

.9 Coordinate with electrical and mechanical fittings, fixtures, and products that penetrate ceiling and require independent support from structure. Provide supplementary framing, blocking, and support members as required. Treat all field-cut openings and exposed wood surfaces to match adjacent factory-finished surfaces.

.10 Completed suspension system shall support superimposed loads, including lighting fixtures, supply and return air devices, grilles, diffusers, speakers, access panels, and other ceiling-mounted components.

.11 Provide supplementary support at light fixtures, diffusers, grilles, and other ceiling-mounted equipment with additional ceiling suspension hangers located within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.12 Where wood grille ceiling interfaces with curved ceiling surfaces, soffits, or bulkheads, terminate slats with straight cuts oriented perpendicular to longitudinal axis of slats.

.13 Finish exposed cut ends of slats resulting from field cutting to match adjacent factory-finished surfaces, including colour, sheen, maximum FSR, and appearance of exposed uncut slat edges.

3.6 ADJUSTING

.1 Replace damaged or broken panels.

.2 Clean exposed surfaces of ceilings, including trim, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.8 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 03 01 30.71 – Concrete Repairs and Finishing.

.3 Section 09 05 23 - Common Work Results for Flooring Preparation.

.4 Section 07 92 00 - Joint Sealants.

.5 Refer to Schedules on Drawings.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM D2047-25, Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine

.2 ASTM F710-22, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

.3 ASTM F1516-23, Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when Recommended).

.4 ASTM F1860-21a, Standard Specification for Rubber Sheet Floor Covering With Backing

.5 ASTM F1869-23, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

.6 ASTM F2034-18(R2025), Standard Specification for Sheet Linoleum Floor Covering.

.7 ASTM F2170-19a, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 SDS - Safety Data Sheets.

.3 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1113-16, Architectural Coatings.

.2 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

.4 National Floor Covering Association (NFCA)

.1 Floor Covering Reference Manual (Online version).

.5 UL Solutions in Canada (ULC):

.1 ULC 102.2-18 (R2024), Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies (CAN-ULC-102.2-18-(R2024)).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals shall comply Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit one copy of product data for each type of product specified.

.2 Submit WHMIS SDS - Safety Data Sheets for flooring adhesive and seam welding. Indicate VOC content.

.3 Provide seaming diagram prior to laying flooring.

.3 Samples:

.1 Submit duplicate 300mm x 300mm sample pieces of each finish of sheet material selected.

.2 Submit 300mm long base and transition strips of each type and finish selected.

.4 Closeout Submittals:

.1 Provide manufacturer's printed recommendations for general maintenance, including cleaning instructions and guidelines for use of waxes and other protective coatings and appearance enhancers in accordance with Section 01 78 00 – Closeout Submittals. Submit warranties.

1.4 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials:

.1 Provide extra materials of resilient sheet flooring and adhesives in accordance with Section 01 78 00 – Closeout Submittals.

.2 Provide 5 m^2 of each colour, pattern and type flooring material required for project for maintenance use.

.3 Provide 5 m of each colour, pattern and type of resilient base material required for project for maintenance use.

.4 Extra materials one piece and from same production run as installed materials.

.5 Clearly identify each roll of sheet flooring and each container of adhesive.

.6 Deliver to Owner upon completion of the work of this section.

.7 Store where directed by Owner.

1.5 QUALITY ASSURANCE

.1 Regulatory Requirements: Provide products that meet requirements of ULC 102.2 as applicable for required flame spread ratings; labelled and listed by UL Solutions in Canada (ULC), or another testing and inspecting agency acceptable to authorities having jurisdiction.

.2 Qualifications: Provide proof of qualifications when requested by Consultant:

.1 Installer shall be Trade Qualified for their specific flooring products by the National Floor Covering Association.

.2 Resilient Flooring Installer: Use an installer who is competent in heat welding and has documented experience in the installation of resilient sheet flooring and seams in accordance with manufacturer's training or certification program:

.3 Source Limitations: Obtain each type, colour, and pattern of flooring or accessories specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements.

.2 Deliver materials in good conditions to the jobsite in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.

.3 Store materials in a clean, dry, enclosed space off the ground, and protect from the weather and from extremes of heat and cold. Protect adhesive from freezing. Store flooring, adhesives and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

.4 Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring. Do not install flooring over concrete slabs until they are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture tests.

.5 Packaging Waste Management

.1 Separate and recycle waste materials in accordance with Division 01 - General Requirements.

1.7 AMBIENT CONDITIONS

.1 Maintain air temperature and structural base temperature at flooring installation area above 20°C for 48 hours before, during and 48 hours after installation.

1.8 WARRANTIES

.1 Provide Manufacturer's Warranty for product to be free from manufacturer's defects for a period of 5-years from date of Substantial Completion.

.2 Contractor agrees to correct any deficiencies of labour or material found in the work performed for a period of 2-years from date of Substantial Completion.

Part 2 Products

2.1 PERFORMANCE CRITERIA

.1 Provide sheet and tile materials as required; coordinate locations with Floor Finishes Plans, and Schedules and Legends on Drawings.

.1 Linoleum sheet: to ASTM F2034.

.2 Rubber base: to ASTM F1861.

2.2 ACCEPTABLE MANUFACTURERS

.1 Forbo Flooring Systems

.2 or approved alternate

2.3 RESILIENT SHEET FLOORING

.1 Linoleum Sheet Flooring (**FF1** and **FF2**)

.1 Standard of Acceptance:

.1 Forbo, Marmoleum Fresco and Marmoleum Terra Collections.

.1 Format: Rolls.

.2 Total thickness :

.1 EN ISO 24011: 2.5 mm.

.3 Surface Finish : Topshield Pro.

.4 Slip resistance (ASTM D2047) >0.5 for flat surfaces: Meets or exceeds.

.5 Castor chair continuous use, ISO 4918: Pass.

.6 Static Load Limit, ASTM F970-17: 0.002" with 250 lbs/sq.in.

.7 Flexibility, ASTM F137: Pass.

.8 Colour fastness to light, EN 20 105-B02 method 3: ≥ 6.

.9 Indoor air emissions; TVOC after 28 days, EN 16516: ≤ 0,01 mg/m3

.10 Bacteriostatic properties: Marmoleum has natural bacteriostatic properties which are confirmed by independent laboratories, even against MRSA bacteria.

.2 Colour

.1 Colour no. 3872 Volcanic Ash.

.1 Collection: Fresco (2.5m).

.2 Welding Rod: MC structure.

.2 Welding rods: to match flooring colour and as recommended by flooring manufacturer.

.2 Linoleum Sheet Flooring (**FF3**)

.1 Standard of Acceptance:

.1 Tarkett, Homogeneous Vinyl, iQ Granit

.1 Format: Roll.

.2 Total thickness: 3.50 mm.

.3 Total weight: 3810 g/m2

.4 Wear layer thickness: 2 mm.

.5 Surface treatment: New iQ PUR

.6 Bacteria Resistance (ISO 846 Part C): Does not promote growth.

.7 Residual indentation (EN ISO 24343-1): Best measured value: 0,09 mm.

.8 Light fastness (ISO 105-B02): ≥ 7.

.9 Dimensional stability (EN ISO 23999): Average Measured Value: ≤ 0.40 %.

.10 Chemical resistance (ISO 26987): Excellent Resistance.

.11 Slip Resistance (EN 16165 Annex C): Low risk of slip.

.12 Furniture leg (EN 424): No damage.

.13 Castor chair (ISO 4918): Suitable.

.14 Reaction to fire - EN ISO 11925-2: Pass.

.15 Installation: Glue Down

.2 Colour: Granit Warm Light Grey 0234

2.4 RESILIENT BASE

.1 Resilient Base: to ASTM F1861, and as follows:

.1 **B1**: Thermoplastic Rubber Base (Type TP), 4" (100 mm) nominal overall height, complete with preformed outside corners and end caps.

.1 Standard of Acceptance:

.1 Johnsonite by Tarket Wall Base or approved equivalent.

.1 Profile: Coved Toe.

.2 Thickness: 1/8".

.3 Colours:

.1 B1-A: TG 1 Snowbound W.

.2 B1-B: TH 2 Blue Intensity.

.2 **B2**: Thermoplastic Rubber Base (Type TP), 4" (100mm) nominal overall height, complete with preformed outside corners and end caps.

.1 Standard of Acceptance:

.1 Johnsonite by Tarket Wall Base or approved equivalent.

.1 Profile: Straight Toe.

.2 Thickness: 1/8".

.3 Colours:

.1 B2-A: TB 4 Grapest.

.2 B2-B: VM 2 Shoreline.

.3 B2-C: TA 9 Indigo.

.4 B2-D: VM 3 Misted Plum.

.3 **B3** (at corridor refresh): Flooring flashcove base complete with cove former, clean corner system, anodized aluminium cove capping strip.

.1 Standard of Acceptance:

.1 Tarkett PVC Cove Former: 15 mm x 15 mm.

.2 Anodized aluminum capping strip, manufacturer-approved for use with resilient sheet flooring installed over PVC cove former system; provide continuous installation at straight and curved wall conditions.

.1 Colour: Satin Anodized Aluminium

.2 Locations: as indicated on Drawings.

2.5 ACCESSORIES

.1 Transition Profiles:

.1 Extruded aluminum transition strips suitable for floor coverings indicated. Provide continuous transition profile at all flooring material transitions.

.2 Profiles to provide smooth transition between flooring materials of differing thicknesses and finishes.

.3 Finish: Satin anodized aluminum unless noted otherwise.

.4 Products:

.1 Schluter RENO-TK.

.2 Schluter RENO-V.

.3 Tarkett transition profiles.

.4 Approved equivalent.

.2 Edge Profiles:

.1 Extruded aluminum edge profiles for exposed flooring terminations.

.2 Provide profile geometry appropriate for flooring thickness and substrate condition.

.3 Finish: Satin anodized aluminum unless noted otherwise.

.4 Products:

.1 Schluter SCHIENE-AE.

.2 Schluter SCHIENE-V for curved conditions.

.3 Tarkett edge profiles.

.4 Approved equivalent.

.3 Block Wall Filler: Latex filler, "S-180" by Armstrong Cork Canada Ltd., or "Planicrete 20" by Mapei Canada Ltd., "87 Latex Underlayment" by Flextile Ltd. or waterproof filler recommended by flooring manufacturer.

.4 Aluminium Wheelchair Transition Strip: Supply and install resilient transitions between dissimilar floor finishes, designed for wheeled traffic,

.5 Concrete levelling materials: to Section 03 01 30.71 - Concrete Repairs and Finishing.

.6 Sub-floor filler and leveler 2-part latex-type filler requiring no water, as recommended by flooring manufacturer for use with their product; to Section 09 05 23 - Common Work Results for Flooring Preparation.

.7 Cementitious underlayment: self-levelling polymer modified quick setting cement based, to Section 03 01 30.71 - Concrete Repairs and Finishing.

.8 Primers and adhesives: waterproof, of types recommended by resilient flooring manufacturer for specific materials on applicable substrates, above, on or below grade.

.1 Marmoleum Floor Adhesives (sheet and tile):

.1 Styrene Butadiene Latex polymer, wet-lay fast grab, rebonding adhesive with maximum VOC limit 50 g/L to SCAQMD Rule 1168.

.2 Standard of Acceptance:

.1 Ultrabond ECO 390, MAPEI Inc.

.2 Tarkett Linoleum Floor adhesives per manufacturer’s instructions and recommendations.

.9 Welding rod: designed to weld seams of sheet flooring as recommended by flooring manufacturer, colour as directed by Consultant.

.10 Sealer and wax: types recommended by resilient flooring material manufacturer for material type and location.

.11 Joint Sealant: to Section 07 92 00; clear silicone, as manufactured by Tremco, CGE, or Dow Corning.

2.6 TEMPORARY FLOOR PROTECTION

.1 Standard of Acceptance:

.1 Ram Board Plus®, by Ram Board, Inc., plus manufacturer’s recommended accessories.

.2 Equivalent temporary protection mat.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 SITE VERIFICATION OF CONDITIONS

.1 Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.

.2 Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

.3 Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

.1 Prepare substrates to receive resilient flooring in accordance with NFCA guidelines and the recommendations found in the latest published edition of the NFCA Floor Covering Reference Manual.

.2 Prepare substrates according to manufacturer’s printed instructions as required to meet warranty requirements.

.1 Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

.2 Remove substrate paint, coatings and other substances that are incompatible with adhesives or contain soap, wax, oil, solvents, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

.3 Mechanically remove contamination on the substrate that may cause damage to the resilient athletic flooring material. Permanent and non-permanent markers, pens, crayons, paint, etc., shall not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and stain the flooring material.

.4 Prepare Substrates according to ASTM F710 including the following:

.1 Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

.2 Perform anhydrous calcium chloride test, ASTM F1869. Results shall not exceed 5 lbs. Moisture Vapor Emission Rate per 1,000 sq. ft. in 24-hours.

- or -

.1 Perform relative humidity test using in situ probes, ASTM F2170. Shall not exceed 80%.

.3 A pH test for alkalinity shall be conducted. Results shall range between 7 and 9. If the test results are not within the acceptable range of 7 to 9, the installation shall not proceed until the problem has been corrected.

.4 Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.

.3 Fill cracks, holes, depressions and irregularities in the substrate with good quality Portland cement-based underlayment leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

.4 Floor covering shall not be installed over expansion joints.

.5 Do not install resilient products until they are same temperature as the space where they are to be installed.

.6 Move resilient products and installation materials into spaces where they will be installed at least 48-hours in advance of installation.

.7 Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

.8 Install cementitious underlayment over entire floor area to provide a level and flat floor finish.

3.4 UNDERLAYMENT

.1 Where resilient flooring abuts other flooring of different thickness, provide cementitious underlayment allowing for smooth and level transition between finished floor surfaces. Provide cementitious underlayment where substrate surfaces are not level and uniform to specified tolerances, in order to provide smooth and level surfaces prior to application of flooring.

.2 Mix, apply and finish underlayment in accordance with manufacturer's recommendations.

3.5 INSTALLATION: GENERAL

.1 Install resilient flooring in accordance with NFCA guidelines and the recommendations found in the latest published edition of the NFCA Floor Covering Reference Manual.

.2 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.

.3 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.4 Cut flooring around fixed objects.

.5 Install feature strips and floor markings where indicated. Fit joints tightly.

.6 Continue flooring over areas which will be under built-in furniture.

.7 Continue flooring through areas to receive movable type partitions without interrupting floor pattern.

.8 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.

.9 Install transition strips at unprotected or exposed edges where flooring terminates or transitions to another floor covering type. Install transition strips where required to suit flooring transitions involved.

3.6 INSTALLATION: SHEET FLOORING

.1 Lay flooring with seams parallel to building line or as indicated on drawings to produce a minimum number of seams. Border widths minimum 1/3 width of full material.

.2 Run sheets in direction of traffic. Double cut sheet joints and continuously seal according to manufacturer's printed instructions.

.3 Provide seams in strict accordance with manufacturer's recommendations. Heat weld seams with welding rod when heat welded seams are a permitted option by manufacturer.

.4 As installation progresses and after installation is complete, roll resilient sheet flooring in accordance with the manufacturer's instructions.

3.7 INSTALLATION: INTEGRAL FLASH COVE BASE

.1 Install Tarkett PVC Cove Former pre-formed flash coving in strict accordance with instructions published by flooring manufacturer.

.2 Height: 100 mm (4").

.3 Install cove support strips continuously where sheet flooring is to be coved to vertical surfaces.

.4 Apply cove sticks with adhesive .

.5 Heat weld seams.

.6 Do not apply cap strips where flexible vinyl wall covering is to be installed.

.7 Straight cut top; finish with clear silicone sealant as indicated in Section 07 92 00 – Joint Sealants.

3.8 INSTALLATION: BASE

.1 Lay out base to keep number of joints at minimum.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.

.7 Cope internal corners. Use premoulded corner units for right angle external corners. Use formed straight base material for external corners of other angles.

.8 Refer to finish schedule on drawings for base locations.

.9 Install toeless type base before installation of carpet on floors.

.10 Heat weld base in accordance with manufacturer's printed instructions.

3.9 INSTALLATION: ACCESSORIES

.1 Install extruded aluminium transition and edge profiles at unprotected or exposed edges where flooring terminates, and at junctions with other flooring types. Types to suit flooring thickness and to provide level transition.

.2 Fill voids with plastic filler along the top edge of the resilient wall base or integral cove cap on masonry surfaces or other similar irregular substrates.

3.10 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.2 Register the warranty and supply warranty to Owner.

3.11 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 - General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 - General Requirements.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Construction Waste Management. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.12 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Prohibit traffic on floor for 48 hours after installation.

.3 Repair damage to adjacent materials caused by Work of this Section.

3.13 DEMONSTRATION AND TRAINING

.1 Provide minimum 1-hour cleaning and maintenance training to Owner’s maintenance staff. Video-record training session and provide video on flash drive to Owner at conclusion of training. Video shall be in high-definition colour and include high-fidelity sound capture of the session. Provide 2 printed copies of cleaning and maintenance instructions to Owner.

3.14 SCHEDULE

.1 Refer to Drawings; coordinate locations for each material colour and type with Consultant prior to ordering materials and determining quantities and lay-outs.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 03 01 30.71 - Concrete Repairs and Finishing.

.3 Section 07 92 00 - Joint Sealants.

.4 Section 09 05 13 - Mechanical Preparation of Flooring Substrates.

.5 Section 09 05 23 - Common Work Results for Flooring Preparation.

.6 Section 09 65 00 - Resilient Flooring.

.7 Refer to Schedules and Legends on Drawings.

1.2 REFERENCES

.1 American Association of Textile Chemists and Colourists (AATCC)

.1 TM16.1-2023, Test Method for Colorfastness to Light: Outdoor.

.2 TM16.2-2023e, Test Method for Colorfastness to Light: Carbon-Arc (Editorially Revised 2024).

.3 TM16.3-2020, Test Method for Colorfastness to Light: Xenon-Arc.

.4 TM23-2015e(2020), Test Method for Colorfastness to Burnt Gas Fumes.

.5 TM118, Test Method for Oil Repellency: Hydrocarbon Resistance, latest version.

.6 TM129-2025, Test Method Colorfastness to Ozone in the Atmosphere Under High Humidities.

.7 TM134-2019, Test Method for Electrostatic Propensity of Carpets.

.8 TM171-2019, Carpets: Cleaning of; Hot Water Extraction Method.

.9 TM174-2022e, Antimicrobial Activity Assessment of New Carpets.

.10 TM175-2024, Stain Resistance: Pile Floor Coverings.

.11 TM189-2024e, Fluorine Content of Carpet Fibers.

.2 ASTM International (ASTM)

.1 ASTM D1335-21 (2026), Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings.

.2 ASTM D1667-22, Standard Specification for Flexible Cellular Materials-Poly (Vinyl Chloride) Foam (Closed-Cell).

.3 ASTM D3676-18(2024), Standard Specification for Rubber Cellular Cushion Used for Carpet or Rug Underlay.

.4 ASTM D3936-21, Standard Test Method for Resistance to Delamination of the Secondary Backing of Pile Yarn Floor Covering.

.5 ASTM D5252-25, Standard Practice for the Operation of the Hexapod Tumble Drum Tester.

.6 ASTM D5417-21 (2026), Standard Practice for Operation of the Vettermann Drum Tester.

.7 ASTM D6004-21, Standard Test Method for Determining Adhesive Shear Strength of Resilient Flooring and Carpet Adhesives.

.8 ASTM D7799-12a(2021), Standard Specification for Tufted and Woven Broadloom Carpet Adhesives Without Homogenous PVC or Non-PVC Backings

.9 ASTM E84-26a, Standard Test Method for Surface Burning Characteristics of Building Materials.

.10 ASTM E648-25a, Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

.11 ASTM E662-21ae1, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 4.2 No. 27.6-2023, Textile Test Methods - Flame resistance of soft floor coverings.

.4 Carpet and Rug Institute (CRI)

.1 The CRI Carpet Installation Standard.

.2 IAQ Carpet Testing Program.

.5 National Fire Protection Association

.1 NFPA 253, Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source, 2023 Edition.

.6 National Floor Covering Association (NFCA)

.1 NFCA Floor Covering Reference Manual (Online version).

.7 NSF International (NSF)

.1 NSF/ANSI 140-2024, Sustainability Assessment for Carpet

.8 UL Solutions in Canada (ULC)

.1 ULC 102-19 (R2024), Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies (CAN-ULC-102-2019-(R2024)).

.2 ULC 102.2-18-(R2024), Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies (CAN-ULC-102.2-18-(R2024)).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures.

.1 Submit product data sheet for each carpet, under-cushion, adhesive, carpet protection and subfloor patching compound.

.2 Submit data on specified products, describing physical and performance characteristics, sizes, patterns, colours, and methods of installation.

.3 Submit verification to demonstrate compliance with ULC 102 and ULC 102.2.

.4 Submit carpet manufacturer's installation instructions: Indicate special procedures and perimeter conditions requiring special attention.

.2 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

.1 Indicate locations and lengths of seams for carpeted areas.

.2 Indicate nap direction, open edges, special patterns, and other details required by Consultant to clarify work.

.3 Submit drawings showing columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required as well as direction of carpet pile and pattern, location of edge moldings and edge bindings to Consultant for review prior to installation of carpet.

.3 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.

.1 Submit duplicate 610 mm x 610 mm pieces of each type of carpet specified, duplicate 225 x 225 mm pieces for each colour selected, termination edge strip, and base and divider strip.

.4 Submit closeout data in accordance with Section 01 78 00 – Closeout Submittals.

.1 Submit maintenance data: Include maintenance procedures, recommendations for maintenance materials and equipment, and suggested schedule for cleaning.

.5 Submit quality control submittals in accordance with Section 01 40 00 – Quality Requirements.

.1 Submit proof that carpet has been tested and passed the Indoor Air Quality (IAQ) Carpet Testing Program requirements of the Carpet and Rug Institute (CRI) and the Canadian Carpet Institute (CCI).

.2 Submit report outlining proposed dust control measures.

.6 Submit carpet schedule using same room designations indicated on drawings.

1.4 QUALITY ASSURANCE

.1 Regulatory Requirements:

.1 Prequalification: compliance with Department of Consumers and Corporate Affairs regulations under "Hazardous Products Act", Part II of the Schedule.

.2 Indoor Air Quality: compliance with CRI/CCI Green Label Indoor Air Quality Program, CRI/CCI-IAQ requirements for maximum total volatile chemicals released into air. Label each carpet product with CRI/CCI-IAQ label.

.2 Installer Qualifications:

.1 Flooring contractor requirements.

.1 Specialty contractor normally engaged in this type of work, with prior experience in installation of these types of materials.

.2 Certified by carpet manufacturer prior to bid submission.

.3 Must not sub-contract labour without written approval of Owner and/or Consultant.

.3 Be responsible for proper product installation, including floor testing and preparation as specified and in accordance with carpet manufacturers written instructions.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Label packaged materials.

.2 Store packaged materials in original containers or wrapping with manufacturer's seals and labels intact.

.3 Store carpeting and accessories in location as directed by Consultant. Store carpet and adhesive at minimum temperature of 18°C and relative humidity of maximum 65% for minimum of 48 hours before installation.

.4 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness.

.5 Store materials in area of installation for minimum period of 48 hours prior to installation.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Moisture: Ensure substrate is within moisture limits and alkalinity limits prescribed by manufacturer. Prepare moisture testing and provide report to Consultant.

.2 Temperature: Maintain ambient temperature of not less than 18°C from 48 hours before installation to at least 48 hours after completion of work.

.3 Relative humidity: Maintain relative humidity between 10 and 65% RH for 48 hours before, during and 48 hours after installation.

.4 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

.5 Ventilation:

.1 Arrange for ventilation system to be operated during installation of carpet by use of approved portable supply and exhaust fans.

.2 Ventilate enclosed spaces. Provide fans with HEPA filters.

.3 Provide continuous ventilation during and after carpet application. Run ventilation system 24 hours per day during installation; provide continuous ventilation for 7 days after completion of carpet installation.

.6 Test existing floor levelling compound for presence of asbestos contamination. Notify Consultant for additional instructions where asbestos is discovered.

.7 Do not install carpet until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete.

1.7 EXTRA MATERIALS

.1 Provide extra materials of carpet, carpet base, and adhesives in accordance with Division 01 – General Requirements.

.2 Provide 10 m^2 of each colour, pattern and type of carpeting. Provide in one continuous full width roll.

.3 Extra materials to be from same production run as installed materials.

.4 Identify each package of carpet and each container of adhesive.

.5 Store where directed by Consultant.

1.8 WARRANTY

.1 Manufacturer's Warranty:

.1 Provide manufacturer's warranty for 10 years from date of Substantial Completion, and as follows:

.1 10 year limited abrasive wear warranty.

.2 Lifetime limited anti-static warranty.

.3 Lifetime limited no zipper or edge ravel warranty.

Part 2 Products

2.1 MATERIALS

.1 Manufacturers: Subject to compliance with requirements, manufacturer's offering products that may be incorporated into the Work include, but are not limited to, the following:

- .1 Tarkett Johnsonite.
- .2 Interface.
- .3 Mohawk Group.
- .4 Milliken.

.2 Provide resilient flooring materials as specified by Schedules and Legends on Drawings for selections and locations.

2.2 CARPET TILE (FF4 and FF5)

.1 Standard of Acceptance:

- .1 Open Archive Collection by Tarkett.
  - .1 Style: Geoknit #10887
  - .2 Dimensions: 610 mm x 610 mm (24" x 24").
  - .3 Construction: Stratatec® Patterned Loop.
  - .4 Face Weight: 779.7 g/sq m (23 oz/sq yd.)
  - .5 Gauge: 50.4 rows/10 cm (5/64)
  - .6 Stitches per Inch: 31.9 pu/10 cm (8.1)
  - .7 Tuft Density: 16.1 tufts/sq cm (103.68 tufts/sq in)
  - .8 Pile Height Average: 4.7 mm (0.187 inch)
  - .9 Pile Thickness: 2.4 mm (0.095 inch)
  - .10 Total Finished Thickness: Powerbond® hybrid carpet: 0.312 inch
  - .11 Pile Density: 322.5 kg/cu m Kilotex12.1 (8,716 oz/cu yd)
  - .12 Fiber System: TDX Nylon
  - .13 Dye Method: Solution Dyed
  - .14 Fluorine-Free Soil Protection: Eco-Ensure: C2C Material Health Certification - Gold (v4.1)
  - .15 Primary Tufting Substrate: Synthetic Non-Woven
  - .16 Installation Method: 24" x 24" Vertical Ashlar.
- .2 **FF4**, Carpet Colour: Saturated Grey 42703.
- .3 **FF5**, Carpet Colour: Purple Sage 42716.
- .4 Location: Scope 5, Mid-size Classroom and Studio Space.

2.3 WALL BASE

.1 Provide wall base; refer to Section 09 65 00 – Resilient Flooring and finish plan drawings.

2.4 ACCESSORIES

.1 Underlayment as recommended by carpet manufacturer.

.2 Carpet tackstrips: types recommended by carpet manufacturer.

.3 Binder bars: aluminum finish. Submit colour samples for Consutant's selection.

.4 Seaming Cement: Hot melt adhesive tape or similar product recommended by carpet manufacturer for taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

.5 Seaming sealer adhesive: type recommended by carpet manufacturer for purpose intended.

.6 Rubber Wheelchair Transition Strip: Supply and install resilient transitions between dissimilar floor finishes, designed for wheeled traffic, by Johnsonite® or equivalent.

.7 Subfloor filler: premix latex requiring only water to produce cementitious paste.

.1 Size: maximum practical length, minimum roll width 1800 mm.

.8 Adhesives: Water resistant, mildew resistant, non-staining type to suit products and subfloor conditions indicated that comply with flammability requirements for installed carpet as recommended by the carpet manufacturer. Maximum VOC limit 50 g/L to SCAQMD Rule 1168.

.9 Protection Mat: breathable mat as follows:

.1 Standard of Acceptance: Ram Board Plus®, by Ram Board, Inc., plus manufacturer's recommended accessories, or approved equivalent.

.10 Concrete floor sealer: to CAN/CGSB-25.20, Type 1.

.11 Subfloor patching compound: refer to Section 03 01 30.71 - Concrete Repairs and Finishing.

.12 Carpet Tile Adhesive: pressure-sensitive, releasable surface tackifier recommended in writing by the carpet tile manufacturer for the specified tile backing and the substrate conditions of this Project; low-emission, complying with the indoor air quality requirements specified in this Section; applied for full coverage of the tile field.

.1 Standard of Acceptance:

.1 Styccobond F41 surface tackifier, by F. Ball and Co. Ltd., as recommended by Tarkett or approved equivalent.

Part 3 Execution

3.1 PREPARATION

.1 Prepare floor surfaces in accordance with CRI Carpet Installation Standard for Installation of Commercial Carpet, and NFCA Floor Covering Reference Manual guidelines.

.2 Concrete substrates shall be free of paint, dirt, grease, oil, curing or parting agents, and other contaminates, including sealers, that may interfere with the bonding of the adhesive.

.3 Seal porous and powdery surfaces with concrete floor sealer and apply sub-floor filler to low spots and cracks to achieve level floor to a tolerance of 1:500 in accordance with manufacturer's written requirements

.4 Pre-condition carpeting following manufacturer's printed instructions.

.5 Lay down an area as indicated to confirm pattern direction with Consultant.

3.2 INSTALLATION

.1 Install in accordance with manufacturer's published preparation and installation instructions and in accordance with Carpet and Rug Institute Carpet Installation Standard of Commercial Carpet, and NFCA Floor Covering Reference Manual guidelines.

.2 Install carpet after finishing work is completed but before demountable office partitions and telephone and electrical pedestal outlets are installed.

.3 Finish installation to present smooth wearing surface free from conspicuous seams, burring and other faults.

.4 Use material from same dye lot. Ensure colour, pattern and texture match within any one visual area. Maintain constant pile direction.

.5 Fit neatly around architectural, mechanical, electrical and telephone outlets, and furniture fitments, around perimeter of rooms into recesses, and around projections.

.6 Install carpeting to underfloor duct system and to access covers.

.7 Install carpeting in pan type floor access covers.

.8 Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

.9 Install carpet smooth and free of bubbles, puckers, and other defects.

3.3 CARPET TACKSTRIPS AND BINDER BARS

.1 Install carpet grippers at junctions of walls and vertical surfaces. Secure gripper to prevent movement.

.2 Install binder bars at exposed carpet edges and centre under doors in door openings.

3.4 CARPET TILE

.1 Installation Pattern: install in pattern as indicated.

.2 Lay carpet tile with butt seams.

.3 Apply carpet tile adhesive specified in Part 2 - Accessories at the coverage rates and by the methods in the carpet tile manufacturer’s current published instructions; allow pressure-sensitive tackifier to dry to tack before placing tiles.

3.5 DIRECT GLUE DOWN CARPET

.1 Apply adhesive and install carpeting in accordance with manufacturer's written instructions, by direct glue-down method.

3.6 SEAMS

.1 Seal edges of cut outs with [latex], [binding method].

.2 Carpet visibility of seams and joints to acceptable industry standards.

3.7 BASE INSTALLATION

.1 Install wall base at locations indicated on Drawings.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 - General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 - General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.9 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

.3 Vacuum carpets clean immediately after completion of installation. Protect traffic areas.

.4 Prohibit traffic on carpet for a period of 24 hours until adhesive is cured.

.5 Install carpet protection to satisfaction of Consultant.

3.10 DEMONSTRATION AND TRAINING

.1 Provide minimum 1-hour cleaning and maintenance training to Owner's maintenance staff. Video-record training session and provide video on USB Flashdrive to Owner at conclusion of training. Video shall be in high-definition colour and include high-fidelity sound capture of the session. Provide 2 printed copies of cleaning and maintenance instructions to Owner.

3.11 SCHEDULE

.1 Install as indicated.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM E84-26a, Standard Test Method for Surface Burning Characteristics of Building Materials.

.2 ASTM E90-23, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

.3 ASTM G21-15(2021)e1, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

.2 The International Accreditation Service (IAS)

.3 International Organization for Standardization (ISO)

.1 ISO 9001:2015, Quality management systems - Requirements.

.4 International Organization for Standardization (ISO) / International Electrotechnical Commission (IEC)

.1 ISO/IEC 17025:2017, General requirements for the competence of testing and calibration laboratories.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Action Submittals:

.1 Submit Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheets.

.1 Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for sound barrier wall end cap system.

.2 Submit Shop Drawings:

.1 Include typical dimensioned cross-section(s) at the location where drywall partition terminates at the perimeter curtain wall, indicating:

.1 Dimensions.

.2 Finish.

.3 Submit Samples for each exposed product and for each color and texture specified:

.1 Size: 6 inch (152 mm) sound barrier mullion trim cap sample and 2" x3-1/2" (51 mm x 89 mm) custom color paint sample.

.4 Submit closeout data:

.1 Submit maintenance instruction for incorporation into the Operation and Maintenance Manual.

.3 Informational Submittals:

.1 Qualification Data: for Installer.

.2 Product Test Reports: for each sound barrier mullion trim cap assembly, for ASTM E 90 tests performed by a qualified third party testing agency.

1.4 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Manufacturer of aluminum extrusions and anodizing shall be ISO-9001 certified.

.2 Installer Qualifications: An entity that employs installers and supervisors who are approved by manufacturer.

.3 Testing Agency Qualifications: ASTM E90 testing to be performed by laboratory accredited by IAS as complying with ISO/IEC Standard 17025

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Storage and Handling Requirements:

.1 Do not deliver sound barrier mullion trim caps until spaces to receive them are clean, dry, and ready for their installation.

.2 Store sound barrier mullion trim caps in original undamaged packaging inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.6 WARRANTY

.1 Manufacturer's Warranty: Manufacturer agrees to repair or replace sound barrier mullion trim caps that fail in materials or workmanship within specified warranty period.

.1 Warranty Period: Ten years limited warranty from date of Substantial Performance.

.2 Limited warranty does not cover adjacent products or improper installation.

Part 2 Products

2.1 MANUFACTURERS

.1 Products: Subject to compliance with requirements, provide the following:

.1 MULL-IT-OVER® Products; Sound barrier mullion trim cap systems.

.1 Tel: (616) 730-2162

.2 url: www.mullitoverproducts.com

2.2 SYSTEM DESCRIPTION

.1 General: Provide sound barrier mullion trim caps of design, basic profile, materials, and operation indicated. Provide units with capability to accommodate variations in adjacent surfaces.

.2 Furnish units in lengths of sufficient additional length to allow for field trimming to required length to match variations in construction tolerances of adjacent systems.

2.3 PERFORMANCE REQUIREMENTS

.1 Sound Transmission:

.1 Double-Sided Installations: STC 60.

.2 Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

.1 Mullion trim cap to be sized to accommodate thermal movement.

2.4 SOUND BARRIER TRIM CAP

.1 Sound Barrier Mullion Trim Cap:

.2 Products: MULL-IT-OVER® Products; Mullion Trim Cap.

.3 Profile: STC 60 Flush Mullion Trim Cap.

2.5 COMPONENTS

.1 Aluminum Extrusions:

.1 Thickness: 0.125 inches.

.2 Profile: As selected and approved by Architect to allow solid attachment and fastening to the partition wall framing.

.2 Sound Absorbing Foam:

.1 Resistant to smoke, flame, and microbial growth.

.2 Fire Rating: ASTM E84 Class 1.

.3 Fungi Resistance: Zero rating per ASTM G21.

.3 Compressible Foam: Between edge of extrusion and interior face of curtain wall glass.

.1 Thickness: Standard 1/2 inch (12.7 mm), ¾" (19.1 mm), 1 inch (25.4 mm) or 1-1/2" (38.1 mm) as required to accommodate mullion deflection.

.2 Color: Light gray.

.4 Fasteners:

.1 Self Tapping or appropriate threaded fastener.

.2 Compatible with all materials fasteners will contact with and not causing galvanic corrosion.

.5 Snap Cover: Snap-on fastener cover.

.6 Acoustical Sound Sealant: Acrylic latex based.

2.6 ACCESSORIES

.1 Provide all accessories as required for a complete installation.

.2 Provide necessary and related parts and tools to complete installation.

2.7 FABRICATION

.1 Extrusions and generic profiles to be shipped in custom lengths as required to meet project requirements or shipped in standard incremental foot lengths and cut to exact length on jobsite.

2.8 FINISHES

.1 Exposed surfaces of exposed aluminum extrusion: match finish and colour of wall bring capped.

Part 3 Execution

3.1 COMPLIANCE

.1 Comply with manufacturer's datasheets, published installation instructions, guide specifications and standard details.

3.2 EXAMINATION

.1 Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

.2 Examine walls and adjacent curtain wall for suitable conditions where sound barrier wall end cap will be installed.

.3 Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

.1 Measure and cut sound barrier wall end cap to proper lengths.

.2 Notch around horizontal mullions, sills, or other obstructions leaving appropriate gap for differential movement between the sound barrier wall end cap and the obstruction.

.3 Apply continuous bead of acoustical sealant to the unexposed side of extruded aluminum surface that will be in contact with the drywall edge.

.4 Place sound barrier wall end cap on the vertical surface of the drywall partition wall and loosely install fasteners in the top and bottom slotted holes of the wall end cap.

.5 Plumb the wall end cap leaving recommended gap spacing between the interior glass surface and the wall end cap. Foam gasket to be in contact with glass.

.6 Tighten top and bottom fasteners to secure end cap.

.7 Install additional fasteners at 12 inches on center, minimum.

.8 Install snap cover to conceal fasteners.

.9 Apply color matched sealant at joints of dissimilar materials as desired.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.6 SCHEDULE

.1 Install where partition wall intersects with a vertical curtain wall mullion, and as indicated.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Apply paint as required and as indicated; refer to Drawings, Legends and Schedules. Coordinate with other trades and sequence Work of this Section in relation to other Work.

.3 Schedules and Legends on Drawings.

.4 Section 09 96 53 - Powder Coating: shop-applied powder-coating.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM D16-24, Standard Terminology for Paint, Related Coatings, Materials, and Applications.

.2 ASTM D6386-22, Standard Practice for Preparation of Zinc (Hot Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.

.3 ASTM E84-26a, Standard Test Method for Surface Burning Characteristics of Building Materials.

.2 Department of Justice Canada (Jus)

.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

.3 Environmental Protection Agency (EPA)

.1 EPA Test Method for Determining Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings, Method 24 - 2020.

.4 Master Painters Institute (MPI)

.1 MPI Architectural Painting Specification Manual – 2024.

.5 National Fire Code of Canada – 2020.

.6 Ontario Building Code (OBC) – 2024.

.7 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1113-16, Architectural Coatings.

.8 Society for Protective Coatings (SSPC)

.1 SSPC Painting Manual, Volumes 1 and 2.

.2 SSPC-SP 1, Solvent Cleaning.

.3 SSPC-SP 16, Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meeting:

.1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations in accordance with Construction Progress Schedule.

.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Coordination with other building trades.
.4 Review manufacturer's installation instructions and warranty requirements.

.2 Scheduling

.1 Submit work schedule for various stages of painting to Consultant for review. Submit schedule minimum of 48 hours in advance of proposed operations.
.2 Obtain written authorization from Consultant for changes in work schedule.
.3 Schedule painting operations to prevent disruption of and by other trades.

.3 Health and Safety:

.1 Do construction occupational health and safety in accordance with Health and Safety Requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit product data and instructions for each paint and coating product to be used.
.2 Submit product data for the use and application of paint thinner.

.3 Samples:

.1 Submit full range colour sample chips to indicate where colour availability is restricted.
.2 Submit duplicate 200 x 300 mm draw downs/sample panels of each paint, stain, clear coating, and special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:
.1 3 mm plate steel for finishes over metal surfaces.
.2 13 mm maple veneer plywood for finishes over wood surfaces.
.3 50 mm concrete block for finishes over concrete or concrete masonry surfaces.
.4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.
.3 Resubmit draw downs/samples as required until colours and gloss values are approved
.4 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.

.4 Closeout Submittals: submit maintenance data for incorporation into manual specified in Division 01 – General Requirements, and include following information for each Product and colour incorporated into the Work:

.1 Product name, type and use.
.2 Manufacturer's product number.
.3 Colour number / formula code.

.4 MPI Environmentally Friendly classification system rating.

.5 Manufacturer's Instructions:

.1 Submit manufacturer's installation and application instructions.

.6 Submit quality assurance submittals in accordance with Section 01 40 00 – Quality Requirements.

.1 Test reports: submit certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.1 Lead, cadmium and chromium: presence of and amounts.

.2 Mercury: presence of and amounts.

.3 Organochlorines and PCBs: presence of and amounts.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.5 QUALITY ASSURANCE

.1 Conform to the standards contained in the MPI Manual.

.2 Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in service performance, and as follows:

.1 Have a minimum of five years proven satisfactory experience and shall show proof before commencement of work that he will maintain a qualified crew of painters throughout the duration of the work.

1.6 MOCK-UPS

.1 Provide required mock-up in accordance with Division 01 – General Requirements: Quality Control and as follows:

.1 Provide mock-up of each paint system including:

.1 concrete block; gypsum board; hollow metal doors and frames (1 door and 1 frame of each specified).

.2 Allow 48 hours for review of mock-up by Consultant and others affected by work of the Section.

.3 Obtain acceptance from Consultant before proceeding with Work.

.4 When accepted, mock-up will demonstrate minimum standard of quality required for this Work. Approved mock-up may remain as part of finished Work

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Packing, Shipping, Handling and Unloading:

.1 Pack, ship, handle and unload materials in accordance with Division 01 – General Requirements and manufacturer's written instructions.

.2 Acceptance at Site:

.1 Identify products and materials with labels indicating:

.1 Manufacturer's name and address.

.2 Type of paint or coating.

.3 Compliance with applicable standard.

.4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Storage and Protection:

.1 Provide and maintain dry, temperature controlled, secure storage.

.2 Store materials and supplies away from heat generating devices.

.3 Store materials and equipment in well-ventilated area with temperature range 7 degrees C to 30 degrees C.

.5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.

.7 Remove paint materials from storage only in quantities required for same day use.

.8 Fire Safety Requirements:

.1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.

.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

1.8 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:

.1 Ventilate enclosed spaces.

.2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.

.3 Provide continuous ventilation for seven days after completion of application of paint.

.4 Coordinate use of existing ventilation system with Consultant and ensure its operation during and after application of paint as required.

.5 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.

.6 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless pre-approved written approval by Consultant and product manufacturer, perform no painting when:

.1 Ambient air and substrate temperatures are below 10 degrees C.

.2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.

.4 The relative humidity is above 85% or when the dew point is more than 3 degrees C variance between the air/surface temperatures. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.

.2 Perform painting work when maximum moisture content of the substrate is below:

.1 12% for concrete and masonry (clay and concrete brick/block).

.2 15% for wood.

.3 12% for plaster and gypsum board.

.4 Allow new concrete and masonry to cure minimum of 28 days.

.3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".

.4 Test concrete, masonry and plaster surfaces for alkalinity as required.

.3 Surface and Environmental Conditions:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.

.3 Apply paint when previous coat of paint is dry or adequately cured.

.4 Additional interior application requirements:

.1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

.2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Consultant such that painted surfaces will have dried and cured sufficiently before occupants are affected.

1.9 EXTENT OF WORK

.1 Paint and finish "paintable" surfaces for area of the Work indicated in the Contract Documents, except those exempted by the Contract Documents.

.2 The following surfaces are considered "non-paintable" for purposes of this Contract.

.3 Omit painter's finishes from following items:

.1 Material and equipment furnished completely prime and finish painted by manufacturer.

.2 Internal surfaces of steel tanks and stacks;

.3 Intumescent fireproofing (unless otherwise specified or indicated).

.4 Exterior concrete including building walls, building floors and pavements, except as otherwise scheduled.

.5 Stainless steel, weathering steel, copper, bronze, chromium plate, nickel, anodized or lacquered aluminum, Monel metal (alloy composed of between 28 and 34 percent copper and minimum 63 percent nickel).

.6 Exposed insulation, glass, plastic, brick, stone, resilient floors, treads and bases, tile and hardware.

.7 Prefinished metals, unless required to be colour coded.

.8 Metallic and mastic insulation finishes.

.9 Abrasive material finishes on floors, stair treads, stair nosings and landings.

.10 Insulated electric cables.

.11 Machined parts of machinery and equipment.

.12 Concealed surfaces (except visible portions of inside of ductwork and louvres, etc.).

1.10 EXTRA MATERIALS

.1 Provide two sealed containers, each of four litres (one gallon) capacity of each paint product in each colour used in the work for Owner's maintenance use. Containers shall be new, clearly labelled with manufacturer's name, type of paint, colour and colour number. Store at the Place of the Work where directed by Owner.

1.11 WARRANTY

.1 Warranty period with regard to the work of this section is 2 years from date of Substantial Performance.

.2 Throughout the warranty period, painting systems shall remain free from failure due to causes including: material failure; surface preparation less than that specified; and paint film thickness less than that specified, or when not specified, less than that coverage recommended by manufacturer.

.3 Presence of any of following during the warranty period shall constitute failure: visible corrosion; film peeling, blistering, checking, scaling, embrittling or general film disintegration; and poor adhesion as determined by tape "peel-off" test procedures.

Part 2 Products

2.1 MATERIALS

.1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.2 Provide paint materials for paint systems from single manufacturer.

.3 Only qualified products with E2 "Environmentally Friendly" ratings are acceptable for use on this project, Use E3 rated products where available.

.4 Conform to latest MPI requirements for all painting work including preparation and priming.

.5 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI - Architectural Painting Specification Manual "Approved Product" listing.

.6 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required.

.7 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids:

.1 Non-flammable.

.2 Manufactured without compounds that contribute to ozone depletion in the upper atmosphere.

.3 Manufactured without compounds that contribute to smog in the lower atmosphere.

.4 Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.

.8 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

.9 Flash point: 61.0 degrees C or greater for water-borne surface coatings and recycled water-borne surface coatings.

.10 Surface coatings must not contain:

.1 Lead in excess of 600.0 ppm weight/weight total solids.

.2 Mercury in excess of 50.0 ppm weight/weight total product.

.3 Cadmium in excess of 1.0 ppm weight/weight total product.

.4 Hexavelant chromium in excess of 3.0 ppm weight/weight total product.

.5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.

.11 VOC limits for architectural paints and coatings applied to interior surfaces in accordance with Green Seal Standard GS-11 and as follows:

.1 Interior Flat Coating or Primer: maximum VOC limit 50 g/L.

.2 Interior Non-Flat Coating or Primer: maximum VOC limit 150 g/L.

.12 VOC limits for anti-corrosive and anti-rust paints applied to interior ferrous metal substrates in accordance with Green Seal Standard GS-11 and as follows:

.1 Anti-Corrosive/Anti-Rust Paint: maximum VOC limit 250 g/L.

.13 VOC limits for wood finishes, floor coatings, stains, primers and shellacs applied to interior elements in accordance with SCAQMD Rule 1113 and as follows:

.1 Clear Wood Finishes – Lacquer: maximum VOC limit 275 g/L.

.2 Clear Wood Finishes – Sanding Sealers: maximum VOC limit 275 g/L.

.3 Clear Wood Finishes – Varnish: maximum VOC limit 275 g/L.

.4 Clear Brushing Lacquer: maximum VOC limit 275 g/L.

.5 Floor Coatings: maximum VOC limit 50 g/L.

.6 Sealers and Undercoaters: maximum VOC limit 100 g/L.

.7 Shellac – Clear: maximum VOC limit 730 g/L.

.8 Shellac – Pigmented: maximum VOC limit 550 g/L.

.9 Stain: maximum VOC limit 100 g/L.

.10 Pigmented Lacquer: maximum VOC limit 275 g/L.

.11 Low-Solids Coatings: maximum VOC limit 120 g/L.

2.2 COLOURS

.1 Refer to Finish Schedules and Legends on Drawings.

.2 Second coat and third-coat in a multicoat systems to be tinted slightly lighter colour than top coat and each other to show visible difference between coats.

2.3 FINISHES

.1 Paint colours Standard of Acceptance; paint as indicated on Drawings and as follows:

Paint Types	Manufacturer	Colour	Finish	Location
PT1	Benjamin Moore	Chantilly Lace – OC-65	Flat at Ceilings, Eggshell at Walls	Varies
PT2	Benjamin Moore	French Lilac – 1403	Eggshell	Scope 1 Classroom Accent Wall
PT3	Benjamin Moore	Snugglepuss – 1405	Flat at Ceilings, Eggshell at Walls	Study Pod Walls, Ceiling
PT4	Benjamin Moore	Mauve Bauhaus – 1407	Flat at Ceilings, Eggshell at Walls	Study Pod Walls, Ceiling
PT5	Benjamin Moore	Bordeaux Red – 1365	Flat at Ceilings, Eggshell at Walls	Study Pod Walls, Ceiling
PT6	Benjamin Moore	Your Majesty – 1400	Flat at Ceilings, Eggshell at Walls	Study Pod Walls, Ceiling
PT7	Benjamin Moore	Night Flower – 1344	Eggshell	Scope 5 Wall between Classroom and Study Lounge - between new door and glazed partition
PT8	Benjamin Moore	Stunning – 826 (TBC, as selected by Consultant)	Flat at Ceilings, Eggshell at Walls	Scope 3 Cabinetry Bulkhead + Portion of Ceiling, Partition walls
PT9	Benjamin Moore	Charcoal Grey Colour TBC by Consultant	Semi-gloss for frames, flat for fascias	HM Door Frames, Gwb fascia around slat ceiling.
PT10	Benjamin Moore	White TBC by Consultant - Allow		Concrete Block Paint to match existing white paint on

		for 3 samples| Match Existing		Concrete Block in Corridors

.2 Confirm all selections with Consultant prior to ordering materials.

.3 Confirm gloss levels for all surfaces with Consultant before starting work. Unless otherwise specified in this specification Section 09 91 00, allow for:

.1 Ceilings: flat.

.2 Walls: eggshell (semi-gloss at service areas and bathroom walls).

.3 Trim/doorframes/doors: semi-gloss.

.4 Metal: semi-gloss.

.4 Paint mechanical equipment, ducts, piping which is exposed in all areas as directed by Consultant. Identification labelling by Division 22 and 23.

.5 All paints at walls shall be scuff-resistant and scrubbable: Scuff-X.

2.4 MIXING AND TINTING

.1 Unless otherwise specified or pre-approved, all paint shall be ready-mixed and pre-tinted. Re-mix all paint in contained prior to and during application to ensure break-up of lumps, completed dispersion of settled pigment, and colour and gloss uniformity.

.2 Mix paste, powder, or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer's instructions.

2.5 GLOSS/SHEEN RATINGS

.1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

Description / Gloss Level	Gloss @ 60 degrees	Sheen @ 85 degrees
G1 - Matte Finish (flat)	Max. 5	Max. 10
G2 - Velvet-Like Finish	Max. 10	10 to 35
G3 - Eggshell Finish	10 to 25	10 to 35
G4 - Satin-Like Finish	20 to 35	min. 35
G5 - Traditional Semi-Gloss Finish	35 to 70	
G6 - Traditional Gloss	70 to 85	
G7 - High Gloss Finish	More than 85	

.2 Gloss level ratings of painted surfaces as indicated or otherwise specified.

2.6 INTERIOR PAINTING

.1 All interior painting work to be in accordance with MPI Premium Grade finish requirements, minimum 1 coat of primer, 1 intermediate coat, and finish coat. Refer to schedules on Drawings to coordinate locations and determine finishes required.

.2 Structural, electrical and mechanical elements at exposed areas, including visible inside portions of ductwork and louvres, shall be primed and finish painted to MPI Premium Grade requirements.

.3 Gloss/Sheen Levels: to item 2.3.3 of this Section.

.4 High-Humidity Areas (kitchens, and other wet areas that normally develop higher relative humidity):
- .1 Standard of Acceptance:
  - .1 Benjamin Moore, Aura Bath & Spa.
- .2 Apply 2 finish coats over primer, minimum 3 coats overall.

.5 Trim and Doors:
- .1 Standard of Acceptance:
  - .1 Benjamin Moore, Advance.
- .2 Apply 2 finish coats over primer, minimum 3 coats overall.

.6 Gypsum Board; walls and partitions; Latex finish, INT 9.2B: Scuff-X
- .1 1st Coat: Latex Primer/Sealer.
- .2 2nd Coat: high performance latex.
- .3 3rd Coat: high performance latex.

.7 Gypsum Board; ceilings and bulkheads; Latex finish, INT 9.2B:
- .1 1st Coat: Latex Primer Sealer.
- .2 2nd Coat: high performance latex.
- .3 3rd Coat: high performance latex.
- .4 Note: this system qualifies as a Class 3 (Class III) vapour retarder: 10 perm or less and greater than 1.0 perm.

.8 Exposed piping and ductwork, wrapped; Latex finish, INT 5.3M or 5.1R as applicable:
- .1 1st coat latex primer sealer.
- .2 2nd coat high performance latex.
- .3 3rd coat high performance latex.

.9 Concrete Unit Masonry and Exposed Concrete Ceilings:
- .1 Epoxy Paint.
- .2 Standard of Acceptance:
  - .1 Benjamin Moore, Ultra Spec Masonry Acrylic Latex.

.10 Concrete; Painted, INT 3.1C:
- .1 1st Coat: Latex Primer Sealer.
- .2 2nd Coat: high performance latex.
- .3 3rd Coat: high performance latex.

.11 Metal and prime painted structural steel and steel fabrications; Latex finish INT 5.1R:
- .1 1st Coat: Latex Metal Primer.
- .2 2nd Coat: Acrylic Latex Enamel.
- .3 3rd Coat: Acrylic Latex Enamel.
- .4 Gloss: Semi-Gloss.

.12 Galvanized metal (zinc coated steel), including exposed piping and conduit unwrapped; Alkyd finish, INT 5.3L:
- .1 1st Coat: Galvanized metal primer.
- .2 2nd Coat: Acrylic latex finish.
- .3 3rd Coat: Acrylic latex finish.
- .4 Gloss: Semi-Gloss.

.13 Bituminous coated surfaces: cast iron pipe, concrete, etc.:
- .1 INT 10.2A - Latex G5 finish.

.14 Fire-Retardant Paint (electrical and communications plywood panels):
- .1 Standard of Acceptance:
  - .1 Fire Retardant Paint FR-110, by Incl-x, or similar from Great Northern Insulation, InnovProtect, or AD Fire Protection Systems.
    - .1 Colour: white.
- .2 CSA Class A - flame spread rating 0 - 25.

2.7 SOURCE QUALITY CONTROL

.1 Perform following tests on each batch of consolidated post-consumer material before surface coating is reformulated and canned. Testing by laboratory or facility which has been accredited by Standards Council of Canada.
- .1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.
- .2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.
- .3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 GENERAL

.1 Perform preparation and operations for interior and exterior painting in accordance with MPI - Architectural Painting Specifications Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Maximum moisture content as follows:
- .1 Stucco, plaster, and gypsum board: 12%.
- .2 Concrete: 12%.
- .3 Wood: 15%.
- .4 Clay and Concrete Block/Brick: 12%.

.4 Check surfaces to determine if pH of surfaces meet manufacturer's requirements.

.5 Inspect surfaces to be coated for gouges, marks, nibs, and other defects and properly prepare patching, filling, smoothing or other surface preparation necessary to ensure satisfactory finish.

.6 Report in writing any condition adversely affecting this work.

.7 Proceed with work only when surfaces and conditions are satisfactory. Remove dust, grease, rust, scale and extraneous matter, tool and machine marks and insects from all surfaces which could be detrimental to a satisfactory and acceptable finish.

3.4 PREPARATION

.1 Prepare substrate surfaces in accordance with MPI Manual Premium Grade requirements including, but not limited to remaining items listed in this article.

.2 Remove hardware and hardware accessories, electric plates, machined surfaces, lighting fixtures, other escutcheons and appurtenances and similar items already installed that are not to be painted:

.1 Provide surface applied protection before surface preparation and painting where removal is impractical or impossible because of size or weight of the item.

.2 Reinstall items removed using workers skilled in the trades involved after completing painting operations in each space or area.

.3 Remove oil and grease then clean substrates of substances that could impair bond of the various coatings before applying paint or other surface treatments:

.1 Clean floors, adjacent surfaces and surfaces to be painted before work is commenced.

.2 Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

.3 Clean and prepare surfaces according to manufacturer's written instructions for each particular substrate condition and as specified.

.4 Prepare concrete floors to CSA A23.1/A23.2.

.4 Provide barrier coats over incompatible primers or remove and re prime substrate where trade contractor for this Section failed to adequately coordinate use of MPI Manual recommended primers and surface preparation techniques.

.5 Pre-existing Conditions – Hazardous Materials:

.1 Any work that involves contact with pre-existing hazardous materials shall meet Province of Ontario and Government of Canada requirements, and conform to the directions of authorities having jurisdiction and Owner’s environmental consultant.

.6 Prepare concrete, concrete unit masonry by removing efflorescence, chalk, dust, dirt, grease, oils, and release agents; roughen as required to remove glaze; mechanically remove hardeners or sealers used to improve curing; use solvent or mechanical cleaning methods that comply with SSPC recommendations appropriate to surface and exposure location:

.1 If mechanical cleaning is not recommended due to existing conditions, prepare surfaces using alternate methods.

.2 Exposed concrete and concrete block walls that are scheduled to be painted or sealed shall not be painted or sealed until sealants have been applied at control joints and joints with hollow metal frames.

.3 Thoroughly clean form oil, parting compounds, curing compounds and other incompatible materials from concrete surfaces.

.4 Thoroughly clean masonry and concrete surfaces to be painted free of mortar droppings, concrete spatter and extraneous matter.

.5 Use abrasive blast cleaning methods if recommended by paint manufacturer.

.6 Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application.

.7 Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.

.8 Clean concrete floors with a 5% solution of muriatic acid or other etching cleaner; flush floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.

.7 Clean wood surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required and as follows:

.1 Sand surfaces exposed to view smooth and dust off before prime coat application. Putty nail holes and minimal cracks after primer has dried; sand between primer and top coats with No. 300 sandpaper and remove dust.

.2 Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer.

.3 After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler, sand smooth when dried.

.4 Where wood elements are to be painted, stained or clear finished:

.1 Prime, stain, or seal wood to be painted immediately on delivery.

.2 Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.

.3 Back prime with spar varnish where transparent finish is required.

.4 Back prime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.

.8 Clean ungalvanized ferrous metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances using solvent or mechanical cleaning methods that comply with SSPC recommendations appropriate to surface and exposure location:

.1 Clean unpainted and shop primed metal to provide satisfactory surfaces to receive overcoats and provide permanent adhesion of coatings. Remove rust and scale with emery paper and wire brushes. Thoroughly clean metal surfaces including piping and ductwork of oil and grease with mineral spirits.

.2 Remove loose paint and scale from shop primed metal work.

.3 Blast steel surfaces clean as recommended by paint system manufacturer.

.4 Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.

.5 Prime bare metal, make good shop primed metal where abraded, feather out edges to make touch-up patches inconspicuous.

.6 Touch up bare areas and shop applied prime coats that have been damaged; wire brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as shop coat.

.9 Clean galvanized surfaces with non-petroleum-based solvents so surface is free of oil and surface contaminants, mechanically remove pre-treatment materials from galvanized sheet metal fabricated from coil stock.

.1 Apply cold phosphate surface treatment to SSPC-PT2-82 to unpassivated zinc-coated metal.

.2 For passivated zinc-coated metal ("white rusted"), power wire brush or vigorously hand wire brush to scuff galvanize thoroughly, and solvent clean to SSPC-SP1-82.

.3 Prepare exterior exposed galvanized steel and galvanized steel at wet areas to SSPC-SP7 - Sweep Blast.

.4 For galvanized steel floor and roof deck in Natatorium and related adjacent service areas, supplement the above in accordance with Paragraph 3.9 of this section and finish coating system manufacturer's instructions and recommendations.

.10 Gypsum Board:

.1 Ensure that gypsum board joints are smooth and board is clean and free of jointing compound spatter.

.2 Test surfaces for alkalinity with pink litmus paper or other recognized method.

.11 Mix and prepare paint materials according to manufacturer's written instructions:

.1 Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

.2 Stir material before application to produce a mixture of uniform density.

.3 Stir as required during application to maintain consistent tint density.

.4 Do not stir surface film into material, remove surface film and strain material before using.

.5 Use only thinners approved by paint manufacturer and only within recommended limits.

.6 Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied.

.7 Tint undercoats to match the colour of the finish coat but provide sufficient differences in shade of undercoats to distinguish each separate coat.

.12 Shut down motors, fans, and mechanical ventilation systems during spray painting. Shut down air intakes in affected areas and ventilate to exterior, when applying noxious smelling or VOC containing paints and coatings.

.13 Materials shall be thoroughly mixed before application and applied without cutting or admixture except as indicated in writing by the manufacturer.

.14 Protect adjacent surfaces and areas from painting operations and damage by drop cloths, shields, masking, templates, or other suitable protective means.

.15 Correct, refinish or replace any damage caused by failure to provide adequate protection to adjacent surfaces.

.16 Sand, clean, dry, etch, neutralize or test all surfaces using adequate illumination, ventilation and temperature requirements in accordance with manufacturer's written instructions and the MPI Manual.

.17 Keep waste rags in covered metal drums containing water and remove from building at end of each day.

3.5 APPLICATION - PRIMERS

.1 Apply primer coats to steel and galvanized steel surfaces that have and have not received shop coat or primer.

.2 Finish and back prime all wood components prior to their installation.

.3 When primer sealer is dry, touch up visible suction spots before the next coat is applied and do not proceed with the work until suction spots are sealed.

3.6 APPLICATION

.1 Method of application to be as approved by Consultant. Apply paint by brush, roller, air sprayer or airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:

.1 Apply paint in uniform layer using brush and/or roller type suitable for application.

.2 Work paint into cracks, crevices, and corners.

.3 Paint surfaces and corners not accessible to brush using spray, daubers, or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers, or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.

.5 Remove runs, sags, brush marks from finished work, and repaint.

.3 Spray application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.

.4 Brush out immediately all runs and sags.

.5 Use brushes and rollers to work paint into cracks, crevices, and places which are not adequately painted by spray.

.4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.

.5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum period as recommended by manufacturer.

.7 Sand and dust between coats to remove visible defects.

.8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

.9 Finish inside of cupboards and cabinets as specified for outside surfaces.

.10 Finish closets and alcoves as specified for adjoining rooms.

.11 Finish top, bottom, edges, and cut-outs of doors after fitting as specified for door surfaces.

.12 Reseal cut edges of wood doors and seal unfinished tops and bottoms of wood doors with 3 coats polyurethane sealer. At wood doors with plastic laminate facing, paint edges of doors to match colour of plastic laminate, 1 coat of primer and 2 finish coats.

.13 Grilles and perforated items shall be spray painted in a manner that does not block perforations. Apply evenly to present a consistent appearance free from defects visible from distance of 1.5 metres.

3.7 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Unless otherwise specified or noted, paint all “unfinished” conduits, piping, hangers, ductwork and other mechanical and electrical equipment with color and texture to match adjacent surfaces, in the following areas:

.1 where exposed-to-view in all exterior and interior areas.

.2 in all interior high humidity interior areas.

.3 in all boiler room, mechanical and electrical rooms.

.2 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.

.3 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.

.4 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.

.5 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.6 Do not paint over nameplates.

.7 Keep sprinkler heads free of paint.

.8 Paint inside of ductwork where and to the full extent visible behind grilles, registers, and diffusers with primer and minimum one coat of matt black paint.

.9 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.10 Paint natural gas piping yellow.

.11 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

.12 Do not paint interior transformers and substation equipment.

.13 Coordinate painting of services with application of colour banding, flow arrows, and identification labels provided by mechanical and electrical Divisions.

3.8 PATCHING

.1 Do retouching to ensure that the work is handed over to the Owner in proper condition, free of runs, spatter, finger marks, rust, watermarks, scratches, blemishes or other disfiguration, with full, even coverage.

3.9 SITE TOLERANCES

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.10 FIELD QUALITY CONTROL

.1 Where special painting, coating or decorating system applications (e.g., elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Consultant.

.2 Advise Consultant when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.3 Cooperate with inspection firm and provide access to areas of work.

.4 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Consultant.

3.11 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.1 Prevent overspray and/or splashes to adjacent surfaces.

.2 Clean spills, splashes and/or or overspray immediately using manufacturer's recommended cleaners and procedures.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.12 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.13 SCHEDULES

.1 Finish Schedule: refer to schedules on Drawings and the requirements of this Section.

.1 Assume full responsibility for painting or otherwise finish surfaces of all materials of the contract exposed in the finished work which do not already have finished surfaces and that normally require paint or varnish finish. Inspect surfaces over which the work of this section is dependent for unevenness, cracks, surface defects, moisture, cleanliness, roughness and other irregularities detrimental to the application and performance of the work. Confirm conditions satisfactory before proceeding. Failure in complying with above or failure to have

unsatisfactory conditions corrected before proceeding, shall not relieve Subcontractor of responsibility for required results.

.2 Exposed means visible in complete work including interiors of cupboards and closets, tops of doors, trim, and the like, whether in sight line or not, including behind surface mounted fixtures and heating units.

.3 Unless otherwise indicated, all exposed wood that is not prefinished is to receive a transparent finish. Prefinished wood items include:

.2 In instances where materials specified are not suitable for particular application or are contrary to manufacturer's recommendations for use on particular surface, immediately bring to attention of Consultant for clarification and instructions.

.3 Where finishing formula for surfaces requiring paint is not specified, follow recommendations of MPI Painting Specifications Manual, Premium.

.4 Consultant shall have right to make changes in colour tone of finishes prior to final coat to obtain desired results without additional cost to Owner.

.5 Unless otherwise noted or scheduled, walls shall be painted the same colour within a given area.

.6 Access doors, prime coated butts and other prime painted hardware, registers, radiators and covers, exposed piping and electrical panels shall be painted to match adjacent surfaces in terms of colour, texture and sheen, unless otherwise indicated.

.7 In areas specifically designated as "unfinished" painting is not required except for bare, primed and zinc coated metal surfaces and insulated ductwork and pipes.

.8 Where exposed to view paint bare metals, previously primed metals and zinc coated metals unless specified otherwise.

.9 Paint electrical power and lighting panels, whether prefinished or not.

.10 Apply fire-retardant coatings where required and as indicated.

.11 Unless specifically indicated on drawings to be painted, all finish carpentry work shall receive transparent finish.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 50 00 – Metal Fabrications.

.2 Section 06 40 00 – Finish Carpentry and Casework.

.3 Section 09 91 00 – Painting.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Provide electrostatic coating materials manufacturer's technical data sheets and performance evaluations for products listed in this Section indicating compliance with specified requirements.

.2 Safety and Data Sheets: Post manufacturer's standard SDS information for products specified in this Section in a visible location with cautions, hazards and recommended safety procedures clearly identified for the duration of the work of this Section on site.

.3 Samples:

.1 Samples for Verification: Submit 2 samples indicating final colour match to Consultant for verification before ordering coating materials.

.4 Operation and Maintenance Data: Submit manufacturer's written instructions for cleaning and maintenance procedures; include name of original installer and contact information in accordance with Section 01 78 00 - Closeout Submittals.

1.3 QUALITY ASSURANCE

.1 Electrostatic paint company shall have a minimum of five years experience who has completed systems similar in material, design, and extent to that indicated for Project and with record of successful performance

.2 Applicator shall be fully experienced, have a full knowledge of all specified paints and primers, have a valid autobody journeyman certificate or equivalent, and trained in the use of the specified electrostatic painting equipment.

.3 All paint applications shall be "premium grade" unless specified otherwise.

1.4 ENVIRONMENTAL REQUIREMENTS

.1 Ambient Conditions: Provide adequate ventilation in areas that electrostatic coatings are being applied; in areas that are free from dust generating activities; and with air and surface temperatures within manufacturer's recommended temperature and humidity range.

.2 Do not apply electrostatic paint finish in areas where dust is being generated.

.3 Provide an 11 kg CO_2 fire extinguisher adjacent to items being coated.

.4 Keep oily rags, waste and other similar combustible materials in closed metal containers and remove at end of each day. Take precautions to avoid spontaneous combustion.

.5 Provide adequate cover for all finished Work close to surfaces to be painted. Covers shall be placed before painting commences and remain until completed.

.6 Post "wet paint" signs while Work is in progress or drying.

.7 Post "no smoking" signs where volatile materials are being used.

1.5 WARRANTY

.1 Submit manufacturer's standard 20-year powder coating warranty.

Part 2 Products

2.1 POWDER COAT FINISH SYSTEM

.1 Epoxy pre-coat / Colour Coat / Polyester Powder Coat Finish 20-Year Warranty System.

.2 Colours: as determined by Consultant; refer to Drawings.

2.2 SYSTEM REQUIREMENTS

Test Methods	Powder Properties	Requirement
		Final Coating
Prime coat	Epoxy pre-coat by DuPont	
Colour coat	Polyester Powder Coat by DuPont	
ASTM D5965	Specific Gravity	1.29 +/- 0.05
	Theoretical Coverage	1.49 ft 2/lb/mil
ASTM D3451	Mass Loss During Cure	less than 1%
	Max. Storage Temp.	75 degrees F.

Test Methods	Coating Properties	Requirement
ASTM D523	Gloss at 60 percent	85+
DPC TM 10.219	PCI Powder Smoothness	8
ASTM D2454	Overbake Resistance,	Time 100%
ASTM D3363	Pencil Hardness	2H
ASTM D2794	Dir/Rev Impact, Gardner	160/160in/lbs
ASTM D3359	Adhesion, Cross Hatch	5Bpass
ASTM D522	Flexibility, Mandrel	1/8"dia. no fracture
ASTM B117	Salt Spray	4,000 hours

Application	
Electrostatic Spray, 300 degrees F.	**Cure Schedule** (Time at substrate temp.)
Pretreatment: White Metal Blast (2mil. Min. Etch)	
Substrate: 0.032 in. CRS	10 Min. @ 400f.
Film Thickness	8.0-10.0 Mils

2.3 ACCESSORIES

.1 Supply manufacturer's recommended materials and accessories as required for a complete job.

Part 3 Execution

3.1 PREPARATION

.1 Prepare surfaces to be painted or finished in accordance with manufacturer's instructions and the following.

.2 All surfaces shall be thoroughly examined to determine extent of visible defects. Fill or remove all dents and scratches by using mandrel and metal working techniques or filling with automotive body filler.

.3 All fabricated products shall be 100% sandblasted to white metal for removal of scale, oil and debris to create a minimum 2mil etching for proper adhesion.

3.2 APPLICATION

.1 Painting Work shall be applied to manufacturer's directions. Apply paint only when dust-free conditions prevail. Results shall be even, uniform in sheen, colour and texture, free from brush or roller marks, or other defects.

.2 Electrostatic application of epoxy powder primer with 375f. minimum 15-minute duration heat cure for maximum corrosion protection.

.3 Immediately apply electrostatic application of polyester powder colour coat while metal temperature is minimum of 300f. and heat cure for minimum 10 minutes at 400f.

.4 Powder coating process shall provide an average of 8-10 mils total coating thickness, minimum 8 mils. Coating shall be able to withstand more than 4,000 hours salt spray.

.5 Finish all exposed surfaces after fabrication.

.6 The painting coats as specified are intended to cover surfaces completely. If surfaces finished as specified are not covered completely, apply additional coats at no additional cost.

.7 Polarity level of paint shall be tested by applicator and adjusted to suit application requirements.

.8 Primer shall be compatible with colour coat.

.9 Mask adjacent surfaces against overspray.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.5 SCHEDULE

.1 Power coat metal fabrications after fabrication for those items noted as powder coated on the Drawings, and as noted in Section 05 50 00 and Section 06 40 00.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the Contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 05 50 00 – Metal Fabrications

.3 Section 06 10 10 – Rough Carpentry

.4 Section 09 21 16 – Gypsum Board Assemblies

.5 Section 09 22 00 – Non-Structural Metal Stud Framing

1.2 REFERENCES

.1 Aluminum Association (AA)

.1 AA DAF-45-2003 (R2009), Designation System for Aluminum Finishes.

.2 American National Standards Institute (ANSI)

.1 ANSI A208.1-2016, Particleboard.

.2 ANSI A208.2-2016, Medium Density Fiberboard (MDF) for Interior Applications.

.3 ASTM International (ASTM)

.1 ASTM D2832-25, Standard Guide for Volatile and Nonvolatile Content of Paint and Related Coatings.

.2 ASTM D3930-08(2023), Standard Specification for Adhesives for Wood-Based Materials for Construction of Manufactured Homes

.3 ASTM E84-26a, Standard Test Method for Surface Burning Characteristics of Building Materials.

.4 CSA Group (CSA)

.1 CSA O151:26, Canadian softwood plywood.

.5 UL Solutions in Canada (ULC)

.1 ULC 102-19 (R2024), Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies (CAN-ULC-102-2019-(R2024)).

.2 ULC 706.1-2026, Standard for Insulating Wood Fibre Boards for Buildings (CAN-ULC-706.1-2026).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures.

.1 Submit manufacturer's printed product literature, specifications and data sheets.

.2 Submit WHMIS MSDS - Safety Data Sheets. WHMIS SDS acceptable to Labour Canada and Health and Welfare Canada for concrete floor treatment materials. Indicate VOC content. Indicate VOC's:

.1 For caulking materials during application and curing.

.2 For adhesives.

.2 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

.1 Indicate location, type, size, panel arrangement, backing, hardware, anchor or mounting details, frames or trim and accessories.

.3 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.

.1 Marker Boards: Submit minimum two (2) - 305 mm x 305 mm samples of porcelain enamel finish for each type of marker board required.

.2 Submit 300 mm long sample of trim in each finish type and colour.

.4 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

.5 Submit closeout data as follows:

.1 Provide manufacturer’s printed recommendations for general maintenance, including cleaning instructions.

1.4 QUALITY ASSURANCE

.1 Regulatory Requirements:

.1 Surface burning characteristics of materials: listed and labelled by an organization accredited by Standards Council of Canada.

.2 Engage an experienced installer who is an authorized representative of visual display board manufacturer for both installation and maintenance of the type of products required for this Project.

Part 2 Products

2.1 MANUFACTURERS

.1 Acceptable Manufacturers: Subject to compliance with requirements specified in this Section, manufacturers offering products that may be incorporated into the Work include; but are not limited to, the following:

.1 CCDC
.2 Clarus
.3 Architectural School Products Ltd..
.4 Claridge Products and Equipment Inc..
.5 C.P. Distributors Ltd..
.6 Crestway Systems Ltd..
.7 Delta Products Ltd..
.8 Egan Visual Inc..
.9 Malem Architectural Specialties Ltd..
.10 Shanahan’s Limited Partnership.

2.2 VERTICAL SLIDING WHITEBOARDS

.1 Vertical Sliding Whiteboard with two writing surfaces (one fixed, one sliding) with no legs.

.2 Standard of Acceptance:

.1 Series 900 without legs by CBBC.

.1 Custom Sizes, to be coordinated with existing room dimensions and door sizing. Refer to Drawings.

.1 3660mm x 1830mm.

.2 2860mm x 1830mm..

.2 Surfaces: Porcelain Enameled Board.

.1 Porcelain enamel finish shall meet the requirements of Porcelain Enamel Institute Standard S104.

.3 Surface Colour: White.

.4 Frame Material: Anodized Aluminium.

.5 Sliding Mechanism: Counterweight mechanism consisting of ball bearing pullies and a steel cable.

.6 Magnetic: Yes.



2.3 HORIZONTAL SLIDING WHITEBOARDS

.1 Horizontal Sliding Whiteboard with 1 fixed board and 1 sliding board.

.2 Standard of Acceptance:

.1 Series 940 by CBBC.

.1 Custom Sizes, to be coordinated with existing room dimensions and door sizing. Refer to Drawings.

.1 9140mm x 1220mm overall whiteboard size, to be comprised of maximum standard panel length available

.1 3040mm x 1220mm - movable section.

.2 Surfaces: Porcelain Enameled Board.

.1 Porcelain enamel finish shall meet the requirements of Porcelain Enamel Institute Standard S104.

.3 Surface Colour: White.

.4 Frame Material: Anodized Aluminium..

.5 Sliding Mechanism: Horizontal sliding tracks.

.6 Magnetic: Yes.



2.4 GLASS WHITEBOARDS

.1 Standard of Acceptance:

.1 White Glass Board 48” x 96 Tempered Glass – White – Edge - Square corners.

.1 Product #: RVER-4896CCBC-A

.2 Size: 48” x 96” (122 cm x 243.8 cm)

.3 Surface: Tempered glass

.4 Colour: White

.5 Magnetic: Yes.

.6 Board: ¼” (6 mm).

.7 Mounting System: Edge grip (Hidden Z-anchors)



.2 Alternate Acceptable Material:

.1 Clarus wall to wall glass whiteboard – 6mm tempered safety writing glass

2.5 ACCESSORIES – GENERAL

.1 Trim and Framing: Extruded aluminum to profiles indicated using manufacturer’s standard sections appropriate for installation conditions.

.2 Accessories:

.1 Pen Trays: Manufacturer's standard 25 mm rail, plate type, continuous for full length of each installation, complete with end closures and matching trim and frame materials.

.2 Maprails: Manufacturer's standard continuous for full length of each installation with cork inserts and end stops and matching trim and frame materials.

.3 Markers and Cloth Kits: provide 4 Egan Markers (red, black, green, blue), and 1 cleaning cloth per whiteboard/communication board.

.4 Whiteboard cleaner: manufacturer's recommended cleaner, 1 bottle per board.

.5 Whiteboard eraser: manufacturer's recommended dry-erase eraser, 1 eraser per board.

.3 Joint reinforcement: concealed mechanical jointing system to provide straight, rigid, continuously supported, tight butt, flush joints at surface.

.4 Anchor clips, mounting brackets, anchors and fasteners: concealed-type system, recommended by manufacturer for fixed installation.

2.6 FABRICATION

.1 Shop fabricated display boards in one piece for lengths 3600 mm or less, for longer sections colour match adjacent pieces.

.2 Laminate display board and backing sheet to the core in accordance with the display board manufacturer's recommendations.

.3 Install trim on panels in factory. Make mitres and joints to hair-line fit, free of rough edges with concealed brackets to reinforce and hold joints tight and flush. No exposed fasteners permitted.

.4 Overlap trim 6 mm onto panels. Provide closed ends for chalk troughs and open-end extrusions (not required at Tackboards).

.5 Factory fit assemblies too large for shipment to site in one piece, disassemble for delivery and site assembly.

2.7 ALUMINUM TRIM FINISHES

.1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.

.1 Consultant to choose from Manufacturer’s full range.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 INSTALLATION

.1 Install display boards in accordance with manufacturer's instructions, parallel to floor, plumb and level, to provide rigid, secure surface.

.2 Install trim and framing around display boards panels. Make mitres and joints to hair-line fit, free of rough edges. Use concealed brackets to reinforce and hold joints tight and flush. No exposed fasteners permitted.

.3 Mechanical attachment:

.1 To concrete or solid masonry use lag screw and expansion bolts or screws and fibre plugs as appropriate for stresses involved.

.2 To hollow masonry use toggle bolts or equivalent.

.3 To wood or sheet metal use screws. Secure into framing members in stud walls.

.4 Mount on site maprails and tackable strips, and accessories as indicated.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.5 SCHEDULE

.1 Provide Communication Boards as indicated.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 07 92 00 – Joint Sealants

.3 Division 08: Door Hardware

.4 Section 08 80 50 – Glazing

.5 Section 08 87 53 – Glazing Films.

.6 Section 09 21 16 – Gypsum Board Assemblies

.7 Section 09 22 00 – Non-Structural Metal Framing

.8 Division 26 – Electrical: coordination conduit, wiring, and other materials

.9 Division 27 – Communications: coordination communications cabling and other materials.

.10 Refer to Drawings.

1.2 REFERENCES

.1 Aluminum Association (AA):

.1 AA DAF 45-2003 (R2009), Designation System for Aluminum Finishes.

.2 ASTM International (ASTM)

.1 ASTM A653/A653M-25a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM B429/B429M-20 Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.

.3 ASTM B221M-21, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

.4 ASTM B221-21 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

.5 ASTM C423-23e1, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

.6 ASTM C634-22, Standard Terminology Relating to Building and Environmental Acoustics.

.7 ASTM C1036-25, Standard Specification for Flat Glass.

.8 ASTM C1048-25, Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

.9 ASTM C1396/C1396M-24, Standard Specification for Gypsum Board.

.10 ASTM E72-25, Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.

.11 ASTM E84-26a, Standard Test Method for Surface Burning Characteristics of Building Materials.

.12 ASTM E90 23, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

.13 ASTM E336-25a, Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings.

.14 ASTM E413-22, Classification for Rating Sound Insulation.

.15 ASTM E1111/E1111M-14(2022), Standard Test Method for Measuring the Interzone Attenuation of Open Office Components.

.16 ASTM E1414/E1414M-21a, Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 12.1-2026, Safety glazing.

.2 CAN/CGSB 12.8-2026, Insulating glass units.

.4 CSA Group (CSA)

.1 CSA A500-16 (R2026), Building guards.

.2 CSA B480-02 (R2022), Customer Service Standard for People with Disabilities (Developed in partnership with the Government of Ontario).

.3 CSA / ASC B651:23, Accessible Design for the Built Environment, Includes Errata (2023) and Errata (2025).

.5 Glass Association of North American (GANA)

.1 NGA's GANA Glazing Manual, International Year of Glass (IYOG Edition), 2022.

.2 GANA Laminated Glazing Reference Manual (2019 edition).

.6 National Fire Protection Association (NFPA):

.1 NFPA (Fire) 80, Standard for Fire Doors and Other Opening Protectives, 2025 Edition.

.2 NFPA (Fire) 252, Standard Methods of Fire Tests of Door Assemblies, 2022 Edition.

.3 NFPA (Fire) 257, Standard on Fire Test for Window and Glass Block Assemblies, 2022 Edition.

.1 UL Solutions in Canada (ULC)

.1 ULC 102-19 (R2024), Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies, (CAN-ULC 102-2019-(R2024))

.2 ULC 106-15 (R2025), Standard Method for Fire Tests of Window and Glass Block Assemblies (CAN-ULC-106-2015-(R2025)).

1.3 DEFINITIONS

.1 OBC 2024 or OBC: means the 2024 edition, as amended, of the Ontario Building Code.

.2 Non-progressive: A non-progressive demountable partition system must allow the removal of individual panels from any location without disturbing adjoining panels, allowing for removal and reinstallation of sections from either side of partition and at any point in the panel field without disturbance of adjacent panels.

.3 Unitized Partition Module: Unitized partition modules are comprised of factory assembled frames with integrated acoustic insulation, wiring and opening according to shop drawings and design, finished exposed panels, which are delivered to site ready for erection. It is expected that the product can be removed, relocated, and reinstalled in different layout with minimum parts replacement.

.4 Component-Based Wall: Wall product typically shipped to site in parts and walls are assembled on-site according to planned layout. It is expected that the product can be disassembled, relocated and reassembled in different layouts with minimum parts replacement.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00- Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's printed product literature and data sheets for post and panel demountable partitions and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit engineered shop drawings, designed and stamped by Manufacturer’s P.Eng. licensed to practice in the Province of Ontario.

.1 Comprehensive drawing set with floorplans, elevations, partition modules, materials, components, finishes, door and glazed openings, hardware, connections and fastening to adjacent structure, plan and section details, assembly details. Include dimensions, glass thickness, materials and finishes, including design calculations.

.4 Samples:

.1 Submit one representative model of each type partition.

.1 Indicate basic construction, glazed sections, door frames, trim, and finishes.

.2 Submit duplicate 200 x 300 mm samples of panel colours, textures and finishes and duplicate 300 mm long samples of trim options for colour selection by Consultant.

.3 Submit sample of ceiling fixing device.

.4 Submit duplicate samples of all proposed hardware

.5 Test Reports:

.1 Submit test reports in accordance with Section 01 40 00- Quality Requirements, from approved independent testing laboratory, certifying partition system complies with sound transmission rating classifications as specified.

.1 Testing shall be to ASTM E90 and ASTM E413, certifying STC rating for each partition type supplied.

.6 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance and physical requirements.

1.5 CLOSEOUT SUBMITTALS

.1 Submit closeout data in accordance with Section 01 78 00 – Closeout Submittals.

.1 Operation and Maintenance Data: Submit manufacturer's written instructions for maintenance of operable components and cleaning procedures, include name of original installer and contact information.

1.6 QUALITY ASSURANCE

.1 Installer Qualifications: installer to have a minimum of two years documented experience in installing products of similar type and scope and must be approved by the manufacturer.

.2 Obtain primary products specified in this Section from a single manufacturer.

.3 Apparent Sound Transmission Class (ASTC) tests of completed demountable enclosures may be conducted at random locations, to ASTM E336, at the sole option of the Owner. STC ratings must be within 5-8 points of the certified STC rating.

.4 Glass and glazing design: to National Glass Association (with GANA) Engineering Standard Manual and OBC 2024.

.5 Mock-ups:

.1 Construct mock-ups in accordance with Section 01 40 00 - Quality Requirements.

.2 Erect full-sized finished partitioning for one typical enclosed office, and additional condition as required to demonstrate the following typical components:

.1 Exterior corner.

.2 Swing Door and frame

.3 Sliding Barn door and Frame.

.4 Connection of partition system to perpendicular wall.

.5 Chases for installation of wiring and piping.

.3 Allow 48-hours for review of mock-up by Consultant before proceeding with work.

.4 When accepted, mock-ups will demonstrate minimum standard for this work. Mock-ups may remain as part of finished work.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.2 Inspect demountable wall system components upon delivery for damage. Remove and replace damaged items.

.3 Storage and Handling Requirements:

.1 Store demountable wall system components indoors on raised platforms in vertical positions with blocking between units to allow air circulation. Keep stored material covered and protected from damage.

.2 Store and protect demountable partitions from damage.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction Waste Management.

1.8 PROJECT CONDITIONS

.1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install the system components under environmental conditions outside manufacturer's absolute limits.

.2 Environmental Limitations: Do not deliver or install the system components until building is enclosed and finishing operations, including ceiling and floor covering installation and painting, are completed.

.3 Site Measurements: Verify dimensions by site measurements before fabrication and indicate measurements on shop drawings where demountable partition system components are indicated to fit between or around other construction; coordinate fabrication schedule with construction progress to avoid delaying the Work.

.4 Established Dimensions: Establish dimensions and proceed with fabricating demountable partition system without site measurements where site measurements cannot be made without delaying the Work; coordinate construction to ensure that actual site dimensions correspond to established dimensions; allow for trimming and fitting.

.5 Contractor responsible to visit site and confirm that all product, including large panels, can be delivered to the locations required. Contractor is responsible to modify product as needed and provide solutions to designer for approval prior to manufacturing.

1.9 WARRANTY

.1 Manufacturer’s Warranty: Submit the manufacturer‘s standard 10-year warranty starting from the date of Substantial Performance. The manufacturer‘s warranty is in addition to other rights contained within the Contract.

.2 For the work of this Section, the 12-month warranty period prescribed in Subsection GC 32.1 of General Conditions "C" is extended to 24 months.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 At modules requiring double-glazed insulating glass units, in whole or in part, Provide non-progressive Component-Based Walls.

.2 Provide modules / partitions as follows; refer to Drawings for locations:

.1 Demountable Wall: (Sound enhanced glazing) Double-glazed with safety warning strips (glazing film shall be supplied and field-installed by Section 08 87 53 - Glazing Films – installed to glass at exterior of room).

2.2 GLAZED MODULES

.1 Standard of Acceptance:

.1 PC350 Elite Double Glass Wall

.2 Double-Glazed Modules:

.1 Monolithic glazed panel frameless (floor to ceiling, butt joint without vertical post support).

.2 Monolithic glazed panel framed (floor to ceiling, in-line joint with vertical post support).

.3 Full-height glass shall meet Ontario Building Code requirements, and CSA A500 as applicable.

.1 Double-Glazed Panels (Full Height): to CAN/CGSB 12.8, and as follows:

.1 Inboard pane: clear tempered glass, 12 mm thick

.2 Air space, 100% air filled.

.3 Outboard pane: clear tempered glass, 12 mm thick.

.3 Aluminum Frame Characteristics:

.1 Rectilinear design

.2 Profile: 50mm (2") x 124mm (4-7/8") wide double glazed base and ceiling frame.

.3 Snap on trim: Aluminum

.4 1.8 mm (0.070") rabbet wall thickness

.5 STC rating of assembly: STC 47.

.6 Aluminum frame assembly wrap around the following 124mm thick wall assembly at locations indicated on drawings:

.1 16mm (5/8”) gypsum wall-board

.2 92mm (3 5/8”) metal studs w/ 89mm of mineral wool acoustic batt insulation

.3 16mm (5/8”) gypsum wall board

2.3 GENERAL REQUIREMENTS – GLAZED MODULES

.1 Wall panel size and requirements:

.1 Wall height: Accommodate full height floor to finished ceiling. Provide a minimum of 63.5mm (2.5 inch) vertical support post element. Erected and removed with minimal damage to floor and ceiling finishes.

.2 Panel width: As indicated on architectural drawings and confirmed by manufacturer’s design to suit partition and mullion layout.

.3 Panel thickness: Nominal thickness 100mm (4 inches) maximum.

.4 Panel connection: In-line, 90-degree, (L, T and X connection) and 45-degree.

.5 Panel base installation with minimal damage to finished flooring to provide flexibility and minimize floor repair for future reconfiguration. (Anchor vary by seismic requirements)

.6 Panel top can be installed to the underside of a partition wall extending to floor deck above suspended ceilings with minimal damage and alteration to existing ceiling.

.2 Glazed panel frameless (without structural vertical post support):

.1 Glazed panels must be connected to each other using self-adhesive silicone tape or non-structural support elements (used at corners). Corner glazed panels to be frameless return.

.3 Glazed panel framed (with vertical post support):

.1 Glazed panels where connected to each other with structural vertical post support elements.

.4 Glass:

.1 Clear tempered glass, to CAN/CGSB 12.1; minimum 12 mm thick glass, or as otherwise required to meet OBC 2024 requirements if thicker.

.2 Safety warning strips (glazing film shall be supplied and field-installed by Section 08 87 53 - Glazing Films – installed to glass at exterior of room. Full height glass shall be minimum 12 mm thick.

.3 Full-height glass shall meet Ontario Building Code requirements, and CSA A500 as applicable.

2.4 PERFORMANCE REQUIREMENTS – GLAZED MODULES

.1 Structural Performance – Glazed Modules:

.1 Meet or exceed the requirements of OBC 2024.

.2 Transverse Load Capacity:

.1 Wall system must be able to sustain a 240 Pa (5 psf) minimum transverse loading with panel deflection no greater than l/120, in accordance to ASTM E72 Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.

.3 Floor deflection:

.1 Wall system must be able to accommodate a minimum of 6mm (0.25 inch) floor-deflection in vertical shift. Provide product drawings or report for vertical shift allowance and seismic bracing for the wall system designed by Qualified Structural engineer.

.2 Acoustic Performance – Glazed Modules:

.1 Tested per ASTM E90 “Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements: and ASTM E413 “Standard Classification for Rating Sound Insulation”.

.2 STC rating as follows: 47 STC minimum, typical.

.3 Sound packing may be used to increase STC ratings including but not limited to: gasketing for use between crown and ceiling, and wall channels and walls, loose or mineral fiber pieces / batting packed inside of base, crown, wall channels and pilaster cavities.

.4 STC tests shall be conducted to represent entire wall assembly, including all components as installed in the field with panel adjoining components with a minimum of 2440 mm (96 inch) wall span and minimum 2743 mm (108 inch) height. Submit test report for evaluation.

.5 Noise Reduction requirements: NRC.

.1 When acoustic panel is specified, manufacturer must provide noise reduction solution for base panel with covering material to obtain a minimum of NRC 0.5. Supporting document for evaluation may be requested.

.3 Flammability – Glazed Modules:

.1 Provide exposed panel finishes and surfaces meeting fire hazard classification requirements, tested in accordance with CAN/ULC S102, Test for Surface Burning Characteristics of Building Materials and Assemblies as follows:

.1 Flame Spread Rating: Less than 25.

.2 Smoke Development: Less than 450.

.4 Marking for Full-Height Glass Walls:

.1 Continuous opaque strip of logos, signs or decorative features such as broken lines or continuous bands is required to increase visibility and provide awareness the presence of the glass wall in accordance with Ontario Building Code requirements and CSA /ASC B651 quidelines.

.1 Refer to Drawings for designs and locations, and to Section 08 87 53 - Glazing Films for glass film requirements.

2.5 DOOR SYSTEMS

.1 Hinged swing doors and sliding doors as indicated; refer to Drawings.

2.6 GENERAL REQUIREMENTS – DOOR SYSTEMS

.1 Door Clear Width:

.1 Complied to OBC requirement of clear width of door open must be a minimum of 900 mm (35-7/16 inches) and a maximum of 1219 mm (48 inches). Measured between the face of the door and the stop of the frame with the door open to 90 degrees for swing or pivot doors.

.2 For sliding doors: Complied to OBC requirement of clear width of door open must be a minimum of 900 mm (35-7/16 inches) and a maximum of 1219 mm (48 inches) when fully opened.

.1 In all areas where space allows, provide a 305 mm (1 foot) clearance on the interior side of the pull side of all sliding doors.

.2 All sliding to receive a ladder pull. Refer to Door Hardware Schedule.

2.7 PERFORMANCE REQUIREMENTS – DOOR SYSTEMS

.1 Structural Performance – Door Systems:

.1 Doors must compliance to BIFMA x 5.6 - access door tests.

.2 Acoustic Performance:

.1 Tested per ASTM E90 “Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements: and ASTM E413 “Standard Classification for Rating Sound Insulation”.

.1 A minimum of 47 STC for all doors construction.

.3 Doors:

.1 Swing Glass Doors:

.1 Standard of Acceptance:

.1 PC350 P5 Low Profile Swing Doors.

.2 125 mm (5") wide stiles and138 mm (5-1/2”) top and bottom rails.

.3 Depth: 45 mm (1-3/4”)

.4 Glass: 1” sealed clear, tempered IGU.

.5 Provide acoustical enhancement options to achieve STC 47 rating.

.6 With Full Size Interchangeable Core FSIC cylinder 6 pin.

.7 Door Seals: to include brush and foam receiver at closer side for light and sound seal

.8 Glass Door Hardware: provided by Demountable Partition Supplier and as selected by the Consultant from the manufacturer's full range, door handle must comply to CSA / ASC B651 requirements.

.9 Soft Open / Close Mechanism.

.10 Access Control: Prep frame for electric strike on doors noted on hardware schedule

.2 Sliding Glass Doors (Left or Right Slide as indicated):

.1 Standard of Acceptance:

.1 SRT™ Barn Door 4" Elite Curb Base (Single Barn Door Type).

.2 5" Stile aluminum doors x 1-3/4" thick

.3 100 mm (4") top and bottom rails

.4 With 65 mm (2 9/16") valance trim

.5 With Full Size Interchangeable Core FSIC cylinder 6 pin.

.6 Glass: Tempered, meets or exceeds the requirements of CAN/CGSB 12.1.

.7 Glass: 1" sealed clear, tempered IGU.

.8 Door Seals: to include brush and foam receiver at closer side for light and sound seal

.9 Glass Door Hardware: provided by Demountable Partition Supplier and as selected by the Consultant from the manufacturer's full range, door handle must comply to CSA / ASC B651 requirements.

.10 Track Assembly: Manufacturers standard assembly with slow down mechanism.

.11 Soft Open / Close Mechanism.

.12 Locking: Provide Storeroom lock with keyed side facing meeting room.

.3 Refer to Door Hardware Schedule for full hardware requirements

2.8 MATERIALS AND COMPONENTS

.1 Pre-manufactured, non-progressive, unitized (component-based for instances where part of panel is opaque and part is glazed) wall system consisting of framing members, finish panels and glazing, floor, wall and ceiling mounting materials, acoustic fillers, doors, and hardware; fully moveable and reusable in reconfigured layouts and spaces, and as follows:

.1 Manufacture must refer to drawings for demountable partition location and types.

.2 Panel Connections: Manufacturer's standard for panel and framing attachments.

.3 Trim and Base: Manufacturer's standard for complete installed system.

.4 Base finish and frames to be white metal.

.2 Acoustic Insulation: When used, insulation material to contain post-consumer and post-industrial recycle content

.3 Aluminium Extrusions:

.1 ASTM B221/B221M, extruded aluminum alloy.

.2 Finish: Elements of Earth Luxe Tones – Carbon

.1 For concealed surfaces: mill finish.

.4 Steel Components:

.1 ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.5 Flexible Plastic Components:

.1 Manufacturer standard PVC Free components including; but not limited to, ceiling and wall trims and glass retainers; colour black and custom coloured as selected by the Consultant from the manufacturers complete range of colours.

.6 Door frames:

.1 Extruded aluminum to ASTM B221/B221M; manufacturer's standard attachment hardware to unitized partition modules. Include continuous vinyl seal on door stop.

.2 Finish: Elements of Earth Luxe Tones – Carbon

.1 For concealed surfaces: mill finish.

.3 Hardware Reinforcement: Factory installed steel backer plates at all hinge and strike locations.

.4 Prepare for template hardware; Coordinate with Section 08 71 00.

.5 Coordinate all card readers used at demountable partition doors with Contractor.

2.9 PANEL REQUIREMENTS FOR INTEGRATED ELECTRICAL AND COMMUNICATION SYSTEMS

.1 Unitized partition modules shall provide integrated, factory installed electrical wiring for access control specified in door hardware schedule.

.2 All electrical components shall comply with Canadian Electrical Code or CSA certified before assembly.

.3 All standard electrical switches and outlets, thermostats, communications systems must be mounted with accessibility procedure CAN/CSA B651, section 4.2.3, operating controls shall be located in a range between 400mm (15.8 inch) and 1200mm (47.2 inch) from the floor.

.4 Unitized partition modules could be fully accessible from either side to allow for direct access to interior cavity space with connectors. Modules shall have the capacity to be electrified by a floor and top feed power harness. When panel design does not allow fully accessibility to interior cavity, supply factory installed internal raceways with pull string with option to fish cables through the base cavity of the panel after installation to accommodate future routing of electrical and data cables.

.5 Supply power to unitized partition module via ceiling terminating at height that comply with accessibility requirement located above finished floor or to module base where specifically indicated or required. Provide project required whip/pigtail length.

.6 Unitized partition modules shall accommodate power of 120V with 12 AWG wiring for 15/20 amp circuitry, lighting control typical 120V unless specified or low voltage and single and double gang receptacles and switches.

.7 Provide all cutouts and reinforcements required for unitized partition modules to accept electrical, communications, mechanical and security system components.

.8 Provide outlet boxes and device boxes in partition module cavity for all outlets and devices as indicated on Electrical Contract Documents.

.9 Metal conduit raceway and pull wire: As indicated on Electrical Contract Documents.

.10 Prepare partition modules for light switches, thermostats, cable, as required, with final locations indicated on Electrical Contract Documents.

.11 Future Work: Unitized partition module shall allow field installation of electrical and communication wiring without damage to the wall structure and must be able to run from the ceiling to near floor and have the capability of adding electrical and communication easily post-partition module erection. When panel design does not allow fully accessibility to interior cavity, supply factory installed internal raceways with pull string with option to fish cables through the base cavity of the panel after installation to accommodate future routing of electrical and data cables. Provide blank plates indicated on Electrical Contract Documents.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates and surfaces to receive post and panel demountable partitions previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions.

.1 Visually inspect substrate in presence of Consultant.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval from Consultant.

3.2 ERECTION

.1 Install system after floor finishes and in accordance with manufacturer's instructions and engineered shop drawings.

.2 Erect gypsum wall-board clad steel stud partitions as described in section 09 21 16 – Gypsum Board Assemblies for floor tracks, ensure alignment with existing wall assemblies.

.3 Fasten runners to wall assemblies on floors, ceilings and abutting vertical surfaces per manufacturers instructions and recommendations.

.1 All top tracks to connect to framed, gypsum-wallboard clad walls that extend to underside of structural deck in ceiling plenum

.4 Erect partitions plumb, square and level.

.1 Accurately fit and fasten to abutting surfaces.

.2 Shim under partitions at uneven floors to ensure level installation.

.5 Install continuous light/sound seal at junction of ceiling height partitions with floors, ceilings and abutting walls and vertical surfaces.

.6 Provide vertical posts and joint covers, full height, in one piece.

.7 Install acoustical insulation and caulking to correspond with tested assembly according to manufacturer's instructions.

.8 For rail height partitions, secure posts to floor for lateral stability.

.9 Glaze partitions in accordance with National Glass Association (with GANA) Glazing Manual.

.10 Seal partitions in accordance with Section 07 92 00 - Joint Sealants and National Glass Association (with GANA) Sealant Manual.

.11 Structural Silicone Glazing, to National Glass Association (with GANA) Sealant Manual.

3.3 ADJUSTING

.1 Adjust post and panel demountable partitions fit accurately in accordance with manufacturer's written recommendations.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Construction Waste Management. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.6 SCHEDULE

.1 Refer to Drawings for types, finishes, configurations and locations.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the Contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 21: Fire Suppression.

1.2 REFERENCES

.1 Authorities Having Jurisdiction

.1 Conform to the requirements of the Authority Having Jurisdiction.

.2 Ontario Building Code of Canada (OBC) 2024 - including all revisions and errata.

.3 National Fire Code of Canada (NFCC) 2025 - including all revisions and errata.

.4 Ontario Regulation 213/07: Fire Code – latest version, including all revisions and errata.

.5 National Fire Prevention Association (NFPA) Standards - including all revisions and errata.

.1 NFPA (Fire) 10, Standard for Portable Fire Extinguishers, 2026 Edition.

.2 NFPA (Fire) 13, Standard for the Installation of Sprinkler Systems, 2025 Edition.

.3 NFPA (Fire) 14, Standard for the Installation of Standpipe and Hose Systems, 2024 Edition.

.4 NFPA (Fire) 20, Standard for the Installation of Stationary Pumps for Fire Protection 2025 Edition.

.5 NFPA (Fire) 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems 2026 Edition.

.6 Approvals

.1 Obtain approval from the Authority Having Jurisdiction and from the before beginning installation.

.2 Pay all costs associated with such approvals and checking.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with the requirements of Section 01 33 00 – Submittal Procedures and Division 21.

.2 Product Data:

.1 Submit two copies of product technical datasheets.

.3 Samples:

.1 Submit two – 150 mm x 150 mm samples of enclosure finish

.4 Manufacturer’s Instructions: Submit manufacturer's printed installation instructions indicating:

.1 Special handling criteria.

.2 Recommended methods of installation.

.3 Cleaning procedures.

.5 Show extinguisher locations on piping layout drawings done using latest version of AutoCAD®.

1.4 CLOSEOUT SUBMITTALS

.1 Submit closeout documentation in accordance with Section 01 78 00 – Closeout Submittals and Division 21.

.2 Provide maintenance data for incorporation into manual specified in Division 01 – General Requirements: Closeout Submittals as applicable.

1.5 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 40 00 - Quality Requirements.

.2 Occupation Health and Safety requirements: comply with applicable requirements of jurisdictional authorities. Protect workers and public as required.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Store and handle materials in accordance with manufacturer's written instructions.

1.7 WARRANTY

.1 Provide manufacturer’s standard warranty.

Part 2 Products

2.1 FIRE PROTECTION CABINETS

.1 Fire extinguisher cabinets; mounting style as per drawings, constructed of 1.6 mm (0.06”) thick stainless steel with full opening door of 2 mm (0.08”) thick stainless steel unless otherwise noted.

.2 Provide recessed stainless steel cabinets where indicated. Wall mounted stainless steel cabinets in Barn areas.

.3 Locate cabinet so door, when open, does not obstruct any other door opening.

.4 Equip cabinet door with approved latching and locking device.

.5 Provide cabinet door with 5 mm (0.2”) full glass panel.

.6 Provide fire extinguisher and or other fire protection equipment in each cabinet as specified elsewhere and as indicated on the drawings.

.7 Acceptable Manufacturer:

.1 National Fire Equipment.

.8 Fire protection cabinet to suit the following fire extinguisher types:

.1 FE1: 4-A:60-B:C

.2 FE2: 3-A:40-B:C.

.3 FE:3 Type K.

2.2 FIRE EXTINGUISHERS

.1 Fire extinguishers to be sizes and types indicated on Drawings. Coordinate requirements and locations with Consultant before ordering equipment.

Part 3 Execution

3.1 COMPLIANCE

.1 Comply with manufacturer's printed installation instructions, details, technical datasheets and specifications.

3.2 INSTALLATION

.1 Install fire extinguisher cabinets in locations noted on drawings and as per the requirements of NFPA 10.

.2 Mounting Height: to be installed 1524 mm (60") max to top of cabinet from finished floor.

.3 Coordinate final location on site with Contractor.

.4 All installation work to be in accordance with the rules and regulations of the Authority Having Jurisdiction and the Consultant.

.5 Protect finished cabinets until turn over to Owner.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01 – General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01 – General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 - Construction Waste Management.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 The General Conditions of the Contract, Division 00, and Division 01 shall be deemed to apply and be a part of this Section of the Specifications.

.2 Section 06 40 00 – Finish Carpentry and Casework.

.3 Section 09 21 16 - Gypsum Board Assemblies.

.4 Division 26 – Electrical: coordination conduit, wiring, and other materials

.5 Division 27 – Communications: coordination communications cabling and other materials.

.6 Refer to Drawings.

.7 Coordinate with plans and elevations to determine mounting and placement locations. Exact locations determined by Consultant.

1.2 REFERENCES

.1 American National Standards Institute / Business + Institutional Furniture Manufacturers Association (BIFMA)

.1 ANSI/BIFMA X5.1-2017(R2022), American National Standard for Office and Institutional Furnishings, General-Purpose Office Chairs - Tests.

.2 ANSI/BIFMA X5.5-2021, American National Standard for Office and Institutional Furnishings, Desk/Table Products.

.3 ANSI/BIFMA X6.1-2018, American National Standard for Office and Institutional Furnishings, Educational Seating.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-44.227-2017, Freestanding office desk/table, storage products and components.

.3 CSA Group (CSA)

.1 CAN/CSA-C22.2 No.203:16 (R2026), Modular wiring systems for office furniture.

.4 UL Solutions in Canada (ULC)

.1 ULC 102-19 (R2024), Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies, (CAN-ULC 102-2019-(R2024)).

.5 UL Solutions (UL)

.1 UL 1286-2022 (R2024), Office Furnishing Systems.

1.3 DEFINITIONS:

.1 ‘FF&E’ means ‘furniture, fixtures and equipment’.

1.4 COORDINATION

.1 Coordinate with Owner, Consultant, suppliers and other affected parties, and as required for complete installations.

.1 Coordination shall also include an exchange of all information, templates, measurements, parts and components, and other requirements as needed between all relevant parties.

.2 Coordinate layout and installation of blocking and reinforcement for support of installations.

.3 Coordinate connection of service fittings where required.

.4 Coordinate and integrate furniture, fixtures and equipment into Work.

1.5 OWNER AND CONTRACTOR RESPONSIBILITIES

.1 Owner and Contractor FF&E responsibilities are clarified in Section 01 10 00 – Summary.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's published instructions, product literature, owner's manuals, and datasheets for FF&E, and include product characteristics, performance criteria, physical sizes, finishes and limitations.

.2 Submit 2 copies of WHMIS MSDS.

.3 Submit manufacturers' limited warrantees.

.3 Samples:

.1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit two samples of each exposed material, colour, pattern, texture, and finish specified, of sufficient size to accurately represent the finished product.

.3 Include representative samples of upholstery, wood/veneer, laminates, plastics, metals, and other exposed finishes, including the anticipated range of natural variation where applicable.

.4 Reviewed samples establish the acceptable standard for the Work. Retain one reviewed sample on Site for comparison with delivered and installed FF&E.

.4 Shop Drawings:

.1 Submit drawings indicating the following:

.1 Provide plans, elevations and details as required to adequately show locations, integration of services if required, and methods of installation or placement.

.2 Location of each item in relation to room or corridor and permanent installations.

.3 Locations for any required roughing-in of electrical and/or mechanical services.

.4 Where an item is wall-mounted or ceiling-mounted, provide engineered shop drawings showing connections to structure and the details of installation per Section 01 35 01 - Delegated Design, designed, stamped and signed by a professional engineer (P.Eng.) licenced to practice in British Columbia. Include engineering calculations.

.2 Scale:

.1 Plans: Not less than 1:50 metric.

.2 Sections: Not less than 1:20 metric.

.3 Details: Not less than 1:10 metric.

1.7 QUALITY ASSURANCE

.1 Quality assurance and field quality control processes shall comply with requirements of Section 01 40 00 - Quality Requirements.

.2 Manufacturers / Suppliers: in accordance with this specification Section.

.3 Installer shall be an authorized / certified representative of manufacturer / supplier. Supply proof of authorization / certification upon request.

.4 Warranty Terms and Conditions: comply with manufacturer's / supplier's warranty terms and conditions, and take all steps as required to avoid invalidating warranty.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect materials from nicks, scratches, blemishes, and other types of damage.
- .3 Replace defective or damaged materials with new.

1.9 SITE CONDITIONS

.1 Where FF&E item is required to fit to other construction, establish dimensions for areas where item is to fit; coordinate construction to ensure that actual dimensions correspond to established dimensions and provide fillers and scribes to allow for trimming and fitting.

1.10 WARRANTIES

.1 Submit manufacturer's / supplier's product warranties and related documents to Owner, commencing from date of Substantial Performance, and include copies in Operations and Maintenance Manual in accordance with Section 01 78 00 – Closeout Submittals.

Part 2 Products

2.1 FURNITURE, FIXTURES AND EQUIPMENT

.1 Fixed pedestal-supported classroom benching in Scope 1, to be anchored into the slab and provide integrated power.

- .1 Standard of Acceptance:
  - .1 KI, Fixed Seminar Tables.
- .2 Construction: Floor-mounted steel bases which support solid core continuous tabletops, including but not limited to:
  - .1 Worksurfaces are 1-1/4" thick, warp-resistant construction with a center core of 1-1/8" thick particleboard, a minimum of 40-50 lb/ft³ PCF density to prevent warping. Top surface to be a minimum of .040" thick high-

pressure laminate meeting NEMA standards with a .040” phenolic backing sheet.

.2 Provide:

.1 Standard depth 457mm (18”) benching and

.2 accessible AODA-compliant benching, with sufficient pedestal spacing and bench support to facilitate operation of accessibility device beneath benching.

.3 K & V Tite Joint fasteners, hardwood spline, and steel splice plates are used to provide a virtual “seamless top”.

.4 Edge: 74P: 1-1/4” PVC Free.

.5 Base style: Basic = Square

.6 Nacre® In-Surface Pop-Up Power Module:

.1 Power module is pop-up design and shall be 7.25" long by 3.31" wide by 2.92" high and fit securely into a 6.94” x 3” cutout with .38” radius corners. The module is made of molded plastic. The module will have two simplex receptacle ports (rated at 15 amps/125 volts), one USB-A port and one USB-C port, 2 amps per port, and one data jack opening. The module shall have a dampened spring-loaded mechanism to allow the unit to smoothly open for use and shall close smoothly when not in use. The power receptacles shall be located on a vertical plane and above the worksurface when in use to avoid accidental spills into the receptacle. A power cord with a three-prong plug, 21” or 108” long, shall plug into the 4-wire duplex receptacle under the surface. Module shall be Listed by an approved NRTL.

.2

.7 Modesty panels with laminate finish; Edge: 74P: 1-1/4” PVC Free.

.8 Powder-coat painted steel frames.

.9 All finishes and colors to be selected by Consultant from manufacturer’s full range.

.10 UL Listed Office Furnishings.

.11 Refer to drawings for dimensions, quantities and locations.

.2 Fixed tables in Scope 5 Study Lounge with integrated power.

.1 Standard of Acceptance:

.1 Spec™ EndZone 2” End Panel Table.

.2 Base Construction: Constructed using two 1” thick 9-ply particle board core. Covered and bonded with a water-based glue to a 1/16’ high-pressure laminate sheet on top. End panels are secured to the table top using mechanical fasteners. Comes with recessed glides. Provide hidden/recessed bracket with tamper-proof fasteners to fix tables to concrete floor.

.3 Cable Management: Undersurface support trough is made from bent steel plate that has cut-outs to allow for data/communication and power. Vertical Wire Manager on one interior side of End-Panel, including junction box and furniture whip connection to Legrad Wiremold OFR series overfloor raceway. Modify end-panel as needed to facilitate cable penetration through leg.

.4 Power Module: Integrated duplex Cove power-module recessed into tabletop. Provide 3x units per table.

.5 Tabletop Construction:

.1 Core: Nu-Green 2, ULEF (Ultra Low Emission Formaldehyde) raw particleboard core. The core is made using 100% pre-consumer recycled or recovered wood fibre, and is manufactured inside an FSC Certified manufacturing facility. The top density is 39 lbs/ft^3.

.2 High-pressure laminate: 1/16" high-pressure laminate sheet with a plastic laminate backing, bonded with water-based glue. Total top thickness of approximately 1-1/8".

.6 Edge Construction:

.1 PVC (2 mm): Edge is made from PVC pellet material, and applied to the table core using a water-based glue.

.7 Dimensions: 30"xH x 36"xW x 84"xL

.8 Finish: as selected by Consultant from manufacturer's full range.

.9 Quantity: 4 units.

.3 Fixed Seating for tables in Scope 5.

.1 Standard of Acceptance:

.1 Hauser Mambo bolt-down swivel stools

.2 Construction: Steel bolt-down pedestal-supported swivel stool.

.3 Finish: to be selected by Consultant from Manufactuer's full range

.4 Shell Type: Full-size Mambo Shell

.5 Shell Material: Plastic Laminate Ply-Lam from Formica

.6 Seat Height: 457mm (18")

.7 Quantity: 21 units.

.4 Refer to Drawings for locations; exact locations to be determined by Consultant.

.5 Installation, mounting and attachment to structure must meet or exceed Ontario Building Code requirements. Meet Ontario Building Code accessibility requirements.

2.2 ACCESSORIES

.1 Provide all mounting/suspending hardware, fasteners, connections to electrical/mechanical services, manufacturer's recommended parts and components, and all accessories as required for complete installations.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for installation of items in accordance with manufacturer's / supplier's written instructions.

.1 Check and verify that no irregularities exist that would affect quality of execution of work required.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: Comply with manufacturer's / supplier's printed installation instructions, technical datasheets, assembly illustrations and details, and warranty terms and conditions.

3.3 INSTALLATION

.1 Assemble and install items in accordance with manufacturer's published instructions for type and use.

.2 Securely fasten as required. Include reinforcing, anchorage, seismic and mounting devices required for the installation of each Product.

.3 Coordinate and ensure connections to electrical and mechanical services as required, meeting or exceeding OBC requirements.

3.4 ADJUSTING

.1 Adjust items for correct function and operation in accordance with manufacturer's published instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.5 FIELD QUALITY CONTROL

.1 Test and commission all equipment in accordance with equipment manufacturer's published instructions. Make all adjustments as required to meet manufacturers' specifications

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01- General Requirements. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01- General Requirements. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Section 01 74 19 – Construction Waste Management.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by Work of this Section.

3.8 DEMONSTRATION AND TRAINING

.1 For the items provided under this specification Section, provide minimum ½ day (overall) operating, cleaning and maintenance training to Owner's maintenance staff, addressing the items herein specified. Video-record training session and provide video on USB Flashdrive to Owner at conclusion of training. Video shall be in high-definition colour and include high-fidelity sound capture of the session. Provide 2 printed copies of operating, cleaning and maintenance instructions to Owner.

END OF SECTION

1 GENERAL

1.1 GENERAL REQUIREMENTS

.1 The General Conditions of the Contract as supplemented in Section 00 73 00, and the General Requirements form part of this section, and must be read in conjunction with the requirements of this section.

1.2 SECTION INCLUDES

.1 Provision of all labour, materials, equipment and incidental services necessary to provide sodding.

1.3 DELIVERY, STORAGE & HANDLING

.1 Schedule deliveries in order to keep storage at job site to minimum without causing delays.

.2 Deliver sod to site within 24 hours of being lifted and lay sod within 36 hours of being lifted.

.3 During wet weather, allow sod to dry sufficiently to prevent tearing during lifting and handling.

.4 During dry weather protect sod from drying, and water sod as necessary to ensure its vitality and prevent dropping of soil in handling. Dry sod will be rejected.

1.4 SCHEDULING

.1 Schedule sod installation to coincide with topsoil and finish grading operations.

2 PRODUCTS

2.1 Materials

.1 Nursery Sod: quality and source to comply with standards outlined in Section 17 of the Guide Specification for Nursery Stock (latest edition), published by Canadian Nursery Trades Association.

.1 Number one Kentucky Bluegrass/Fescue Sod: sod grown from minimum 40% Kentucky Bluegrass, 30% Creeping Red Fescue, 30% Perennial Rye.

.2 Water: potable.

.3 Fertilizer: complete, synthetic, slow-release fertilizer, with maximum 35% water-soluble nitrogen.

3 EXECUTION

3.1 PREPARATION

.1 Verify that grades are correct and prepared in accordance with Section 31 22 19. If discrepancies occur, notify Owner immediately and do not commence work until instructed by Owner to do so.

.2 Do not perform work under adverse field conditions such as frozen, excessively wet or dry soil, or soil covered with snow, ice or standing water.

.3 Fine grade surface free of any remaining humps and hollows to smooth even grade, to tolerance of ± (3/8") 10mm.

.4 Clean up immediately soil or debris spilled onto adjacent pavement and dispose of deleterious materials.

3.2 LAYING OF SOD

.1 Prior to sodding, obtain approval from Owner that finished grade and depth of topsoil are satisfactory.

.2 Sodding during excessively wet conditions, at freezing temperatures or over frozen soil is not acceptable.

.3 Lay sod in rows, perpendicular to slopes, smooth and even with adjoining areas, and with joints staggered green side up. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

.4 Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

.5 Water sod immediately after laying to obtain moisture penetration into top (4") 100mm of topsoil.

3.3 MAINTENANCE

.1 Maintain sodded area from time of installation until final acceptance of sod, subject to the conditions specified below.

.2 Water sodded areas in sufficient quantities and at frequency required to maintain soil under sod continuously moist for depth of (3") 75 to (4") 100mm.

.3 Cut grass to (1.5") 40mm when it reaches height of (2.5") 65mm. Remove clippings.

.4 Fertilize sodded areas one month after sodding with 2:1:1 ratio fertilizer. Spread evenly at recommended rate and water in well.

3.4 FINAL ACCEPTANCE

.1 Sodded areas will be accepted at final inspection provided that:

.1 Sodded areas are properly established.
.2 Sod is free of bare and dead spots and without weeds.
.3 No surface soil is visible when grass has been cut to specified height.
.4 Sodded areas have been cut twice.

.2 Lawns sodded in fall will be eligible for acceptance one month after start of growing season in following spring, provided all acceptance conditions are fulfilled.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 This Section specifies requirements and instructions that are common to mechanical work Sections of the Specification and it is a supplement to each Section and is to be read accordingly.

1.3 DEFINITIONS

.1 Refer to Section 01 42 16, Definitions. The following are definitions of words found in mechanical work Sections of the Specification and on associated drawings:

.1 "concealed" – means work hidden from normal sight in furred spaces, shafts, tunnels, ceiling spaces, walls and partitions

.2 "exposed" – means work normally visible, including work in equipment rooms and similar spaces

.3 "provide" (and tenses of provide) – means supply and install complete

.4 "install" (and tenses of install) – means install and connect complete

.5 "supply" – means supply only

.6 “demolish” – means to detach existing items and legally dispose of them off site

.7 “remove and reinstall” – means to detach existing item, prepared them for reuse and reinstall them where indicated

.8 “salvage” – means to detach existing item and turn over to owner

.9 "finished area" - means any area or part of an area which receives a finish such as paint, or is factory finished

.10 "governing authority" and/or "regulatory authority" and/or "Municipal authority" – means all government departments, agencies, standards, rules and regulations that apply to and govern the mechanical work and to which the work must adhere

.11 "Consultant" – means the Architect or Consulting Engineer who has prepared the Contract Documents on behalf of the Owner

.12 “Equal to” – if products supplied by an “Equal to” manufacturer are proposed for use the “Equal to” product must be equivalent in quality, size and weight, performance, and operating characteristics (including energy efficiency), to the specified product, and acceptance or rejection of an “Equal to” product will be made by the Consultant

.2 Wherever the words "indicated", "shown", "noted", "listed", or similar words or phrases are used in the specification they are understood, unless otherwise defined, to mean that the product referred to is "indicated", "shown", "listed", or "noted" on the drawings.

.3 Wherever the words "approved", "satisfactory", "as directed", "submit", "permitted", "inspected" or similar words or phrases are used in the specification or on the drawings they are understood, unless otherwise defined, to mean that work or product referred to is "approved by", "inspected by", etc., the Consultant.

.4 In the mechanical specification, singular may be read as plural, and vice-versa.

1.4 SUBMITTALS

.1 Refer to Section 01 78 39, Project Record Documents. As specified in this Section, submit the following to the Consultant:

.1 project close-out documentation: O & M Manuals, record as-built drawings, and all associated data

.2 progress payment breakdown: a detailed breakdown of the mechanical work cost

.3 Extended Warranties: copies of all extended warranties specified, dated, signed, and in the name of the Owner

.4 Contractor’s P. Eng. Documentation: the name, qualifications, and evidence of current liability insurance for all professional engineers to perform work associated with the Contract

1.5 JOURNEYPERSON/APPRENTICE TRADESMEN

.1 All mechanical work is to be done by tradesmen who perform only the work that their certificates permit. Apprentice tradesmen must work under direct on-site supervision of an experienced journeyperson tradesperson.

.2 Unless otherwise specified, the journeyperson/apprentice ratio is to be in accordance with governing regulations.

1.6 CODES, REGULATIONS, AND STANDARDS

.1 All Codes, Regulations, and Standards referred to in this Section and in Sections to which this Section applies are the latest edition of the Codes, Regulations, and Standards in effect at the time the building permit is obtained, or at the time of bid closing for the Project, whichever comes first.

.2 All work is to be in accordance with requirements with Codes, Regulations, and Standards applied by governing authorities Included but not limited to the following:

1) Ontario Building (OBC)

2) Ontario Fire Code (OFC)

3) Ontario Electric Safety Code (OESC)

4) Canadian Standards Association (CSA)

5) Underwriters Laboratory Canada (ULC)

6) National Fire Protection Association (NFPA)

7) Factory Mutual (FM)

.3 All mechanical piping system work, including equipment, must comply in all respects with requirements of local technical standards authorities and CSA B51, Boiler, Pressure Vessels and Pressure Piping Code. Pressure vessels and fittings defined in Clause 4.3 of CSA B51 must bear a Canadian Registration Number (CRN).

.4 Where any governing Code, Regulation, or Standard requires preparation and submission of applications, special details, or drawings for review, prepare and submit them. Pay all associated costs associated with these submittals.

.5 All electrical items associated with mechanical equipment are to be certified and bear the stamp or seal of a recognized testing agency such as CSA, UL, ULC, or ETL, or bear a stamp to indicate special electrical utility approval.

.6 Requirements of the Contract Documents are to take precedence when they are more stringent than codes, ordinances, standards, and statutes.

1.7 IMPERIAL AND METRIC MEASUREMENTS

.1 Conform to requirements of CAN/CSA-Z234.1, Canadian Metric Practice Guide.

.2 Both Metric and Imperial units of measurement are indicated in the mechanical Specification. Metric measurements are "soft" and have been rounded off.

1.8 EXAMINATION OF SITE AND DOCUMENTS

.1 When estimating the cost of the work and prior to submitting a bid for the work, carefully examine all of the bid documents and visit the site to determine and review all existing site conditions that will or may affect the work, and include for all such conditions in the bid price.

1.9 DRAWINGS AND SPECIFICATION

.1 The mechanical drawings are performance drawings, diagrammatic, and show approximate locations of equipment and connecting services. Any information regarding accurate measurement of the building are to be taken at the site.

.2 The mechanical drawings are intended to convey the scope of work and do not show architectural and structural details. Provide, at your cost, all offsets, fittings, transformations, and similar products required as a result of obstructions and other architectural and structural details but not shown on the drawings.

.3 The locations of equipment and materials shown may be altered, when reviewed by the Consultant, to meet requirements of the equipment and/or materials, other equipment or systems being installed, and of the building, all at your cost.

.4 The mechanical drawings and specification are intended to be cooperative. Perform all work that is shown, specified, or reasonably implied on the drawings but not mentioned in the specification, or vice-versa, as though fully covered by both.

.5 When the scale and date of the drawings are the same, or when the discrepancy exists within the specification, the costliest arrangement will take precedence.

.6 In the case of discrepancies between the drawings and specifications, the documents will govern in the order specified in the General Conditions, however, when the scale and date of the drawings are the same, or where the discrepancy exists within the specification, the costliest arrangement will take precedence.

1.10 PLANNING AND LAYOUT OF THE WORK, AND ASSOCIATED DRAWINGS

.1 Properly plan, coordinate, and establish the locations and routing of services with all trades affected prior to installation such that the services will clear each other as well as any obstructions, including structural components of the building. Unless otherwise specified, the order of right-of-way for services is to be as follows:

.1 piping requiring uniform pitch

.2 piping 100 mm (4") diameter and larger

.3 large ducts (main runs)

.4 electrical cable tray and bus duct

.5 conduit 100 mm (4") diameter and larger

.6 piping less than 100 mm (4") diameter

.7 smaller branch ductwork

.8 conduit less than 100 mm (4") diameter

.2 Unless otherwise shown or specified, conceal all work in finished areas, and conceal work in partially finished or unfinished areas to the extent made possible by the area construction. Install piping, ductwork, and similar services as high as possible to conserve headroom and/or ceiling space. Notify the Consultant where headroom or ceiling space appears to be inadequate, prior to installation of the work.

.3 Locate all shut-off valves, balancing devices, air vents, equipment, and similar products, particularly such products located above suspended ceilings, for easy access for servicing and/or removal.

.4 Layout Drawings: Prepare layout drawings for mechanical work with locations of equipment and routing of services generally in accordance with the Contract Documents. Confirm inverts, coordinate with and make allowances for the work of other trades, accurately layout the work, and be entirely responsible for all work installed in accordance with layout drawings. Where any invert, grade, or size is at variance with the Contract Documents, notify the Consultant prior to proceeding with the work.

.5 Interference Drawings: Prepare dimensioned working interference drawings, supplementary to the Contract Documents, for all areas where multiple services and/or equipment occur, or where the work due to architectural and structural considerations requires special study and treatment. Review interference drawings with the Consultant before the work is installed. Where your work has been installed in such areas without preparation of interference drawings and conflicts occur, revise your work to suit at no additional cost.

1.11 GENERAL RE: INSTALLATION OF EQUIPMENT

.1 Unless otherwise specified or indicated, install all equipment in accordance with the equipment manufacturer’s written recommendations and instructions. Governing Codes, Standards, and Regulations take precedence over manufacturer’s written instructions.

1.12 WORKPLACE SAFETY

.1 Comply with requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding the use, handling, storage and disposal of hazardous materials. Submit WHMIS MSDS (Material Safety Data Sheets) for all products where required, and maintain 1 copy at the site in a visible and accessible location available to all personnel.

.2 Comply with all requirements of Occupational Health and Safety Regulations and all other regulations pertaining to health and safety, including worker's compensation/insurance board and fall protection regulations.

.3 If at any time during the course of the work asbestos containing materials, black mould, lead paint, or any other such materials are encountered or suspected, and not previously identified, immediately report the discovery to the Consultant and cease all work in the area in question. Do not resume work in affected areas until the situation has been properly corrected and without written approval from the Owner.

1.13 SHOP DRAWINGS AND PRODUCT DATA SHEETS

.1 Submit Shop Drawings organized by Specification Section. Verify shop drawing package for a given Specification Section is complete, including all equipment, products, materials, and systems to be used as part of that Specification Section, and submit as a single shop drawing package. Do not submit numerous separate Shop Drawings for the same Specification Section. Do not combine more than one Specification Section into one submission. Incorrect submissions will be returned without review.

.2 Submit for review, shop drawings and/or product data sheets indicating in detail the design, construction, and performance of products as requested in Sections of this Specification. The number of copies of shop drawings and/or product data sheets will be as later directed.

.3 Shop drawings are those prepared specifically for the Project. Product data sheets are copies of manufacturer's standard catalogue, etc., literature.

.4 Unless otherwise specified or required, submit shop drawings/product data sheets via email in PDF format only.

.5 Shop drawings and product data sheets must confirm that the product proposed meets all requirements of the Contract Documents.

.6 Identify each shop drawing or product data sheet with the project name and the product drawing or specification reference, i.e. "Exhaust Fan EF-1".

.7 Endorse each copy of each shop drawing or product data sheet "Correct for Review By Consultant", or "Certified to Be In Accordance With All Requirements" and include your company name, the submittal date, and the signature of an officer of your company to indicate your review and approval.

.8 The Consultant will retain 1 copy of each shop drawing or product data sheet submission.

.9 The following is to be read in conjunction with the wording on the Consultant's review stamp applied to each shop drawing or product data sheet submitted:

.10 "This review is for the sole purpose of ascertaining conformance with the general design concept. This review does not approve the detail design inherent in the shop drawings, responsibility for which remains with the Contractor, and such review does not relieve the Contractor of the responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the Contract Documents. Be responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation, and for coordination of the work of all sub-trades."

1.14 CHANGES OR REVISIONS TO THE WORK

.1 Whenever the Consultant proposes in writing to make a change or revision to the design, arrangement, quantity, or type of any work from that required by the Contract, prepare and submit to the Consultant for approval, a quotation being your proposed cost for executing the change or revision.

.2 Your quotation is to be a detailed and itemized estimate of all products, material, labour, and equipment costs associated with the change or revision, plus overhead and profit percentages and all applicable taxes and duties.

.3 Unless otherwise stated in the Contract, the following requirements apply to all quotations submitted:

.1 when the change or revision involves deleted work as well as additional work, the cost of the deleted work (less overhead and profit percentages but including taxes and duties) is to be subtracted from the cost of the additional work before overhead and profit percentages are applied to the additional work

.2 material and labour costs are not to exceed those published in local estimating price guides, less applicable trade discounts, and labour costs for journeyperson and apprentice labour must not exceed prevailing rates at the time of execution of the Contract, and must reflect the actual personnel performing the work

.3 costs for rental tools and/or equipment are not to exceed local rental costs

.4 if overhead and profit percentages are not specified in the General Conditions of the Contract, Supplementary Conditions, or elsewhere in the Specification, but allowable under the Contract, then allowable percentages for overhead and profit are to be 10% for overhead and 5% for profit

.5 the overhead percentage will be deemed to cover all quotation costs other than actual site labour, product and materials and rentals

.6 all quotations, including those for deleted work, must include a figure for any required change to the Contract time.

.4 Failure to submit a proper quotation to enable the Consultant to expeditiously process the quotation and issue a Change Order will not be grounds for any additional change to Contract time.

1.15 SCAFFOLDING, RIGGING, AND HOISTING

.1 Unless otherwise specified or directed, supply, erect and operate all scaffolding, rigging, hoisting equipment and associated hardware required for your work. Immediately remove from the site all scaffolding, rigging, and hoisting equipment when no longer required.

.2 Do not place major erection loads on any portion of the structure without approval from the Consultant.

.3 Submit for review, rigging and hoisting plans, contemplated dates, permits, equipment, safety measures, and personnel prior to hoisting operations.

1.16 PROJECT CLOSEOUT SUBMITTALS

.1 Refer to Section 01 77 00, Closeout Procedures.

.2 Prior to application for Substantial Performance, submit all required items and documentation specified, including the following:

.1 Operating and Maintenance Manuals

.2 as-built record drawings and associated data

.3 extended warranties for equipment as specified

.4 all operating test certificates, i.e. Sprinkler Test Certificate

.5 final commissioning report and TAB report

.6 identified keys for mechanical equipment and/or panels for which keys are required, and all other items required to be submitted

.7 other data or products specified

.3 Operating and Maintenance Manuals: Submit 3 hard copies of operating and maintenance manuals consolidated in hardcover 3 "D" ring binders, each binder sized to include approximately 25% spare space for future data, and identified permanently with the Project name, "MECHANICAL OPERATING AND MAINTENANCE MANUAL" wording, and the date. Manuals are to include the following:

.1 an Introduction sheet listing the Consultant's, Contractor's, and Subcontractor names, street addresses, telephone and fax numbers, and e-mail addresses

.2 a Table of Contents sheet, and corresponding index tab sheets

.3 a copy of each shop drawing or product data sheet, with manufacturer's/supplier's name, telephone and fax numbers, email address, and the email address for local source of parts and service

.4 pressure test reports, and certificates issued by governing authorities

.5 Operating Data: Operating data is to include:

.1 a description of each system and its controls

.2 control schematics for equipment/systems including building environmental controls

.3 if applicable, the building automation system (BAS) architecture and all required operating data

.4 description of operation of each system at various loads together with reset schedules and seasonal variances

.5 operation instructions for each system and each component

.6 description of actions to be taken in event of emergencies and/or equipment failure

.7 valve tag schedule, and flow diagrams to indicate valve locations

.6 Maintenance Data: Maintenance data is to include:

.1 servicing maintenance, operation and trouble-shooting instructions for each item of equipment and each system

.2 schedules of tasks, frequency, tools required, and estimated task time

.3 complete parts lists with numbers

.7 Performance Data: Performance data is to include:

.1 equipment and system start-up data sheets

.2 equipment performance verification test results, and final commissioning report

.3 final testing adjusting and balancing reports

.8 Review Submittal: Assemble one copy of the O & M Manual and submit to the Consultant for review prior to Owner training and instructions, and assembling the remaining copies. Incorporate all comments into the final submission.

.9 Digital O & M Manuals: Submit 4 digital versions of the hard copy manual using the latest version of Adobe Acrobat Portable Document Format and enhanced with bookmarks, internet links, and internal document links. The digital copies are to be copied to CDR with custom labels which indicate the project name, date, the Consultant's name, and "Operating & Maintenance Manual for Mechanical Systems".

.4 Record "As-Built" Drawings and Data: As work progresses at the site, clearly mark in red in a neat and legible manner on a set of white prints of the Contract Drawings, all significant changes and deviations from the routing of services and locations of equipment shown on the Contract Drawings and resulting from the issue of Addenda, Site Instructions, Change Orders, and job conditions. Use notes marked in red as required. Maintain the white print red line as-built set at the site for the exclusive use of recording as-built conditions, keep the set up-to-date at all times, and ensure that the set is always available for periodic review. The as-built set is also to include the following:

.1 the dimensioned location of all inaccessible concealed work

.2 the locations of control devices with identification for each

.3 the location of all piping system air vents and water hammer arrestors

.4 the location and tag identification for all tagged valves

.5 for underground piping, including service entrance/exit piping, record dimensions, invert elevations, all offsets, fittings, cathodic protection and accessories if applicable, and locate dimensions from benchmarks that will be preserved after construction is complete

.6 for fire protection systems, record actual locations of equipment, sprinkler heads, and valves, drains, and test locations, and deviations of pipe routing and sizing from that shown on the drawings

.7 the location of all concealed services terminated for future extension

.5 Digital Record "As-Built" Drawings: When work on site is complete, transfer all the as-built red line information from the site as-built drawings to a recordable and identified CAD disc with CAD work of equal quality to the Contract Drawings. Obtain a CAD disc as described below.

.6 Obtaining CAD Digital Files: The mechanical drawings have been prepared on a CAD system using the latest Release of AutoCad software. For the purpose of producing final as-built drawings, digital files of the Contract Drawings will be supplied by the Consultant for a nominal fee.

.7 Review and Submittal: Prior to inspection for Substantial Performance of the work, submit for review, the red line site as-built white prints, a CAD digital file of the as-built drawings, and a bound set of white prints (of equal quality to the Contract Drawings) made from the digital file. The Consultant will review the drawings and, if necessary, return the disc and the marked-up white prints for corrections or further revisions, in which case complete the corrective and/or revision work and resubmit the disc and white prints until they are determined to be acceptable, all prior to issue of a Certificate of Substantial Performance.

1.17 PROGRESS PAYMENT BREAKDOWN

.1 Submit, prior to submittal of the first progress payment draw, a breakdown of the cost of the mechanical work to assist the Consultant in reviewing and approving monthly progress payment claims.

.2 The payment breakdown is subject to the Consultant's approval and progress payments will not be processed until an approved breakdown is in place. The breakdown is to include one-time claim items such as mobilization and demobilization, insurance, bonds (if applicable), shop drawings and product data sheets, commissioning including testing, adjusting and balancing, and project closeout submittals.

.3 Equipment, material and labour costs are to be indicated for site services (if applicable), plumbing and drainage, fire protection, HVAC piping, HVAC sheet metal, controls, and insulation work, etc., in the same manner as they will be indicated on the monthly progress draw.

1.18 REQUIREMENTS FOR CONTRACTOR RETAINED ENGINEERS

.1 All professional engineers retained by you to perform consulting services with regard to your work, i.e. seismic engineer, fire protection engineer, structural engineer, are to be members in good standing with the local Association of Professional Engineers, and are to carry and pay for errors and omissions professional liability insurance in compliance with requirements of the governing authorities in the locale of the work.

.2 Your engineer's professional liability insurance is to protect your Consultants and Sub-Consultants, and their respective servants, agents, and employees against any loss or damage resulting from the professional services rendered by your Consultants, Sub-Consultants, and their respective servants, agents, and employees in regards to the work of this Contract.

.3 Liability insurance requirements are as follows:

.1 coverage is to be a minimum of $2,000,000.00 inclusive of any one occurrence

.2 the insurance policy is not to be cancelled or changed in any way without the insurer giving the Owner a minimum of thirty days written notice

.3 liability insurance is to be obtained from an insurer registered and licensed to underwrite such insurance in the location of the work

.4 evidence of the required liability insurance in such form as may be required is to be issued to the Owner, the Owner's Consultant, and Municipal Authorities as required prior to commencement of your Consultant's services

1.19 EXTENDED WARRANTIES

.1 All extended warranties specified in mechanical work Sections of the Specification are to be full parts and labour warranties, at the site, and in accordance with requirements of the Contract warranty, but direct and in writing from the equipment manufacturer/supplier to the Owner.

.2 Submit signed and dated copies of extended warranties which clearly state requirements specified above.

1.20 EQUIPMENT AND MATERIAL MANUFACTURER REQUIREMENTS

.1 Equipment and materials scheduled or specified on the drawings or in the Specification have been selected to establish a performance and quality standard.

.2 In most cases acceptable equipment and material manufacturers are listed for any product specified. Unless otherwise stated the bid price may be based on products supplied by any of the manufacturers named as acceptable for the particular product. If acceptable manufacturers are not listed for a particular product, base the bid price on the products supplied by the specified manufacturers.

.3 If products supplied by a manufacturer named as acceptable are used in lieu of the products specified by manufacturer's name and model number, ensure that the product is equivalent in performance and operating characteristics (including energy efficiency if applicable) to the specified product. Pay for any additional costs and changes to associated or adjacent work resulting from the use of products supplied by a manufacturer other than the specified manufacturer. In addition, in equipment spaces where products named as acceptable are used in lieu of the specified products and the dimensions of such products differ from the specified products prepare and submit for review, if requested, accurately dimensioned layouts of the rooms affected to prove that all the equipment in the room will fit properly.

1.21 IDENTIFIED PRICES

.1 Identified prices for work consist of alternative prices, separate prices, and itemized prices. Definitions of these prices are as follows:

.1 Alternative Price(s): An alternative price the difference in the bid amount (plus or minus) for substituting specified work or products for alternative work or products.

.2 Separate Price(s): A separate price is the amount of money to be added to the bid amount for new work not included as part of the Bid Documents.

.3 Itemized Price(s): An itemized price is the amount of money included in the bid amount for work as described and required for information purposes only.

1.22 PHASING OF THE WORK

.1 Phasing of the work is required to maintain the existing building in operation, all as specified in Division 01. Include all costs for phasing the work including all required "off hours" premium time labour costs.

1.23 EQUIPMENT AND SYSTEM MANUFACTURER'S CERTIFICATION

.1 When equipment/system installation is complete, but prior to start-up procedures, arrange and pay for the equipment/system manufacturer's authorized representative to visit the site to examine the installation, and when any required corrective measures have been made, to certify in writing to the Consultant that the equipment/system installation is complete and in accordance with the equipment/system manufacturer's written instructions.

1.24 EQUIPMENT AND SYSTEM START-UP

.1 When installation of equipment/systems is complete, but prior to commissioning, perform start-up for equipment/systems as specified in mechanical work Sections in accordance with the following requirements:

.2 submit a copy of each equipment/system manufacturer's blank start-up report sheet to the Consultant for review, and incorporate any comments

.3 under direct on-site supervision and involvement of the equipment/system manufacturer's representative, start-up the equipment/systems, make any required adjustments, document the procedures, leave the equipment/systems in proper operating condition, and submit a complete set of start-up documentation sheets signed by the manufacturer/supplier and the Contractor

1.25 EQUIPMENT AND SYSTEM COMMISSIONING

.1 After successful start-up and prior to Substantial Performance, commission the mechanical work in accordance with requirements of CSA Z320, Building Commissioning. Use commissioning sheets included with the CSA Standard, and any supplemental commissioning sheets required. Submit final commissioning data sheets, TAB reports, project closeout documents, and other required submittals.

1.26 EQUIPMENT AND SYSTEM O & M DEMONSTRATION & TRAINING

.1 Refer to equipment and system operational and maintenance training requirements specified in Division 01.

.2 Train the Owner's designated personnel in all aspects of operation and maintenance of equipment and systems as specified in mechanical work Sections of the Specification. All demonstrations and training is to be performed by qualified technicians employed by the equipment/system manufacturer/supplier. The number of hours of training and the number of Owner's personnel to be involved will be specified in the mechanical work Sections to which this Section applies.

.3 For each item of equipment and for each system for which training is specified, prepare training modules as specified below. Operating and Maintenance Manuals are to be used during the training sessions, and training modules are to include:

.1 Operational Requirements and Criteria: Requirements and criteria are to include but not be limited to equipment function, stopping and starting, safeties, operating standards, operating characteristics, performance curves, and limitations.

.2 Troubleshooting: Troubleshooting is to include but not be limited to diagnostic instructions, test and inspection procedures.

.3 Documentation: Documentation is to include but not be limited to equipment/system warranties, and manufacturer's/supplier's parts and service facilities, telephone numbers, email addresses, and the like.

.4 Maintenance: Maintenance requirements are to include but not be limited to inspection instructions, types of cleaning agents to be used as well as cleaning methods, preventive maintenance procedures, and use of any special tools.

.5 Repairs: Repair requirements are to include but not be limited to diagnostic instructions, disassembly, component removal and repair instructions, instructions for identifying parts and components, and review of any spare parts inventory.

.4 Assemble the training modules into a training manual and submit a copy to the Consultant for review prior to scheduling training. Ensure that each participant in each training session has all required training material.

.5 Schedule demonstrations and training at mutually agreed to times with a minimum of 7 working days notice.

.6 Training Session DVD: For equipment/system demonstration and training sessions as specified in mechanical work Sections, submit an identified DVD of the session prepared by a professional photographer with construction project technical training session experience.

.7 Demonstration and Training Confirmation: Obtain a list of personnel to receive demonstration and training from the Consultant, and have each participant sign the list to confirm that he/she understood the demonstration and training session.

2 PRODUCTS

NOT APPLICABLE

3 EXECUTION

NOT APPLICABLE

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 This Section specifies products, common criteria and characteristics, and methods and execution that are common to one or more mechanical work Sections of the Specification, and it is intended as a supplement to each Section and is to be read accordingly.

1.3 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Submit product data sheets for:

.1 pressure gauges and thermometers

.2 strainers

.3 drain valves

.4 flexible connections

.5 equipment support assemblies, other than concrete pads

.3 Samples:

.1 submit a sample of each proposed type of access door, and samples of materials and any other items as specified in mechanical work Sections of the Specification

.4 Access door locations: submit white prints of architectural reflected ceiling plan drawings and elevation drawings to indicate proposed access door locations in walls and ceilings in finished areas

.5 List of equipment nameplates: submit a list of equipment identification nameplates indicating proposed wording and sizes

.6 Pipe & duct identification: submit a list of pipe and duct identification colour coding and wording

.7 Valve tag chart: submit a proposed valve tag chart and a list of proposed valve tag numbering and identification wording

.8 Waste management and reduction plan: submit a waste management and reduction plan prior to commencing work and as per requirements specified in this Section

.9 Drive belts: as specified in Part 2 of this Section, submit a spare belt set, tagged and identified, for each belt driven piece of equipment

.10 Additional submittals: submit any other submittals specified in this Section or other mechanical work Sections of the Specification

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 As listed in materials specified in this section.

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

.1 Firestopping And Smoke Seal Materials

.1 Firestopping and smoke seal system materials for mechanical penetrations through fire rated construction are specified in the mechanical work Section entitled Firestopping and Smoke Seal Systems and the work is to be done as part of the mechanical work.

.2 Waterproofing Seal Materials

.1 Modular, mechanical seal assemblies selected to suit the pipe size and the sleeve size or wall opening size. Acceptable products are:

.1 Thunderline Corp. (Power Plant Supply Co.) "LINK SEAL" Model S-316.

.2 The Metraflex Co. "MetraSeal" type ES.

.3 Pipe Escutcheon Plates

.1 One-piece chrome plated brass or #4 finish type 302 stainless steel plates with matching screws for attachment to the building surface, each plate sized to completely cover the pipe sleeve or building surface opening, and to fit tightly around the pipe or pipe insulation.

.4 Piping Hangers And Supports

.1 General: Pipe hanger and support materials, including accessories, are to be, unless otherwise specified, in accordance with the Manufacturers Standardization Society (MSS) Standard Practice Manual SP-58, Pipe hangers and Supports-Materials, Design and Manufacture, and where possible, MSS designations are indicated with each product specified below. Conform to the following requirements:

.1 Unless otherwise specified, all ferrous hanger and support products are to be electro-galvanized.

.2 Hangers and supports for insulated piping are to be sized to fit around the insulation and the insulation jacket.

.2 Horizontal Suspended Piping: Hangers and supports are to be:

.1 Adjustable steel clevis hanger – MSS Type 1.

.2 Adjustable swivel ring band type hanger – MSS Type 10.

.3 Horizontal Pipe On Vertical Surfaces: Epoxy coated steel pipe stays are not permitted. Supports are to be:

.1 Carbon steel offset pipe clamp to support pipe away from the support surface.

.2 Heavy-duty steel pipe bracket – MSS type 26.

.3 Single steel pipe hook .

.4 Vertical Piping on Vertical Surfaces: Epoxy coated steel pipe stays are not permitted. Supports are to be:

.1 Carbon steel offset pipe clamp to support pipe away from the support surface.

.2 Heavy-duty steel pipe bracket or soil pipe bracket – MSS Type 26.

.3 Extension split pipe clamp – MSS Type 12.

.5 Horizontal Pipe On Racks: Unistrut or equal galvanized steel pipe racks with pipe securing hardware as follows:

.1 Standard galvanized steel U-bolts/clamps supplied by the rack manufacturer.

.6 Special Hangers and Supports: Special hangers and supports for various applications are as follows:

.1 For groups of pipes having the same slope – welded steel brackets - MSS SP-58 and SP-69 Type 32, universal carbon steel channel trapeze assemblies with hanger rods and hardware, or Unistrut or equal support assemblies, all with U-bolts, clamps, etc., to secure pipes in place.

.2 For sections of piping connected to vibration isolated equipment – hangers and supports as specified above but complete with MSS Type 48 spring cushions.

.3 For plastic piping above ground – generally as specified above but in accordance with the pipe manufacturer’s printed recommendations.

.4 For fire protection piping – generally as above but ULC listed and/or FM approved, and in accordance with Chapter requirements of the NFPA Standard applicable to the piping system.

.5 For bare horizontal copper piping – generally as above but factory vinyl coated to prevent direct copper/steel contact.

.6 For bare copper vertical piping – corrosion resistant ferrous clamps with flexible rubber gasket type material (not tape) to isolate the pipe from the clamp.

.7 Insulation protection shields to & including 40 mm (1½") diameter – galvanized steel shields with ribs to keep the shield centred on the hanger – MSS SP-58 Type 40.

.7 Hanger Rods: Electro-galvanized carbon steel (unless otherwise specified), round, threaded, complete with captive machine nuts with washers at hangers, sized to suit the loading in accordance with Table 3 in MSS SP-58, but, in any case, minimum 9.5 mm (3/8") diameter and in accordance with ASTM A307, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength, and ASME B18.31.3, Threaded Rods (Inch Series).

.5 Piping Strainers – "Y" Shaped

.1 Wye shaped strainers, bronze with sweat type or flanged connections in copper piping, cast iron with screwed, flanged, or grooved end connections in steel piping, minimum 1725 kPa (250 psi) rated and complete with a removable perforated type 304 stainless steel 20 mesh screen, and, for strainers 40 mm (1½") diameter and larger, a blow down pipe connection tapping.

.6 Piping Drain Valves

.1 Minimum 2070 kPa (300 psi) water rated, 20 mm (¾") diameter, straight pattern full port bronze ball valves, each complete with a lever handle, threaded outlet suitable for coupling connection of 20 mm (¾") diameter garden hose, and a cap and chain. Access Doors

.1 Prime coat painted steel (unless otherwise specified) flush access doors, each complete with a minimum #16 gauge frame, minimum #18 gauge door panel, heavy-duty rust-resistant concealed hinges, a positive locking screwdriver lock, and mounting and finishing features to suit the particular construction in which it is to be installed.

.2 Access door sizes are to suit the concealed work for which they are supplied, and wherever possible they are to be of a standard size for all applications, but, in any case, they are to be minimum 300 mm x 300 mm (12" x 12") for hand entry and 600 mm x 600 mm (24" x 24") for body entry.

.3 Access doors in fire rated construction are to be ULC listed and labelled and of a rating to maintain the fire separation integrity.

.4 Where access doors are located in surfaces where special finishes are required, they are to be of a recessed door type capable of accepting the finish in which they are to be installed so as to maintain the final building surface appearance throughout, and constructed of stainless steel with a #4 finish.

.8 Pressure Gauges And Thermometers

.1 Pressure Gauges: Adjustable, glycerine filled, stainless steel,100 mm or 115 mm (4" or 4½") diameter, in accordance with requirements of ASME B40.100, Pressure Gauges and Gauge Attachments, complete with a dual scale white dial with a scale range such that the working pressure of the system is at the approximate mid-point of the scale, each accurate to within 1% of scale range, and with additional accessories/requirements as follows:

.1 A bronze ball type shut-off valve in the piping to each pressure gauge.

.2 A brass pressure snubber for each pressure gauge for piping and equipment with normal everyday flow.

.3 ULC listing and labelling for pressure gauges in fire protection piping.

.4 Wetted parts of pressure gauges in domestic water piping are to be ANSI/NSF 61 certified lead free.

.2 Thermometers: Round, adjustable, hermetically sealed stainless steel, 125 mm (5") diameter, adjustable (90°) angle bimetal dial type thermometers in accordance with requirements of ASME B40.200, Thermometers, Direct Reading and Remote Reading, each complete with:

.1 A white aluminum dual scale dial with black and blue markings and a range such that the working temperature of the system is the approximate mid-point of the scale.

.2 A suitable thermowell.

.3 For thermometers in domestic water piping, ANSI/NSF 61 lead free certification.

.9 Equipment Drive Guards And Accessories

.1 For flexible couplings - removable "U" shaped galvanized steel guards to OSHA Standards with a 2.3 mm (3/32") thick frame and expanded mesh face.

.2 For unprotected fan inlets & outlets - unless otherwise specified, removable 20 mm (¾") galvanized steel wire mesh with galvanized steel frames, all to OSHA Standards.

.10 Electric Motors

.1 Unless otherwise specified, motors are to conform to EEMAC Standard MG1, applicable IEEE Standards, and applicable CSA C22.2 Standards, and are to meet NEMA standards for maximum sound level ratings under full load. Confirm motor voltages prior to ordering.

.2 Vertically mounted and submersible motors are to be purposely designed for mounting in this attitude.

.3 AC Motor Efficiency: The efficiency of single phase AC motors to 1 HP is to be in accordance with CAN/CSA C747. The efficiency of all three phase motors 1 HP and larger is to be in accordance with CAN/CSA C390 or IEEE 112B.

.4 Single Phase AC Motors: Unless otherwise specified, AC motors smaller than ½ HP are to be 115 volt, continuous duty capacitor start type with an EEMAC 48 or 56 frame size, solid base, heavy-gauge steel shell with solid die-cast end shields, dynamically balanced die-cast rotor, integral automatic reset thermal overload protection, Class "B" insulation, and a 1.15 service factor at 40°C (105°F) ambient temperature.

.5 Two-Speed AC Motors: Two-speed motor(s) are to be as specified above but two-speed, single or double winding type as specified and/or scheduled.

.6 Motors for VFD's: Motors for equipment with variable frequency drives are to be generally as specified above but inverter duty type to NEMA Standard MG-1, Section IV, Part 31, quantified by CSA for operation from a variable frequency drive of the type specified, and complete with Class "H" insulation and a shaft grounding bearing protection ring.

.7 Acceptable Manufacturers: Acceptable motor manufacturers are:

.1 Westinghouse Canada Inc.

.2 Canadian General Electric

.3 Baldor Electric Co.

.4 U.S. Electrical Motors

.5 Weg Electric Corp.

.6 Marathon Electric

.7 Magna-Tech Canada

.8 Toshiba Corp.

.9 Leeson Canada

.11 Mechanical Work Identification Materials

.1 In accordance with existing identification at the site.

.12 Flexible Connectors

.1 Double wall stainless steel flexible connectors for piping connections to vibration isolated equipment, each selected by the manufacturer to suit the application. Shop drawings or product data sheets must indicate construction and performance requirements that suit the application. Acceptable manufacturers are:

.1 Hyspan Precision Products Inc.

.2 Senior Flexonics Ltd.

.3 The Metraflex Co.

3 EXECUTION

3.1 INSTALLATION

.1 General Piping And Ductwork Installation Requirements

.1 Unless otherwise specified, locate and arrange horizontal pipes and ducts above or at the ceiling on floors on which they are shown, arranged so that under consideration of all other work in the area, the maximum ceiling height and/or usable space is maintained. If required to maintain ceiling heights, reroute and/or resize ductwork, with Consultant's approval.

.2 Unless otherwise specified, install all work concealed in finished spaces, and concealed to the degree possible in partially finished and unfinished spaces. Refer to and examine the Architectural drawings and room finish schedules to determine finished, partially finished, and unfinished areas. Note that walls which are painted are considered finished.

.3 Install all pipes and ducts parallel to building lines and to each other.

.4 Neatly group and arrange all exposed work.

.5 Service and Maintenance Access: Locate all work to permit easy access for service or maintenance as required and/or applicable. Locate all valves, dampers and any other equipment which will or may need maintenance or repairs and which are installed in accessible construction so as to be easily accessible from access doors. Where valves, dampers and similar piping or ductwork accessories occur in vertical services in shafts, pipe spaces or partitions, locate the accessories at the floor level.

.6 Dissimilar Metal Pipe Connections: Make all connections between pipes of different materials using proper approved adapters. Provide cast brass dielectric type adapters/unions at connections between ferrous and copper pipe.

.7 Cleaning: Carefully clean all ducts, pipe and fittings prior to installation. Temporarily cap or plug ends of pipe, ducts and equipment which are open and exposed during construction.

.8 Insulation Clearance: Install piping and ductwork which are to be insulated so that they have sufficient clearance to permit insulation and finish to be applied continuously and unbroken around the pipe or duct, except for ductwork at fire barriers, in which case the insulation will be terminated at each side of the duct fire damper.

.9 Surfaces To Receive Your Work: Inspect surfaces and structure prepared by other trades before performing your work. Verify that surfaces or the structure to receive your work have no defects or discrepancies which could result in poor application or cause latent defects in installation and workmanship. Report defects in writing. Installation of your work will constitute acceptance of such surfaces as being satisfactory.

.10 Piping Rust and Dirt: Any ferrous piping that exhibits in excess of 5% surface rust, either inside or outside or both is to be wire brush cleaned to bare metal and coated with suitable primer. Steel pipe, fittings and accessories are to be free of corrosion and dirt when work is complete or prior to being concealed from view. Where dirt is evident, clean the piping prior to being concealed.

.11 Repair of Finished Surfaces: For factory applied finishes, repaint or refinish all surfaces damaged during shipment and installation. The quality of the repair work is to match the original finish. This requirement also applies to galvanized finishes.

.12 Unions and Flanges: Whether shown or specified on the drawings or not, provide screwed unions or flanges in all piping connections to equipment, and in regular intervals in new piping runs in excess of 12 m (40') to permit removal of sections of piping.

.13 Elbows and Eccentric Reducers: Unless otherwise specified and except where space limitations do not permit, all piping elbows are to be long radius. Eccentric reducers are to be installed with the straight side at the top of the piping.

.2 Pipe Joint Requirements

.1 Do not make pipe joints in walls or slabs.

.2 Ream all piping ends prior to making joints.

.3 Screwed Steel Piping: Properly cut threads in screwed steel piping and coat male threads only with Teflon tape or paste, or an equivalent thread lubricant. After the pipe has been screwed into the fitting, valve, union, or piping accessory, not more than 2 pipe threads are to remain exposed.

.4 Welded Steel Piping: Site bevel steel pipe to be welded or supply mill bevelled pipe. Remove all scale and oxide from the bevels and leave smooth and clean. Use factory made welding tees or welding outlet fittings for piping branches off mains. Do not use shop or site fabricated fittings unless written approval has been obtained.

.5 Welding Requirements: Welding is to be TSSA registered. Welded joints are to be made by CWB certified, licensed journeyman welders qualified in accordance with CSA B51, Boiler Pressure Vessel and Pressure Piping Code, and who are in possession of a proper certificate of qualification for each procedure to be performed. Each weld is to be identified with the welder's identification symbol, and welds are not to be concealed until they have been inspected and approved. Electrodes are to be in accordance with CSA W48 Series, Electrodes, and requirements of CAN/CSA W117.2, Safety in Welding, Cutting and Allied Processes are to be followed.

.6 Flanged Joints: Unless otherwise specified, make all flanged joints with EDPM gasket materials to suit the application, and bolts and nuts. Bolts are not to be longer than the length necessary to screw the nut up flush to the end of the bolt. Bolts used for flanged connections in all piping with a working pressure of 690 kPa (100 psi) and greater are to be ASTM A-193, Grade B-7, with heavy hexagon nuts to ASTM A-194, CL-2H. Provide suitable washers between each bolt head and the flange and between each nut and the flange.

.7 Examination of Flanged Joints: A random check of bolted flanged connections will be made to verify that flanged connections are properly mated with no shear force acting on bolts. Supply all labour to disconnect and reconnect the selected flanged joints. If improperly mated joints are found, remove and reinstall the affected piping so that the flanges mate properly. If improperly mated joints are found, additional joints will be checked, and you will be responsible for the repair of any other improper joints discovered.

.8 Soldered Joints: Unless otherwise specified make all soldered joints in copper piping using flux suitable for and compatible with the type of solder being used. Clean the outside of the pipe end and the inside of the fitting, valve, or similar accessory prior to soldering. Comply with requirements of ASTM B828, Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.

.9 Mechanical Joints: Install mechanical joint fittings and couplings in accordance with the manufacturer's instructions.

.10 Grooved Pipe & Coupling Joints: Make arrangements with the coupling and fitting manufacturer for shop and/or site instructions and demonstrations as required, and adhere to the manufacturer's instructions with respect to pipe grooving, support, type of gasket required, anchoring and guiding the grooved piping system.

.11 Pressure Crimped Piping Joints: If pressure crimped couplings and fittings are used, ensure that gaskets are fully compatible with the piping fluid, and that all valves and piping accessories are suitable. Use only fitting manufacturer supplied crimping equipment. Comply with the manufacturer’s latest published specification, instructions, and recommendations with respect to pipe, coupling, and fitting preparation and installation, and support, anchoring and guiding of the piping system.

.12 PVC Piping Solvent Weld Joints: Solvent weld PVC piping in 2 parts, primer stage and cementing stage, in accordance with the manufacturer’s recommendations, ASTM D2855, and CSA requirements.

.13 PVC Piping Gasketed Joints: Install PVC piping with gasketed joints in accordance with the manufacturer’s current published specifications, instructions and recommendations, and CSA requirements.

.3 Installation Of Waterproof Mechanical Seals

.1 Provide watertight link type mechanical seals in exterior wall openings where shown or specified.

.2 Assemble and install each mechanical seal in accordance with the manufacturer's instructions.

.3 After installation, periodically check each mechanical seal installation for leakage and, if necessary, tighten link seal bolts until the seal is completely watertight.

.4 Duct Openings

.1 Duct openings, air inlet and outlet openings, fire damper and similar openings will be provided in new poured concrete work, masonry, drywall and other building surfaces by the trade responsible for the particular construction in which the opening is required.

.2 Ensure that openings for fire dampers to 600 mm (24") high are sized to suit the damper arrangement with the folding blade out of the air stream.

.3 For all duct openings except where fire dampers are required, pack and seal the space between the duct or duct insulation and the duct opening as specified above for pipe openings in non-fire rated construction.

.5 Installation Of Pipe Escutcheon Plates

.1 Provide escutcheon plates suitable secured over all new exposed piping passing through finished building surfaces. A finished building surface is any surface with a factory finish or that receives a site applied finish.

.2 Install the plates so that they are tight against the building surface concerned, and ensure that the plates completely cover pipe sleeves and/or openings, except where waterproof sleeves extend above floors, in which case the plate is to fit tightly around the sleeve.

.6 Installation Of Fastening And Securing Hardware

.1 Provide all fastening and securing hardware required for mechanical work to maintain installations attached to the structure or to finished floors, walls and ceilings in a secure and rigid manner capable of withstanding the dead loads, live loads, superimposed dead loads, and any vibration of the installed products.

.2 Use fasteners compatible with structural requirements, finishes and types of products to be connected. Do not use materials subject to electrolytic action or corrosion where conditions are liable to cause such action.

.3 Where the floor, wall or ceiling construction is not suitable to support the loads, provide additional framing or special fasteners to ensure proper securement to the structure that is to support the products. Provide reinforcing or connecting supports where required to distribute the loading to the structural components. Submit support details for review prior to installation.

.4 Obtain written consent before using explosive actuated fastening devices. If consent is obtained, comply with requirements of CSA Standards CAN3-Z166.1 and CAN3-Z166.2.

.5 Do not attach fasteners to steel deck without written consent from the Consultant.

.7 Installation Of Pipe Hangers And Supports

.8 Provide all required pipe hangers and supports.

.1 Provide any additional structural steel channels, angles, inserts, beam champs and similar accessories required for hanging or supporting pipe. Unless otherwise shown or specified, hang or support pipes from the structure only.

.2 For Insulated Pipe: Size the hanger or support to suit the diameter of the insulated pipe and install the hanger or support on the outside of the insulation and insulation finish.

.3 Horizontal Above Ground Piping: Unless otherwise shown or specified, hang and/or support horizontal pipe above ground by means of hangers and/or supports specified in Part 2 of this Section. Unless otherwise shown or specified, hangers for suspended pipe to and including 25 mm (1") diameter are to be clevis type or adjustable ring type, and hangers for suspended pipe 40 mm (1½") diameter and larger are to be adjustable clevis type. Space hangers and supports in accordance with the following:

.1 Cast iron pipe: hang or support at every joint with maximum 2.4 m (8') spacing.

.2 Plastic pipe: conform to pipe manufacturer's recommended support spacing.

.3 Copper and steel pipe: hang or support at spacing in accordance with the following schedule:

PIPE DIA.	MAX. SPACING STEEL (meters)	MAX. SPACING COPPER (meters)
to 25 mm (1")	2.4 m (8')	1.8 m (6')
40 mm (1½")	2.7 m (9')	2.4 m (8')
50 mm (2")	3.0 m (10')	2.7 m (9')
65 mm (2½")	3.6 m (12')	3.0 m (10')
75 mm (3")	3.6 m (12')	3.0 m (10')
90 mm (3½")	3.6 m (12')	3.6 m (12')
100 mm (4")	4.2 m (14')	3.6 m (12')
250 mm (10")	6.0 m (20')	
300 mm (12")	6.7 m (22')	

.4 Flexible grooved pipe/coupling joint piping: as above but with not less than 1 hanger or support between joints.

.5 Changes in direction: where pipes change direction, either horizontally or vertically, provide a hanger or support on the horizontal pipe not more than 300 mm (12") from the elbow, and where pipes drop from tee branches, support the tees in both directions not more than 50 mm (2") on each side of the tee.

.6 Grouped piping: when pipes with the same slope are grouped and a common hanger or support is used, space the hanger or support to suit the spacing requirement of the smallest pipe in the group and secure pipes in place on the common hanger or support.

.7 Inline centrifugal pumps: support piping at both sides of inline centrifugal pumps.

.4 Vertical Piping: Unless otherwise shown or specified, support vertical piping by means of supports specified in Part 2 of this Section, spaced in accordance with the following:

.1 Support vertical pipes at maximum 3 m (10') intervals or at every floor, whichever is lesser.

.2 For sections of vertical piping with a length less than 3 m (10'), support the pipe at least once.

.3 For all vertical cast iron plain end pipe (mechanical joint type), secure the riser or pipe clamp around the pipe under a flange integral with the pipe for vertical support purposes, or provide a length of hub and spigot pipe to facilitate proper support.

.4 For all vertical steel pipe risers in excess of 3 m (10'), weld shear lugs to the pipe to carry the load.

.5 For vibration isolated piping risers, provide rubber-steel-rubber vibration isolation pads between the riser clamps and the floor.

.6 For piping subject to vertical movement exceeding 40 mm (1½") due to vertical pipe expansion, provide suitable engineered constant support hangers.

.5 Isolation for Bare Copper Tubing: Each hanger, support or securement for horizontal bare copper tubing is to be plastic coated to prevent direct contact between the pipe and the ferrous hanger. Each wall or floor clamp for vertical bare copper piping is to be isolated from the pipe by means of strips of flexible rubber inserts. The use of painted ferrous hangers and supports, including those painted with copper coloured paint, is not acceptable. Site application of tape or other types of isolation is not acceptable.

.6 Insulation Protection Shields: For insulated horizontal piping to and including 40 mm (1½") diameter, provide galvanized steel insulation protection shields between the insulation and the hanger or support. Install shields immediately after the pipe is insulated.

.7 Pipe Support from Steel Deck: Do not support piping from steel deck without written consent from the Consultant.

.9 Installation Of Pipeline Strainers

.1 Provide strainers in piping systems where shown on the drawings.

.2 Equip each strainer with a construction screen and remove after piping has been flushed and cleaned. Install permanent screens/mesh.

.3 Provide isolating valves in piping a maximum of 3 m (10') from the strainer on each side of a strainer.

.4 For "Y" shaped strainers 40 mm (1½") diameter and larger, provide blow-off piping complete with a shut-off valve with cap and chain, and terminate blow-off piping downward in a vertical position.

.10 Installation Of Equipment Drains And Piping Drain Valves

.1 Unless otherwise shown or specified, provide minimum 40 mm (1½") diameter type DWV copper drain piping from equipment overflows, condensate drain pans, pump bases, fresh air intake plenum drains, etc., to a floor drain location. Equip the drain piping with deep seal traps located in heated areas.

.2 Provide a drain valve at the bottom of piping risers, at all other piping low points, and wherever else shown and/or specified.

.3 Locate drain valves so that they are easily accessible.

.11 Supply Of Access Doors

.1 Supply access doors to give access to all mechanical work which may need maintenance or repair but which is concealed in inaccessible construction, except as otherwise specified herein or on the drawings.

.2 Locate access doors as inconspicuously as possible in walls and partitions and arrange mechanical work such that it is clearly within view and accessible for inspection and servicing, and to suit access door locations shown on the reviewed and approved white prints of reflected ceiling plan and elevation drawings submitted as per Part 1 of this Section.

.3 Group piping and ductwork to ensure the minimum number of access doors is required. Access doors will be installed by the trades responsible for the particular type of construction in which the doors are required.

.4 Submit a sample of each proposed access door for review prior to ordering.

.12 General Re: Installation Of Valves

.1 Generally, valve locations are indicated or specified on drawings or specified in Sections of the Specification where the valves are specified, however, regardless of locations shown or specified, the following requirements apply:

.1 Provide shut-off valves to isolate all systems, at the base of all vertical risers, in branch take-offs at mains and risers on all floors, to isolate all equipment, to permit work phasing as required, and wherever else required for proper system operation and maintenance.

.2 Install shut-off valves with handles upright or horizontal, not inverted, and located for easy access.

.3 Unless otherwise specified, provide a check valve in the discharge piping of each pump.

.4 Valve sizes are to be the same as the connecting pipe size.

.5 Valves are to be permanently identified with the size, manufacturer's name and figure number, and wherever possible, valves are to be the product of the same manufacturer.

.6 The manufacturer's name, valve model or figure number, and the pressure rating are to be clearly marked on each valve.

.7 For valves in insulated piping, the design of the valve stem, handle and operating mechanism is to be such that the insulation does not have to be cut or altered in any manner to permit valve operation.

.13 Installation Of Pressure Gauge & Thermometer Access Fittings

.1 Provide pressure gauge and thermometer access fittings in 6.4 mm (¼") threaded opening fittings for insertion/removal of piping mounted pressure gauges and thermometers. Where piping is insulated, provide extended length access fittings to accommodate the insulation.

.2 Unless pressure gauges and/or thermometers are provided with equipment, provide access fittings in the following locations:

.1 In valved tubing across the suction, suction strainer (if applicable), and discharge piping of each circulating pump.

.2 In the supply and return piping connections to main mechanical plant equipment such as boilers, chillers, heat exchangers, main coils, etc.

.3 In expansion tank(s) or piping immediately at the expansion tank.

.4 In all water connections to hot water heaters.

.5 In the downstream side of mixing valves.

.6 In separate domestic hot water storage tank(s).

.7 At the topmost outlet in each standpipe fire protection system riser.

.8 In piping at each side of a pressure reducing valve.

.9 In domestic water service piping downstream of the meter.

.10 Wherever else shown and/or specified on the drawings or in the Specification.

.2 All metal surfaces that are in contact with domestic water are to be NSF/ANSI 61 certified.

.14 Installation Of Pressure Gauges And Thermometers

.1 Pressure Gauges: Provide pressure gauges in the following locations:

.1 At the topmost outlet in each standpipe fire protection system riser.

.2 Wherever else shown and/or specified on the drawings or in the Specification.

.2 Thermometers: Provide thermometers in the following locations:

.1 Wherever else shown and/or specified herein or on the drawings.

.3 Installation Requirements: Conform to the following installation requirements:

.1 For installation of thermometers in piping wells, provide a coat of metallic base heat transfer paste or grease in the piping well.

.2 For pressure gauges in piping at equipment locations, install the pressure gauge between the equipment and the first pipe fitting.

.3 Locate, mount and adjust all instruments so they are easily readable.

.4 Where pressure gauges and/or thermometers are located at high level or in an area where they cannot be easily seen, provide remote reading instruments.

.5 All metal surfaces that are in contact with domestic water are to be NSF/ANSI 61 certified.

.15 Mechanical Work Identification

.1 Identify all new/relocated mechanical work in accordance with existing identification standards at the site.

.16 System Flow Diagrams

.1 Prepare AutoCAD, coloured, 1200 mm x 900 mm (48” x 36”) flow diagrams of mechanical systems to identify all equipment and valves.

.2 Install framed and glazed diagrams in equipment rooms housing the system equipment. Confirm location prior to installation.

.3 Include reduced size copies of the diagrams in each copy of the O & M Manuals.

.17 Finish Painting Of Mechanical Work

.1 Touch-up paint all damaged factory applied finishes on mechanical work products.

.2 Finish painting of exposed mechanical work is specified in Division 09 and is part of the work of Division 09.

.18 Pipe Leakage Testing

.1 Before new piping has been insulated or concealed, and before equipment, fixtures and fittings have been connected, test all piping for leakage.

.2 Tests are to be witnessed by the Consultant and/or Owner's representative, and, where required, representatives of governing authorities. Give ample notice of tests in writing and verify attendance. Have completed test report sheets dated and signed by those present to confirm proper test results.

.3 When circumstances prevent scheduled tests from taking place, give immediate and adequate notice of cancellation to all who were scheduled to attend.

.4 Gravity Drainage & Vent Piping: Securely close all openings and pipe ends and fill piping with water up to the highest level, and ensure that the water stands at the same level for a minimum of 2 hours. After the fixtures and fittings are set and the pipes connected to the building drain or drains, turn on water into all pipe, fixtures, fittings and traps in order to detect any imperfect material or workmanship. Make a smoke test if required by the Municipality. At your option, drain and vent piping may be pressure tested with cold water at 345 kPa (50 psi) for 2 hours with zero leakage.

.5 Domestic Water Piping: Test piping with cold water at a pressure of 1½ times normal working pressure and maintain the pressure for a minimum of 2 hours.

.6 Standpipe System Piping: Test all system piping in accordance with requirements of NFPA No. 14, "STANDPIPE AND HOSE SYSTEMS", and in accordance with any additional requirements of governing authorities.

.7 Heat Transfer (HVAC) System Piping: Test piping with cold water at a pressure of 1035 kPa (150 psi) for a minimum of 2 hours.

.8 General Re: All Testing: The following requirements apply to all testing:

.1 Ensure that all piping has been properly flushed, cleaned and is clear of foreign matter prior to pressure testing.

.2 Temporarily remove or valve off all piping system specialties or equipment which may be damaged by test pressures prior to pressure testing the systems, and flush piping to remove foreign matter.

.3 When testing is carried out below the highest level of the particular system, increase the test pressure by the hygrostatic head of 7 kPa (1 psi) for every 600 mm (24") below the high point.

.4 Include for temporary piping connections required to properly complete the tests.

.5 Piping under test pressure is to have zero pressure drop for the length of the test period.

.6 Make tight leaks found during tests while the piping is under pressure, and if this is impossible, remove and refit the piping and reapply the test until satisfactory results are obtained.

.7 Where leaks occur in threaded joints in steel piping, no caulking of these joints will be allowed under any conditions.

.8 Tests are to be done in reasonably sized sections so as to minimize the number of tests required.

.9 In addition to the leakage tests specified above, demonstrate proper flow throughout the systems including mains, connections and equipment, as well as proper venting and drainage, and Include for any necessary system adjustments to achieve the proper conditions.

.19 Electrical Wiring Work For Mechanical Work

.1 Unless otherwise specified or indicated, the following electrical wiring work for mechanical equipment will be done as part of the electrical work:

.1 "Line" side power wiring to motor starters or disconnect switches in motor control centres and starters or disconnects on motor starter panels, and "load" side wiring from the starters or disconnects to the equipment.

.2 "Line" side power wiring to individual wall mounted starters, and "load" side wiring from the starters to the equipment.

.3 "Line" side power wiring to pre-wired power and control panels and variable frequency drives, and "load" side power wiring from the panels and VFD's to the equipment.

.4 Provision of receptacles for plug-in equipment.

.5 Provision of disconnect switches for all motors that are in excess of 10 m (30') from the starter location, or that cannot be seen from the starter location, and all associated power wiring.

.6 All motor starter interlocking in excess of 24 volts.

.7 Wiring from motor winding thermistors in motors 30 HP and larger to motor starter contacts.

.8 Provision of dedicated 120 volt, 15A-1P circuits terminated in junction boxes in mechanical equipment rooms for automatic control and building automation system wiring connections to be made as part of the automatic controls work.

.9 120 volt power connections to electrical receptacles integral with small ceiling exhaust fans, including wiring through light switches or speed controllers.

.10 120 volt wiring connections to lighting fixture/switch combinations integral with air handling units.

.11 120 volt wiring connections to duplex receptacles integral with air handling unit control panels.

.2 Mechanical wiring work not listed above or specified herein or on the drawings to be done as part of the electrical work is to be installed in conduit and is to be done as part of the mechanical work in accordance with wiring requirements specified for the electrical work.

.20 Cutting, Drilling, And Patching For Mechanical Work

.1 Do all cutting, drilling and patching of the existing building for the installation of your work. Perform all cutting and drilling with proper tools and equipment. Confirm the exact location of cutting and drilling with the Consultant prior to commencing the cutting and/or drilling work.

.2 Patch surfaces, where required, to exactly match existing finishes using tradesmen skilled in the particular trade or application worked on.

.3 Where new pipes pass through existing construction, core drill an opening. Size openings to leave 12 mm (½") clearance around the pipes or pipe insulation.

.4 Prior to drilling or cutting an opening in poured concrete construction, determine the location, if any, of existing services concealed in the construction to be drilled or cut. X-ray or Ferro Scan Test the walls or slabs if required.

.5 You will be responsible for the repair of any damage to existing services, exposed or concealed, caused as a result of your cutting or drilling work.

.21 Packing And Sealing Core Drilled Pipe Openings

.1 Pack and seal the void between the pipe opening and the pipe or pipe insulation for the length of the opening as follows:

.1 Non-fire rated interior construction: pack openings in non-fire rated interior construction with mineral wool and seal both ends of the opening with non-hardening silicone base caulking compound to produce a water-tight seal.

.22 Cleaning Mechanical Work

.1 Refer to cleaning requirements specified in Division 01.

.2 Clean all mechanical work prior to application for Substantial Performance of the work.

.3 Include for vacuum cleaning the interior of air handling units and ductwork systems.

.23 Use Of Mechanical Systems For Temporary Heating

.1 Permanent mechanical systems in the building may be used for temporary heating during construction subject to the following conditions:

.1 Each entire system is complete, pressure tested, cleaned, and flushed out.

.2 Specified water treatment system has been commissioned, and treatment is being continuously monitored.

.3 Building has been closed in and areas to be heated/ventilated are clean and will not thereafter be subjected to dust-producing processes.

.4 There is no possibility of damage from any cause.

.5 Supply ventilation systems are protected by minimum MERV 7 filters, which are to be inspected every other day, and changed every 2 weeks, or more frequently as required.

.6 Return air systems have approved construction filters over all openings, inlets, and outlets.

.7 All systems are operated as per the manufacturer's recommendations or instructions, and are monitored on a regular and frequent basis.

.8 Warranties are not affected in any way.

.9 Regular preventive and all other manufacturer's recommended maintenance routines are performed.

.10 Before substantial performance, each entire system is to be refurbished, cleaned internally and externally, restored to "as-new" condition, and filters in air systems replaced.

.11 Energy costs are to be paid by the Contractor.

.24 Maintaining Equipment Prior To Acceptance

.1 Maintain all equipment in accordance with the manufacturer's printed instructions prior to start-up, testing and commissioning.

.2 Employ a qualified millwright to check and align shafts, drives, and couplings on all base mounted split coupled motor driven equipment.

.3 Where equipment lubrication fittings are not easily accessible, extend the fittings to accessible locations using copper or aluminium tubing.

.4 All filters are to be new upon Substantial Performance of the work. This is in addition to any spare filters specified.

.25 Connections To Other Equipment

.1 Carefully examine the Contract Documents during the bidding period and include for mechanical work piping and/or ductwork connections to equipment requiring such connections.

.26 Waste Management And Disposal

.1 Separate and recycle waste materials in accordance with requirements specified in Division 01.

.2 Separate and recycle waste materials in accordance with requirements of Canadian Construction Association Standard Document CCA 81, A Best Practices Guide to Solid Waste Reduction.

.3 Prepare a waste management and reduction plan and submit a copy for review prior to work commencing at the site.

.4 Place materials defined as hazardous or toxic waste in designated containers.

.5 Ensure emptied containers are sealed and stored safely for disposal.

.27 Installation Of Flexible Connectors

.1 Provide flexible connectors in all piping connections to vibration isolated equipment.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 This Section specifies vibration isolation product requirements that are common to mechanical work Sections of the Specification and it is a supplement to each Section and is to be read accordingly.

1.3 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Product Data: Submit copies of manufacturer's product data sheets for all products specified in this Section. Product data sheets are to include product characteristics, limitations, dimension, finishes, and installation recommendations.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Manufacturer's:

.1 Mechanical vibration isolation product manufacturers are to current members of the Vibration Isolation & Seismic Restraint Manufacturers Association.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Mason Industries Inc.

.2 Kinetics Noise Control Inc.

.3 The VMC Group

.4 Vibro-Acoutics

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

.1 General:

.1 Vibration isolation products are to be in accordance with the drawing schedule and details, and as specified below.

.2 Springs: All springs are to be stable, colour coded, selected to operate at no greater than ⅔ solid load, designed in accordance with the Society of Automotive Engineers Handbook Supplement 9 entitled Manual on Design and Application of Helical and Spiral Springs, and with spring diameters in accordance with the manufacturer's recommendations to suit the static deflection and maximum equipment load.

.3 Finishes: All steel components of isolation products not exposed to the weather or moisture are to be zinc plated. All steel components of isolation products exposed to the weather or in a damp, moist environment are to be factory finished with rust inhibiting primer and fusion bonded epoxy, or hot dipped galvanized.

.4 Where the weight of isolated equipment may change significantly due to draining or filling with a liquid, vibration isolators are to be equipped with limit stops to limit spring extensions.

.5 Flexible Piping Connections: Flexible piping connections to vibration isolated equipment are specified in the appropriate piping sections of the Specification.

.2 Isolation Pads:

.1 Sandwich type pads, 20 mm (¾") nominal thickness, selected for 3.2 mm (1/8") static deflection unless otherwise specified, consisting of 2 waffle type or ribbed 50 durometer neoprene elastomer in-shear pads permanently bonded to a minimum #10 gauge steel plate, and complete with rubber bushed bolt holes and equipment anchor bolts with neoprene isolation grommets.

.3 Spring Hangers:

.1 Welded steel plate housing with top and bottom rod mounting holes and spring retainer, neoprene double deflection isolation element, stable colour coded spring, and heavy-duty rubber washers.

.4 Neoprene Hanger Isolators:

.1 Neoprene double deflection rod isolators with steel housing and hanger rod bushing, selected for a minimum 4 mm (0.15") static deflection unless otherwise specified.

3 EXECUTION

3.1 INSTALLATION

.1 Vibration Isolation Materials:

.1 Provide vibration isolation products for mechanical work in accordance with the drawing schedule and details, and requirements specified herein and/or on the drawings.

.2 Supply to the vibration isolation product manufacturer or supplier a copy of a "reviewed" shop drawing or product data sheet for each piece of equipment to be isolated and dimensioned pipe layouts of associated piping to be isolated.

.3 Unless otherwise specified, all vibration isolation products are to be the product of one manufacturer.

.4 Ensure that the vibration isolation manufacturer coordinates material selections with equipment provided in order to ensure adherence to performance criteria. Allow for expansion and contraction when material is selected and installed.

.5 Maintain a minimum clearance of 50 mm (2”) between vibration isolated equipment and adjacent structures, piping, ductwork, conduit, and similar items.

.6 Isolation of Piping: Isolate all piping larger than 25 mm (1") dia. directly connected to motorized and/or vibration isolated equipment with 25 mm (1") static deflection spring hangers at spacing intervals in accordance with the following:

.1 For pipe to and including 100 mm (4") diameter – first three points of support.

.2 For pipe 125 mm (5") to 200 mm (8") diameter – first four points of support.

.3 For pipe 250 mm (10") diameter and larger – first six points of support.

.4 The first point of isolated piping support is to have a static deflection of twice the deflection of the isolated equipment but maximum 50 mm (2").

.5 Secure the top of the spring hanger frame rigidly to the structure, and do not install spring hangers in concealed locations.

.6 Where it is impossible to use at least two spring hangers, provide Senior Flexonics Ltd. Style 102 (or 102-U as required) or equal, twin sphere, moulded rubber flexible connection assemblies, selected by the manufacturer and suitable in all respects for intended application, and complete with required nipples and connections to provide proper vibration isolation.

.7 Control Wiring Connections: For all control wiring connections to vibration isolated equipment ensure that flexible metallic conduit with 90° bend is used for conduit 25 mm (1") diameter and smaller, and for conduit larger than 25 mm (1") diameter, use Crouse Hinds EC couplings. Connections are to be long enough so that the conduit will remain intact if the equipment moves 300 mm (12") laterally from its installed position, and flexible enough to transmit less vibration to the structure than is transmitted through the vibration isolation. Coordinate these requirements with the mechanical trades involved. If electrical power connections are not made in a similar manner as part of the electrical work, report this fact to the Consultant.

.8 Manufacturer’s Inspection & Certification: Refer to the Section entitled Mechanical Work General Instructions.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 This Section specifies thermal insulation requirements that are common to mechanical work Sections of the Specification. It is a supplement to each Section and is to be read accordingly.

1.3 REFERENCES

.1 Definitions:

.1 "concealed" means mechanical services and equipment above suspended ceilings, in non-accessible chases, in accessible pipe spaces, and furred-in spaces

.2 "exposed" means exposed to normal view during normal conditions and operations

.3 "domestic water" means all piping (cold, hot, tempered) extended from the building Municipal supply main

.4 “WHMIS sheets” means Workplace Hazardous Materials Information System sheets

.5 “mineral fibre” means a type of insulation manufactured from molten rock, slag, or glass in accordance with requirements of ASTM C547

.6 “PEX” means cross-linked polyethylene

.7 “insulation system” means insulation material, fasteners, jacket, and any other accessory.

.8 “TIAC” means Thermal Insulation Association of Canada.

.2 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 American Society for Testing and Materials (ASTM):

.1 ASTM A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strap for Pressure Vessels and for General Applications

.2 ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

.3 ASTM C534 – Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form

.4 ASTM C547 - Standard Specification for Mineral Fibre Pipe Insulation

.5 ASTM C552 – Standard Specification for Cellular Glass Thermal Insulation

.6 ASTM C553 – Standard Specification for Mineral Fibre Blanket Thermal Insulation

.7 ASTM C612 – Standard Specification for Mineral Fiber Block and Board Thermal Insulation

.8 ASTM C1136 – Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation

.9 ASTM C1290 – Standard Specification for Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts

.10 ASTM D1784 – Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds

.2 Thermal Insulation Association of Canada (TIAC):

.1 Best Practices Guide

.2 TIAC Quality Standard 1501

.3 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC-S101 – Fire Endurance Tests of Building Construction and Materials

.2 CAN/ULC-S114 – Test for Non-Combustibility

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data Sheets & WHMIS Sheets:

.1 Submit a product data sheet and a WHMIS sheet for each insulation system product. Product data sheets must confirm that the product conforms to requirements of referenced Codes, Standards, and material properties.

1.5 QUALITY ASSURANCE

.1 Mechanical insulation requirements specified in this Section are based on the Thermal Insulation Association of Canada Best Practices Guide.

.2 Qualifications:

.1 Installer's:

.1 The company with the sub-contract for mechanical insulation work is to be a member in good standing of the Thermal Insulation Association of Canada.

.2 Mechanical insulation is to be applied by journeyman tradespersons in the Heat and Frost Insulation Trade. Registered apprentice tradespersons must be under direct, daily, on-site supervision of a journeyman.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Acceptable insulation product manufacturers are listed in Section 4, Products, of the TIAC Best Practices Guide

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of valve from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

.1 Fire Hazard Ratings:

.1 Unless otherwise specified, all insulation system materials inside the building and above ground must have a fire hazard rating of not more than 25 for flame spread and 50 for smoke developed when tested in accordance with CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.

.2 Thermal Performance:

.1 Unless otherwise specified, thermal performance, i.e. conductivity, of insulation is to meet or exceed the values given in the National Energy Code of Canada for Buildings, and ASHRAE/IES Standard 90.1.

.3 Pipe Insulation Materials:

.1 Horizontal Pipe Insulation at Hangers & Supports: Insulated pipe support inserts consisting of minimum 150 mm (6") long, premoulded, rigid, sectional phenolic foam or fiberglass insulation (of same thickness as adjoining insulation) with a reinforced foil and kraft paper vapour barrier jacket and a 180° captive galvanized steel saddle. Acceptable products are:

.1 Belform Insulation Ltd. "Koolphen K-Block"

.2 Shur-Fit Products Ltd. “Pro-Pipe Supports”

.2 Specialty Insulation for Piping: Factory fabricated foamed glass or closed cell foamed plastic insulation fittings specifically made for pipe mechanical joint fittings and couplings, and pipe risers at riser clamps. Acceptable manufacturers are:

.1 Shur-Fit Products Ltd.

.2 Armacell Canada Inc.

.3 Owens Corning “FOAMGLASS”

.3 TIAC Standard 1501, Code A2, Preformed Mineral Fibre: Rigid, sectional, sleeve type insulation to ASTM Standard C 547, Standard Specification for Mineral Fibre Pipe Insulation, supplied in 915 mm (3’) lengths with a factory applied vapour barrier jacket and adhesive jacket closure.to ASTM C1136, Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation, with a minimum thermal conductivity of 0.033 W @ 24° C.

.4 TIAC Standard 1501, Code A2, Preformed Non-Combustible Mineral Fibre: Rigid, sectional, sleeve type insulation to ASTM Standard C 547, Standard Specification for Mineral Fibre Pipe Insulation, minimum thermal conductivity of 0.047 @ 93° C, supplied in 915 mm (3’) lengths with a factory applied vapour barrier jacket and adhesive jacket closure, and non-combustible, in accordance with requirements of CAN/ULC-S114, Test for Non-Combustibility, and compatible with firestopping as per CAN/ULC-S101, Fire Endurance Tests of Building Construction and Materials.

.5 TIAC Standard 1501, Code A6, Flexible Foam Elastomeric: Closed cell, sleeve type, longitudinally split self-seal, foamed plastic pipe insulation in accordance with requirements of ASTM C534, Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form, minimum thermal conductivity of 0.039 A @ 24° C, minimum density of 96 kg/m³, and supplied with all required installation accessories.

.4 Ductwork System Insulation Materials:

.1 TIAC Standard 1502, Code A2, Rigid Mineral Fibre Board: Preformed board type insulation to ASTM C612, Standard Specification for Mineral Fiber Block and Board Thermal Insulation, with a factory applied reinforced aluminum foil and Kraft paper facing to ASTM C1136, Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation, a minimum thermal conductivity of 0.033 W @ 24° C., and a minimum density of 48 kg/m³.

.2 TIAC Standard 1502, Code B2, Flexible Mineral Fibre: Roll form insulation to ASTM C1290, Standard Specification for Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts, with a factory applied vapour barrier facing to ASTM C1136, Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation, a minimum thermal conductivity of 0.042 W @ 24° C., and a minimum density of 12 kg/m³.

.5 Equipment Insulation Materials:

.1 TIAC Standard 1503, Code A1D, Semi-Rigid Mineral Fibre: Roll form insulation to ASTM Standard C553, Standard Specification for Mineral Fibre Blanket Thermal Insulation, (Types I, II, & III), with a factory applied vapour barrier facing.

.2 TIAC Standard 1503, Code A1D, Semi-Rigid Mineral Fibre – High Temperature: Roll form insulation to ASTM Standard C553, Standard Specification for Mineral Fibre Blanket Thermal Insulation, (Type VII), with a factory applied vapour barrier facing. to ASTM C1136, Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation, and a minimum thermal conductivity of 0.042 W @ 24° C.

.6 Insulating Coatings:

.1 Equal to Robson Thermal Manufacturing Ltd. insulating coatings as follows:

.1 Anti-condensation coating, "No Sweat-FX".

.2 Thermal insulating coating, "ThermaLite".

.7 Insulation Fastenings:

.1 Wire: Minimum #15 gauge galvanized annealed wire.

.2 Aluminium Banding: Equal to Childers Products Co. "FABSTRAPS" minimum 12 mm (½") wide, 0.6 mm (1/16") thick aluminium strapping.

.3 Stainless Steel Banding: Equal to Childers Products Co. "FABSTAPS" 0.6 mm (1/16") thick, minimum 12 mm (½") wide type 304 stainless steel strapping.

.4 Duct Insulation Fasteners: Weld-on 2 mm (3/32") diameter zinc coated steel spindles of suitable length, complete with minimum 40 mm (1½") square zinc plated steel self-locking washers.

.5 Tape Sealant: Equal to MACtac Canada Ltd. self-adhesive insulation tapes, types PAF, FSK, ASJ, or SWV as required to match the surface being sealed.

.6 Adhesive - Mineral Fibre Insulation: Clear, pressure sensitive, brush consistency adhesive, suitable for a temperature range of -20°C to 82°C (-4°F to 180°F), compatible with the type of material to be secured, and WHMIS classified as non-hazardous.

.7 Adhesive – Flexible Elastomeric Insulation: Armacell "Armaflex" #520 air-drying contact adhesive.

.8 Adhesive – Closed Cell Foamed Glass Insulation: Equal to Pittsburgh Corning PC88 multi-purpose two-component adhesive.

.9 Lagging Adhesive: White, brush consistency, ULC listed and labelled, 25/50 fire/smoke rated lagging adhesive for canvas jacket fabric, suitable for colour tinting, complete with fungicide and washable when dry.

.10 Sheet Metal Screws: No. 10 stainless steel sheet metal screws.

.8 Insulation Jackets and Finishes:

.1 TIAC Code C11, Canvas: ULC listed and labelled, 25/50 rated, roll form, minimum 170 g (6 oz.) canvas jacket material.

.2 TIAC Code C1, PVC: Roll form sheet and fitting covers in accordance with ASTM D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds, minimum 15 mil thick, white, PVC, 25/50 rated, complete with installation and sealing accessories.

.3 TIAC Code C2, Rigid Aluminium: Equal to Childers Metals "Lock-on" 0.406 mm (5/32") thick embossed aluminum jacket material to ASTM B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate, factory cut to size and complete with moisture barrier and continuous modified Pittsburgh Z-Lock, and "Fabstraps" and butt straps to cover end to end joints. Fittings are to be 2-piece epoxy coated pressed aluminum with weather locking edges.

.4 TICA Code C3, Stainless Steel: Equal to Childers Metals "Lock-on" 0.254 mm (3/32") thick type 304 embossed stainless steel to ASTM A240, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strap for Pressure Vessels and for General Applications, factory cut to size and complete with moisture barrier and continuous modified Pittsburgh Z-Lock, and butt straps with "Fabstraps" to cover end to end joints. Fittings are to be 2-piece pressed stainless steel with weather locking edges.

.5 Protective Coating - Flexible Foam Elastomeric Insulation: Equal to Armacell "WB Armaflex" weatherproof, water-based latex enamel finish.

.9 Removable/Reusable Insulation Covers:

.1 Valve, Etc. Covers: Equal to No Sweat Valve Wrap Inc. “NO SWEAT” reusable insulation wraps with vapour barrier jacket and self-sealing ends and longitudinal seam, with a length to suit the application and an insulation thickness equal to the adjoining insulation.

.10 Chilled Liquid Piping Vapour Dams

.1 Class 1 vapour barrier material with a permeance of less than 0.1 and 25/50 rated in accordance with CAN/ULC-S102 requirements.

3 EXECUTION

3.1 INSTALLATION

.1 General Insulation Application Requirements:

.1 Unless otherwise specified, do not insulate the following:

.1 Factory insulated equipment and piping.

.2 Heating piping within radiation unit enclosures, including blank filler sections of enclosures.

.3 Heating piping in soffits and/or overhang spaces and connected to bare element radiation in the spaces.

.4 Branch domestic water piping located under counters to serve counter mounted plumbing fixtures and fittings, except barrier-free lavatories.

.5 Exposed chrome plated domestic water angle supplies from concealed piping to plumbing fixtures and fittings, except barrier-free lavatories.

.6 Heated liquid system pump casings, valves, strainers and similar accessories.

.7 Manufactured expansion joints and flexible connections.

.8 Acoustically lined ductwork and/or equipment.

.9 Domestic hot and tempered water and heating system piping unions.

.10 Flexible branch ductwork from sheet metal ducts to grilles or diffusers.

.2 Do not apply insulation unless leakage tests have been satisfactorily completed.

.3 Ensure that all surfaces to be insulated are clean and dry.

.4 Ensure that the ambient temperature is minimum 13° C (55° F) for at least one day prior to the application of insulation, and for the duration of insulation work, and that relative humidity is and will be at a level such that mildew will not form on insulation materials.

.5 All insulation materials must be stored on site in a proper and dry storage area. Any wet insulation material is to be removed from the site and replaced.

.6 Install insulation directly over pipes and ducts and not over hangers and supports.

.7 Install piping insulation and jacket continuous through pipe openings and sleeves.

.8 Install duct insulation continuous through walls, partitions, and similar surfaces except at fire dampers.

.9 When insulating "cold" piping and equipment, extend insulation up valve bodies and other such projections as far as possible, and protect the insulation jacketing from the action of condensation at its junction with the metal.

.10 When insulating vertical piping risers 75 mm (3”) diameter and larger, use insulation support rings welded directly above the lowest pipe fitting, and thereafter at 4.5 m (15’) centres and at each valve and flange. Insulate as per Thermal Insulation Association of Canada National Insulation Standards, Figure No. 9.

.11 Where mineral fibre rigid sleeve type insulation is terminated at valves, equipment, unions, etc., neatly cover the exposed end of the insulation with a purpose made PVC cover on "cold" piping, and with canvas jacket material on "hot" piping.

.12 Where there is interference between weld bead, mechanical joints, etc., and insulation, use purpose made insulation fittings or otherwise neatly and properly insulate these items to maintain the insulation value of the work. Seal all exposed surfaces of insulation.

.13 Where thermometers, gauges, and similar instruments occur in insulated piping, and where access to heat transfer piping balancing valve ports and similar items are required, create a neat, properly sized hole in the insulation and provide a suitable grommet in the opening.

.14 Where existing insulation work is damaged as a result of a new mechanical work, repair the damaged insulation work to new work standards.

.2 Insulation For Pipe Mechanical Joint Fittings & Couplings, Etc.:

.1 Provide manufactured insulation fittings, the same thickness as the adjoining pipe insulation, for mechanical joint fittings and couplings, and for piping at riser clamps through the floor. Cover with purpose made PVC covers with joints sealed with tape.

.3 Insulation For Horizontal Pipe At Hangers And Supports:

.1 At each hanger and support location for piping 50 mm (2") diameter and larger and scheduled to be insulated, except where roller hangers and/or supports are required, and unless otherwise specified, supply a factory fabricated section of phenolic foam pipe insulation with integral vapour barrier jacket and captive galvanized steel shield. Supply the insulation sections to the piping installers for installation as the pipe is erected.

.4 Pipe Insulation Requirements – Inside Building & Above Ground:

.1 Insulate pipe inside the building and above ground, as scheduled below, in accordance with TIAC Quality Standard 1501, Piping, as follows:

.1 Material: Type A3 mineral fibre.

.2 Insulation application:

.1 1501-H for hot piping.

.2 1501-C for cold piping.

.3 Insulation finish: CPF/1 canvas jacket or CPF/4 PVC jacket for exposed piping.

PIPE SERVICE	DIAMETER	INSULATION THICKNESS
Domestic Cold Water	to 100 mm	25 mm
	larger than 100 mm	40 mm
Domestic Hot Water, Supply & Recirculation	to 40 mm	25 mm
	larger than 40 mm	50 mm
Tempered Domestic Water	all	25 mm
Storm Drainage From Roof Drains (See Note #1)	all	25 mm
Plumbing Vent, 3 M Back From Roof Penetration	all	25mm
Condensate Drain From A/C Equipment Drain Pans	all	25 mm
Chilled Water Supply & Return	to 100 mm	25 mm
	larger than 100 mm	40 mm
Heating Water Supply & Return (Including Heat Reclaim)	to 40 mm	40 mm
	larger than 40 mm	50 mm

Notes:

#1 Insulate storm drainage piping from roof drains from the roof drain to the point where the piping extends straight down, without offsets, and connects to a horizontal main.
#2 TIAC Standard 1501 Code A6 foamed elastomeric insulation may be used in lieu of Type A2, with 1501-CA application and specified finish.
#3 Use TIAC non-combustible rock slag mineral fibre insulation for insulated pipe penetrating through fire rated construction, and for high temperature piping insulation such a high pressure steam and condensate

.5 Ductwork System Insulation Requirements – Inside Building:

.1 Insulate duct systems inside the building and above ground, as scheduled below, in accordance with TIAC Quality Standard 1502, Ductwork and Plenums, as follows:

.1 Material:

.1 Type A2 rigid mineral fibre for exposed rectangular ducts, and all plenums

.2 Type B2 flexible mineral fibre for concealed rectangular ducts, and concealed and exposed round or oval ducts

.2 Insulation application:

.1 CER/1 for heating and ventilating system rigid insulation

.2 CER/2 for heating and air conditioning system rigid insulation

.3 CEF/1 for heating and ventilation system flexible insulation

.4 CEF/2 for heating and air conditioning system flexible insulation

.3 Insulation finish:

.1 CRF/1 for exposed rectangular duct systems

.2 CRD//1 for exposed round/oval duct systems

DUCT SYSTEM SERVICE	**INSULATION THICKNESS**	
	Rigid Insulation	**Flexible Insulation**
Mixed Air Supply Ducts (Except Where Exposed In Area Served)	25 mm	40 mm

Notes:

#1 Provide commercial quality corner bead only on exposed rigid duct, plenum and casing insulation in all equipment rooms, corridors, and similar areas where the insulation is subject to damage.

.6 Common Duct System Insulation application Requirements:

.1 At duct connection flanges insulate the flanges with neatly cut strips of the rigid insulation material secured with adhesive to side surfaces of the flange with a top strip to cover the exposed edges of the side strips, then butt the flat surface duct insulation up tight to the flange insulation, or alternatively, increase the insulation thickness to the depth of the flange and cover the top of the flanges with tape sealant.

.2 The installation of fastener pins and washers is to be concurrent with the duct insulation application.

.3 Cut insulation fastener pins almost flush to the washer and cover with neatly cut pieces of tape sealant.

.4 Accurately and neatly cut and fit insulation at duct accessories such as damper operators (with standoff mounting) and pitot tube access covers.

.5 Prior to concealment of insulation by either construction finishes or jacket material, patch all vapour barrier damage by means of tape sealant.

.6 At trapeze hanger locations for rectangular duct install insulation between the duct and the hanger.

.7 At each duct hanger for round duct provide a 100 mm (4") wide full length piece of rigid mineral fibre board insulation between the duct and the hanger.

.7 Equipment Insulation Requirements – Inside Building:

.1 Insulate equipment inside the building the building, as scheduled below, in accordance with TIAC Quality Standard 1503, Equipment, as follows:

.1 Material: Type A1D semi-rigid mineral fibre.

.2 Insulation application:

.1 1503-H for hot tanks and equipment.

.2 1503-C for cold tanks and equipment.

.3 Insulation finish:

.1 CEF/2 for hot tanks and equipment.

.2 CEF/1 for cold tanks and equipment.

EQUIPMENT	INSULATION THICKNESS
Roof Drain Sumps Where Inside Building	25 mm
Hydronic Piping Air Separators	40 mm

.8 Application Of Insulating And Protective Coatings:

.1 Apply insulating and protective coatings in accordance with the manufacturer's instructions. Remove any splatter from adjacent surfaces. Apply insulating/protective coating to the following surfaces:

.1 Paint all bare metal surfaces clear of "cold" piping and/or equipment insulation for a distance of from 300 mm (12") to 600 mm (24") clear of the pipe or equipment insulation, with "No Sweat-FX" anti-condensation coating.

.2 Paint all bare metal surfaces associated with mechanical systems with an operating temperature 60°C (140°F) with "ThermaLite" insulating coating.

.3 Coat elastomeric foamed insulation (pipe & duct) with 1 coat of the specified coating on all insulation inside the building and 2 coats (with 24 hours between coats) of the specified coating on all insulation outside the building.

.9 Chilled Liquid Pipe Insulation Vapour Damage Protection:

.1 Ensure that all pipe insulation longitudinal and circumferential joints are properly sealed.

.2 Ensure that there are no perforations to insulation vapour barriers,

.3 Provide properly sealed vapour dams in locations as follows:

.1 On butt ends at all locations where the insulation terminates.

.2 On butt ends and other exposed insulation surface on either side of fittings, tees, flanges, couplings, valves, strainers, and similar pipe accessories.

.3 On butt ends at every 3rd section of insulation (maximum 6 m (20') intervals) on horizontal piping.

.4 On butt ends at every 2nd section of insulation (maximum 2.4 m (8') intervals) in vertical piping.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 This Section specifies requirements, criteria, methods and execution for mechanical demolition work that are common to one or more mechanical work Sections, and it is intended as a supplement to each Section and is to be read accordingly.

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 Canadian Standards Association (CSA):

.1 CAN/CSA-S350 – Code of Practice for Safety in Demolition of Structures.

1.4 SUBMITTALS

.1 Special Procedure Submittals:

2 PRODUCTS

2.1 MATERIALS

Not Applicable

3 EXECUTION

3.1 REMOVALS

.1 Disconnection and Removal of Existing Mechanical Work:

.1 Where indicated on the drawings, disconnect and remove existing mechanical work, including hangers, supports, insulation, and similar items. Disconnect at the point of supply, remove obsolete connecting services and make the system safe.

.2 Cut back obsolete piping behind finishes, identify, and cap water-tight unless otherwise specified.

.3 The scope and extent of the demolition or revision work is only generally indicated on the drawings. Estimate the scope, extent and cost of the work at the site during the bidding period scheduled site visit(s).

.4 Where deemed necessary by the Owner and Consultant, existing shafts, walls, and inaccessible ceilings will be opened by the Owner to permit site visit inspection of services to be removed/revised as part of the work but usually concealed behind such construction.

.5 Claims for extra costs for demolition work not shown or specified but clearly visible or ascertainable at the site during bidding period site visits will not be allowed.

.6 If existing isolation valves are not available to isolate sections of piping to be removed, provide such valves as required. Determine this requirement at the site during the bidding period.

.7 Where existing valves are removed, remove the valve tags, revise existing valve tag charts, and hand the obsolete tags to the Owner.

.8 If any re-design is required due to discrepancies between the mechanical drawings and site conditions, notify the Consultant who will issue a Site Instruction. If, in the opinion of the Consultant, discrepancies between the mechanical drawings and actual site conditions are of a minor nature, the required modifications are to be done at no additional cost.

.9 Where existing mechanical services extend through, or are in an area to serve items which are to remain, maintain the services in operation. Include for rerouting existing services concealed behind existing finishes and which become exposed during the renovation work, so as to be concealed behind new or existing finishes.

.10 Unless otherwise specified, remove from the site and dispose of all existing materials which have been removed and are not to be relocated or reused.

.2 Roofing Work:

.1 Where roof revisions and/or replacements are part of the project, include for disconnecting, lifting, or temporarily removing mechanical equipment on the roof as required to permit completion of the roofing work, and for re-installing the equipment when the roofing work is complete.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 This Section specifies mechanical system testing, adjusting, and balancing requirements that are common to mechanical work Sections of the Specification and it is a supplement to each applicable Section and is to be read accordingly.

1.3 REFERENCES

.1 Definitions:

.1 The following are definitions of words used in this Section:

.1 “TAB” – means testing, adjusting and balancing to determine and confirm quantitative performance of equipment and systems and to regulate the specified fluid flow rate and air patterns at the terminal equipment, e.g., reduce fan speed, throttling, etc.

.2 “hydronic systems” – includes heating water, chilled water, glycol-water solution, condenser water, and any similar system

.3 “air systems” – includes all outside air, supply air, return air, exhaust air, and relief air systems

.4 “flow rate tolerance” – means the allowable percentage variation, minus to plus, of actual flow rate values in the Contract Documents

.5 “report forms” – means test data sheets arranged for collecting test data in logical order for submission and review, and these forms, when reviewed and accepted, should also form the permanent record to be used as the basis for required future testing, adjusting and balancing

.6 “terminal” – means the point where the controlled fluid enters or leaves the distribution system, and these are supply inlets on water terminals, supply outlets on air terminals, return outlets on water terminals, and exhaust or return inlets on air terminals such as registers, grilles, diffusers, louvers, and hoods

.7 “main” – means the duct or pipe containing the system’s major or entire fluid flow

.8 “sub-main” – means the duct or pipe containing part of the systems’ capacity and serving two or more branch mains

.9 “branch main” – means duct or pipe servicing two or more terminals

.10 “branch” – means duct or pipe serving a single terminal

.2 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction.

.1 Standards: Testing, adjusting and balancing of the complete mechanical systems is to be performed over the entire operating range of each system in accordance with 1 of the following publications:

.1 National Standards For A Total System Balance published by the Associated Air Balance Council

.2 Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems published by the National Environmental Balancing Bureau

.3 Chapter 37, Testing, Adjusting, and Balancing of ASHRAE Handbook HVAC Applications

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Name and Qualifications of Testing and Balancing Agency: Within 30 days of work commencing at the site, submit the name and qualifications of the proposed testing and balancing agency in accordance with requirements of the article below entitled Quality Assurance.

.3 Sample Test Forms: Submit sample test forms, if other than those standard forms prepared by the Canadian Associated Air Balance Council (CAABC) or National Environmental Balancing Bureau (NEBB) are proposed for use.

.4 Drawing Evaluation Report: Submit a report by the Agency to indicate the Agency's evaluation of the mechanical drawings with respect to service routing and location or lack of balancing devices. Include the set of drawings used and marked-up by the Agency to prepare the report.

.5 Site Visit Reports: Submit a report by the Agency after each site visit made by the Agency during the construction phase of this Project.

.6 Draft and Final Reports: Submit a draft report and a final report as specified in Part 3 of this Section.

1.5 CLOSEOUT SUBMITTALS

.1 Submittals under this Section shall be in conformance with Section 01 77 00.

.2 Warranty: Submit a testing and balancing warranty as specified in Part 3 of this Section.

.3 Post Construction Site Visit Reports: Submit reports listing observations and results of post construction site visits as specified in Part 3 of this Section.

1.6 QUALITY ASSURANCE

.1 Testing Agencies:

.1 Testing and Balancing Agency: Employ the services of an independent testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical systems to produce the design objectives.

.2 The testing, adjusting and balancing agency is to have successfully completed testing, adjusting and balancing of mechanical systems for a minimum of five projects similar to this Project within the past 3 years, and is to be certified as an independent agency in all required categories by 1 of the following:

.1 CAABC - Canadian Associated Air Balance Council

.2 NEBB - National Environmental Balancing Bureau

2 PRODUCTS

Not applicable.

3 EXECUTION

3.1 SCOPE OF WORK

.1 Perform total mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications and comfort conditions, and recording and reporting the results.

.2 Mechanical systems to be tested, adjusted and balanced include:

.1 Heating Systems: TAB of heating systems is to include all piping and equipment fluid temperatures, flows and control, and if TAB is not done during the heating season, a follow-up site visit during the heating season will be required to confirm proper flows and temperatures, and any required system "fine tuning".

.2 Cooling Systems: TAB of cooling systems is also to include all piping and equipment fluid temperatures, flows and control, and if TAB is not done during the cooling season, a follow-up site visit during the cooling season will be required to confirm proper flows and temperatures, and any required system "fine.

.3 Air Handling Systems: TAB of air handling systems is to include all equipment and ductwork air temperatures, capacities and flows.

.4 Existing Systems: The following existing systems, revised as part of the mechanical work, are to be tested, adjusted and balanced as for new systems:

.1 AHU-3 level 3 air handling system

.2 AHU-4 level 4 air handling system

3.2 TESTING, ADJUSTING AND BALANCING

.1 General Requirements: Conform to the following requirements:

.1 As soon as possible after award of Contract, the Agency is to carefully examine a white print set of mechanical drawings with respect to routing of services and location of balancing devices, and is to issue a report listing the results of the evaluation.

.2 The set of drawings examined by the Agency is to be returned with the evaluation report, with red line mark-ups to indicate locations for duct system test plugs, and required revision work such as relocation of balancing devices and locations for additional devices.

.3 After review of the mechanical work drawings and specification, the Agency is to visit the site at frequent, regular intervals during construction of the mechanical systems, to observe routing of services, locations of testing and balancing devices, workmanship, and anything else that will affect testing, adjusting and balancing.

.4 After each site visit, the Agency is to report results of the site visit indicating the date and time of the visit, and detailed recommendations for any corrective work required to ensure proper adjusting and balancing.

.5 Testing, adjusting and balancing is not to begin until:

.1 Building construction work is substantially complete and doors have been installed.

.2 Mechanical systems are complete in all respects, and have been checked, started, and adjusted.

.6 All mechanical systems to be tested, adjusted and balanced are to be maintained in full, normal operation during each day of testing, adjusting and balancing.

.7 Obtain copies of reviewed shop drawings of all applicable mechanical plant equipment and terminals, and temperature control diagrams and sequences.

.8 The Agency is to walk each system from the system "head end" equipment to terminal units to determine variations of installation from design, and the system installation trades will accompany the Agency.

.9 The Agency is to check all valves and dampers for correct and locked position, and temperature control systems for completeness of installation before starting equipment.

.10 Wherever possible, the Agency is to lock all balancing devices in place at the proper setting, and permanently mark settings on all devices.

.11 For belt-driven equipment, the Agency is to report to the Commissioning Agent who in turn is to inform the Contractor and Consultant of any situation where sheaves have to be replaced to suit testing and balancing, and replacements are to be done by the Contractor at no cost.

.12 Noise: the Agency is to balance all systems with due regard to objectionable noise which is to be a factor when adjusting fan speeds and performing terminal work such as adjusting air quantities, and should objectionable noise occur at the design conditions, the Agency is to immediately report the problem and submit data, including sound readings, to permit an accurate assessment of the noise problem to be made.

.13 Stratification: the Agency is to check all supply air handling system mixing plenums for stratification, and where the variation of mixed air temperature across coils is found to be in excess of ±5% of design requirements, the Agency is to report the problem and issue a detail sketch of plenum baffle(s) required to eliminate the stratification.

.14 Tolerances: the Agency is to perform testing, adjusting and balancing to within ± 5% of design values, and make and record measurements which are within ± 2% of actual values.

.15 Filters for all air handling systems equipped with air filters, test and balance the systems with simulated 50% loaded (dirty) filters by providing a false pressure drop.

.16 Seasonal requirements: test, adjust and balance air conditioning systems during the summer season and heating systems during winter season, including at least a period of operation at outside conditions within 2.8° C (5° F) wet bulb temperature of maximum summer design condition, and within 5.5° C (10° C) dry bulb temperature of minimum winter design condition, and take final temperature readings during seasonal operation.

.2 Preparation of Reports: Prepare reports as indicated below:

.1 Draft Reports: Upon completion of testing, adjusting, and balancing procedures, prepare draft reports on CAABC or NEBB forms. Draft reports may be hand written, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same manner specified for the final reports. Submit 2 complete sets of draft reports. Only 1 complete set of draft reports will be returned.

.2 Final Report: Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit 2 complete sets of final reports. Use units of measurement (SI or Imperial) as used on the Project Documents.

.3 Report Format: Report forms are to be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, 3-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the divisions listed below, separated by divider tabs:

.1 General Information and Summary

.2 Air Systems

.3 Hydronic Systems

.4 Temperature Control Systems

.4 Report Contents: The Agency is to provide the following minimum information, forms and data:

.1 Inside cover sheet to identify the Agency, the Contractor, and Project, including addresses, e-mail addresses and contact names and telephone numbers and a listing of the instrumentation used for the procedures along with the proof of calibration.

.2 The remainder of the report is to contain the appropriate forms containing as a minimum, the information indicated on the standard CAABC or NEBB report forms prepared for each respective item and system.

.3 The Agency is to include for each system to be tested, adjusted and balanced, a neatly drawn, identified (system designation, plant equipment location, and area served) schematic "as-built" diagram indicating and identifying all equipment, terminals, and accessories.

.4 The Agency is to include report sheets indicating building comfort test readings for all rooms.

.3 Verification of Reports: After the final testing and balancing report has been submitted, the Agency is to visit the site with the Contractor and Consultant to spot check results indicated on the balancing report. The Agency is to supply all labour, ladders, and instruments to complete spot checks. Note that if results of spot checks do not, on a consistent basis, agree with the final report, the spot check procedures will stop and the Agency is to then rebalance the systems involved, resubmit the final report, and again perform spot checks with the Contractor and Consultant.

.4 Certification and Warranty: When the final report has been accepted, the Contractor is to submit to the Owner, in the name of the Owner, a certificate equal to the CAABC National Guaranty Certification or a NEBB Quality Assurance Program Bond, and in addition, the Contractor is to submit a written extended warranty from the Agency covering 1 full heating season and 1 full cooling season, during which time any balancing problems which occur, with the exception of minor revision work done during scheduled site visits, will, at no cost, be investigated by the Agency and reported on to the Owner, and if it is determined that the problems are a result of improper testing, adjusting and balancing, they are to be immediately corrected without additional cost to the Owner.

.5 Post Balancing Site Visits: After acceptance of the final report, the Agency is to perform post testing and balancing site visits in accordance with the following requirements:

.1 Post-testing and balancing site visits are to be made:

.1 Once during the 1st month of building operation.

.2 Once during the 3rd month of building operation.

.3 Once between the 4th and 10th months in a season opposite to the 1st and 3rd month visit.

.2 During each return visit and accompanied by the Owner's representative, the Agency is to spot rebalance terminal units as required to suit building occupants and eliminate complaints.

.3 The Agency is to schedule each visit with the Contractor and the Owner, and inform the Consultant.

.4 After each follow-up site visit, the Agency is to issue to the Contractor and Consultant a report indicating any corrective work performed during the visit, all abnormal conditions and complaints encountered, and recommended corrective action.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 This Section specifies fire stopping and smoke seal requirements that are common to mechanical work Sections of the Specification and it is a supplement to each Section and is to be read accordingly.

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC-S101, Standard Method of Fire Endurance Tests of Building Construction and Materials

.2 CAN/ULC-S115 - Standard Method of Fire Tests of Firestop Systems

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data & WHMIS Sheets:

.1 Submit a product data sheet and a WHMIS sheet for each firestopping and smoke seal product. Identify each product with the manufacturer’s name and type, the ULC designation, and the proposed use.

.3 Name & Experience of Proposed Applicator:

.1 Submit for approval the full company name and experience of the proposed firestopping and smoke seal system applicator.

.4 Letter of Certification:

.1 Submit a letter of proper firestopping and smoke seal certification as specified in Part 3 of this Section.

1.5 QUALITY ASSURANCE

.1 Qualifications:

.1 Applicator:

.1 The applicator is to have a minimum of 3 years of successful experience on projects of similar size and complexity and is to be approved by the Consultant.

1.6 PROJECT CONDITIONS

.1 Ambient Conditions:

.1 Environment Conditions: Comply with the firestopping and smoke seal product manufacturer's recommendations regarding suitable environment conditions for product installation.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 A/D Fire Protection Systems "FIREBARRIER"

.2 Tremco Inc. Fire Protection Systems Group "TREMstop"

.3 3M Canada "Fire Barrier"

.4 Hilti (Canada) Ltd. Firestop Systems

.5 Specified Technologies Inc.

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of valve from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 DESCRIPTION

.1 Regulatory requirements:

.1 OBC

.2 OFC

.3 NFPA

.4 ULC

2.3 MATERIALS

.1 Firestopping and Smoke Seal System Materials:

.1 Asbestos-free elastomeric materials tested, listed and labelled by ULC in accordance with CAN/ULC-S115, Standard Method of Fire Tests of Firestop Systems and CAN/ULC-S101, Standard Method of Fire Endurance Tests of Building Construction and Materials for installation in ULC designated firestopping and smoke seal systems to provide a positive fire, water and smoke seal, and a fire-resistance rating (flame, hose stream and temperature) not less than the fire resistance rating of surrounding fire rated construction.

.2 Materials are to be compatible with abutting dissimilar materials and finishes and complete with primers, damming and back-up materials, supports, and anchoring devices in accordance with the firestopping manufacturer's recommendations and the ULC tested assembly.

.3 Pipe insulation forming part of a fire and smoke seal assembly is specified in the Mechanical Insulation Section.

3 EXECUTION

3.1 INSTALLATION

.1 Installation of Firestopping and Smoke Seal Materials:

.1 Where mechanical work penetrates fire rated construction, provide ULC listed and labelled firestopping and smoke seal materials to seal the penetrations, installed in accordance with requirements of CAN/ULC-S115 (ratings F, FT, FH, and FTH as required), CAN/ULC-S101, all other governing authorities, and the product manufacturer's instructions.

.2 Preparation: Abide by the following requirements:

.1 Report any unsuitable or unsatisfactory conditions to the Consultant in writing, prior to commencement of work, and note that commencement of work will mean acceptance of conditions and surfaces.

.2 Mask where necessary to avoid spillage and over coating onto adjoining surfaces, and remove stains on adjacent surfaces.

.3 Application: Conform to the following application requirements:

.1 Provide temporary forming as required and remove only after materials have gained sufficient strength and after initial curing.

.2 Tool or trowel exposed surfaces to a neat, smooth, consistent finish.

.3 Remove excess compound promptly as work progresses and upon completion.

.4 At all fusible link damper locations, seal the perimeter of the angle iron framing on both sides of the wall or slab with ULC listed and labelled sealant materials to provide a positive smoke seal.

.4 Inspection: Notify the Consultant when the work is complete and ready for inspection, and prior to concealing or enclosing firestopping and smoke seal materials and service penetration assemblies. Arrange for final inspection of the work by the Municipal Building Inspector prior to concealing or enclosing work. Make any corrections required.

.5 Certification: On completion of the firestopping and smoke sealing installation submit a letter of assurance to the Consultant certifying that the firestopping and smoke sealing installation has been carried out throughout the building to all mechanical service penetrations and that the installation has been done in strict accordance with the requirements of governing Codes and Regulations, ULC requirements, and the manufacturer's instructions.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Provide fire protection system, including but not limited to the following:

.1 Standpipe systems

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 21 20 05 – Fire Extinguishers

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 American National Standards Institute (ANSI):

.1 ANSI/ASME B16.4, Grey Iron Threaded Fittings (Classes 125 and 250)

.2 American Society for Testing and Materials (ASTM):

.1 ASTM A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded

.2 ASTM A106, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service

.3 ASTM A234, Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service

.3 Canadian Standards Association (CSA):

.1 CSA B64.10, Selection and Installation of Backflow Preventers

.2 CSA B137.2, PVC Injection-Molded Gasketed Fittings for Cold-Water Pressure Services

.3 CSA B137.3, Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications

.4 CAN/CSA B64.10, Backflow Preventers and Vacuum Breakers

.4 National Fire Protection Association (NFPA):

.1 NFPA 14, Standard for the Installation of Standpipes and Hose Systems

.5 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC-S1001, Integrated Systems Testing of Fire Protection and Life Safety Systems

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.1 Shop Drawings/Product Data: Submit shop drawings/product data sheets to the regulatory authority for review and approval prior to submitting to the Consultant. Conform to the following requirements:

.2 Shop Drawings

.1 submit complete CAD white print layout drawings indicating source of water supply with pipe size and test flow and pressure, "head-end" equipment piping schematic, pipe routing and sizing, and risers, all signed and sealed by the design P. Eng.

.2 submit copies of all calculations stamped and signed by the design P. Eng., and a listing of all design data used in preparing the calculations, system layout and sizing

.3 Product Data:

.1 product data sheets are to include all products specified in this Section except pipe and fittings, each clearly marked to indicate the manufacturer, model number, construction and performance of the products being supplied, and each stamped and signed by the system design P. Eng.

.4 Test and Evaluation Reports:

.1 Weekly Inspection Reports: Submit copies of the system design P. Engineer's bi-weekly inspection reports as specified below.

.2 Test Certificates: Submit completed NFPA system material and test certificate(s) as specified in Part 3 of this Section, and documentation to confirm successful testing and commissioning in accordance with CAN/ULC-S1001.

.3 Backflow preventer test reports in accordance with CSA B64.10.

.5 Final Completion Signoff Letter: Following completion of the system, the design P.Eng. responsible for the review is to provide a stamped signoff letter.

1.5 MAINTENANCE MATERIALS SUBMITTALS

1.6 QUALITY ASSURANCE

.1 Qualifications:

.1 Site Personnel: All site personnel are to be Sprinkler Fitters or Sprinkler and Fire Protection Installers licensed in the jurisdiction of the work and under the continuous supervision of a site foreman who is a journeyman.

.2 System Installer: The system installer is to be an experienced fire protection system company and a member in good standing of the Canadian Automatic Sprinkler Association and is to be certified to CSA-W47.1 for welding.

.3 Dimensions and Coordination: Check and verify all dimensions and conditions at the site and ensure that the work can be performed as indicated. Co-ordinate work with all trades at the site and accept responsibility for and the cost of making adjustments to piping and/or spacing to avoid interference with other building components.

.4 Bi-Weekly Inspection Reports: The design P. Eng. is to conduct bi-weekly site inspections for quality control, and prepare and submit an inspection report after each site inspection.

.5 All system components must be UL and/or ULC listed and labelled, and FM approved.

.6 Existing System: Verify the working condition of all existing fire protection system equipment which has direct interface with the new work and is to remain. Replace with new equipment where necessary.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Fire Suppression System Design and Installation

.1 C&H Fire Suppression

.2 Forest City Fire Protection

.3 Vipond

.4 Troy Life and Fire Safety

.2 Fire Hose Cabinets

.1 Wilson & Cousins

.2 National

.3 Backflow Preventers

.1 Watts

.2 Conbraco

.3 Zurn

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

2.2 PERFORMANCE/DESIGN CRITERIA

.1 System Designer: Fire protection work to be installed is to be designed by a fully qualified mechanical P. Eng. registered and licensed in the jurisdiction of the Project. Refer to the mechanical work Section entitled Mechanical Work General Instructions for requirements governing the employment of the Engineer.

.2 Water Flow and Pressure Test Data: If water supply flow and pressure test data is not available, conduct Municipal main water flow and pressure tests at the nearest fire hydrant to obtain criteria to be used in system design. Include the hydrant location and flow and pressure test data with system design calculations.

.3 Standpipe System Design Criteria: Fire protection standpipe work is to be designed in accordance with NFPA 14 and Provincial Standards, and, where required, local building and fire department requirements and, if required, the standards of the Owner's Insurer.

2.3 MATERIALS

.1 Pipe, Fittings and Joints:

.1 Pipe, fittings and joints are to be as follows, with exceptions as specified in Part 3 of this Section:

.1 Schedule 40 Black Steel – Grooved Coupling Joints: North American produced Schedule 40 mild black carbon steel, ASTM A53, Grade B, complete with fittings and couplings equal to Victaulic "FireLock" fittings and Victaulic Style 005 rigid coupling joints. Strap-on fittings such as Victaulic "Snap-Let" strap type fittings are not acceptable.

.2 Schedule 40 Black Steel – Screwed and Welded Joints: North American produced Schedule 40 mild black carbon steel, ASTM A53, Grade B. Screwed piping is to be complete with Class 125 cast iron screwed fittings to ANSI/ASME B16.4. Welded piping is to be complete with factory made seamless carbon steel butt welding fittings to ASTM A234, Grade WPB, long sweep pattern wherever possible.

.2 Water Flow Alarm Switch:

.1 Pipe mounting water flow alarm switch, minimum 1725 kPa (250 psi) rated, designed to actuate two 7 ampere rated (at 125/250 volts AC) SPDT snap action switches when water flow exceeds 0.758 L/sec. (10 GPM), complete with a tamper-proof cover with conduit connection opening, a piping saddle and U-bolt, and an automatic rest pneumatic retard device with field adjustable (0 to 70 second) switch actuation delay to reduce false alarms caused by a single or series of transient water flow surges.

.3 Alarm Check Valve:

.1 Enamelled cast iron check valve assembly designed for either vertical or horizontal mounting and to actuate alarms when the wet type sprinkler system is activated. The assembly is to be minimum 1205 kPa (175 psi) cold water rated with all moving parts constructed of brass, bronze, stainless steel or EPDM, and is to be complete with:

.1 pipe fittings and accessories for site connection of an excess pressure pump

.2 basic trim including piping materials and check valve for an external by-pass, potable water supply and system water supply pressure gauges with gauge test ports and shut-off valves, an angle type main drain valve, and fittings for mounting an alarm test by-pass

.3 alarm test by-pass piping with ball valve to permit alarm testing without operation of the alarm valve

.4 alarm trim with pipe and fittings for connection to a water motor alarm, and an adjustable pressure switch for electrical connection to an alarm system upon flow through the valve

.4 Fire Hose Cabinets:

.1 Factory assembled fire hose cabinet as indicated on the Drawings and as specified below.

.2 Cabinet Construction: Unless otherwise specified, cold rolled steel with a baked enamel finish, #18 gauge with universal knockouts for tubs, #14 gauge for doors and trim, with all metal edges ground and rounded. Where located in fire rated construction, cabinet construction must maintain the fire rating. Doors are to be complete with:

.1 hollow channel reinforcement

.2 full length semi-concealed piano hinge with paint stop feature and designed to permit 180° door opening

.3 a full removable panel of double pane clear safety glass with adhesive centre

.4 a flush stainless steel door latch

.5 for recessed cabinets,12 mm (½") turn back frame and 50 mm (2") frame adjustment

.3 Fire Hose Valve: 40 mm (1½"), forged brass, satin finish, adjustable pressure restricting angle hose valve, complete with integral automatic drain vent, factory set to suit standpipe system pressure.

.4 Fire Department Hose Valve: 65 mm (2½"), forged brass, satin finish, Fire Department angle hose valve with cap and chain.

.5 Hose Rack, Hose and Nozzle: Stationary hose rack with independently swivelling pins, an automatic water stop, and 30 m (100') of 100% synthetic 40 mm (1½") diameter hose with forged brass couplings and a forged brass nozzle with rubber bumper and adjustment for fog, straight stream and shutoff.

.6 Spanner Wrench: A spanner wrench to suit cabinet valves.

.7 Fire Extinguisher: Stored pressure, multi-purpose, 2.26 kg (5 lb.), 4A10B:C rated dry chemical extinguisher.

.8 Chrome Plating: All brass components in recessed cabinets in finished areas are to be chrome plated.

.9 Stainless Steel Construction: Provide stainless steel construction cabinets as specified above but constructed of Type 304 stainless steel with a #4 satin finish applied to the door and frame after fabrication and removal of weld spots.

3 EXECUTION

3.1 PREPARATION

.1 Demolition / Removal:

.1 Do all required fire protection system demolition work. Refer to demolition requirements specified in the mechanical work Section entitled Demolition and Revision Work.

3.2 INSTALLATION

.1 Piping Installation Requirements

.1 Provide all required fire protection system piping. Do all piping work in accordance with "Reviewed" shop drawings and NFPA requirements. Unless otherwise specified, piping is to be as follows:

.1 for "wet" system piping inside building and above ground, Schedule 40 grooved end black steel with Victaulic or equal fittings and coupling joints, or, for piping to and including 50 mm (2") diameter, screwed fittings and joints, or piping 65 mm (2½") diameter and larger, welding fittings and welded joints

.2 All pipe sizes, pipe routing, equipment quantities and locations, and layout of work shown on the drawings are to assist you during the tendering period. Ensure adequate fire protection system coverage. Do not reduce the size of the fire protection system main or re-route the main unless approved.

.3 All pipe, fittings, couplings, flanges and similar components are to be cleaned after erection is complete. Any ferrous pipe, fitting, coupling, flange, hanger, support and similar component which exhibits rust is to be wire brush cleaned and carefully coated with suitably coloured primer.

.4 Slope all horizontal piping so that it may be completely drained. Provide capped drain points.

.5 Provide a pressure gauge at the highest outlet in each standpipe riser. Locate gauges so that they can be read easily. Where possible, locate gauges in fire hose cabinets. See the mechanical work Section entitled Basic Mechanical Materials and Methods for pressure gauge requirements.

.6 When fire protection work is complete, test the system components and the overall system(s) and submit completed NFPA material and test certificate(s), and any other documentation required.

.2 Shut-Off Valves And Check Valves:

.1 Provide shut-off valves and check valves in piping where shown and wherever else required.

.2 Locate all valves for easy operation and maintenance.

.3 Confirm exact locations prior to roughing-in.

.3 Shut-Off Valve Supervisory Switches:

.1 Unless otherwise specified, equip each shut-off valve with a supervisory switch.

.2 Identify each supervised valve with a 150 mm (6") square, engraved, laminated red-white plastic tag to correspond with supervised valve numbering specified and/or shown as part of the electrical work fire alarm system.

.3 Identify each valve with a 150 mm (6") square red-white laminated engraved plastic tag. Confirm wording prior to engraving.

.4 Fire Hose Cabinets:

.1 Provide fire hose cabinets where shown.

.2 Confirm exact cabinet locations prior to roughing-in.

3.3 TESTING AND COMMISSIONING

.1 Test and commission the fire protection system in accordance with requirements of CAN/ULC-S1001.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Provide domestic water piping and valves.

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 22 11 19 – Domestic Water Piping Specialties

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 National Sanitation Foundation (NSF):

.1 NSF/ANSI/CAN 61 – Drinking Water System Components-Health Effects

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers listed throughout Part 2 are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification.

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of valve from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

.1 All products specified in this Section that are in contact with domestic water are to be NSF/ANSI/CAN 61 certified.

.2 Pipe, Fittings and Joints

.1 Hard Copper - Solder Joint: Type "L" hard drawn seamless copper to ASTM B88, complete with wrought copper solder type fittings to ASME/ANSI B16.22 and soldered joints using NSF/ANSI 61 certified silver alloy lead-free solder for cold water pipe, and 95% tin/5% Antimony or silver alloy lead free solder for other services, with flux to ASTM B813.

.2 Copper Pressure Coupled Joint: Type "L" hard drawn seamless copper to ASTM B88 with Viega "ProPress" copper fittings with "Smart Connect" feature, EDPM seals, and pressure type crimped joints made by use of a Rigid Tool Co. Model 330-B or Model 330-C electro-hydraulic crimping tool.

.3 Stainless Steel: Schedule 10 Type 304/304L to ASTM A312/A312M, threaded with screwed stainless steel fittings to ASTM A403/A403M for piping to 65 mm (2½") diameter, roll grooved with Victaulic Co. factory grooved end Type 304/304M stainless steel fittings and cast stainless steel coupling joints with gaskets meeting NSF/ANSI 61 requirements and Type 316 stainless steel bolts, Victaulic Style 807N rigid type or Style 877N flexible type as required by the location and application.

.4 CPVC: Ipex "AquaRise" SDR 11 CPVC pipe and fittings to CAN/CSA B137.6, 25/50 flame spread and smoke developed rated in accordance with CAN/ULC S102.2, certified to NSF/ANSI 61, complete with primer/solvent weld joints, and with a pressure rating of 690 kPa (100 psi) at 82.2° C (180° F).

.5 PEX Tubing: Non-barrier type cross-linked polyethylene piping in accordance with CAN/CSA-B137.5, NSF 372, and ASTM F876, and tested for compliance by an independent third-party agency. The piping is to be complete with brass inserts and crimp-ring joint fittings and couplings.

.3 Dielectric Unions

.1 Lead-free dielectric unions, each complete with a thermoplastic liner and rated minimum 1725 kPa (250 psi) at 120º C (250º F).

.4 Shut-Off Valves

.1 Brass & Bronze Ball Valves: Lead free, Class 600, 4140 kPa (600 psi) non-shock WOG rated, 2-piece, full port ball type valves, each complete with a forged brass or bronze body, blowout-proof stem, solid forged brass or bronze chrome plated ball, "Teflon" or "PTFE" seat, a removable coated steel lever handle marked with valve identification, and ends to suit the piping being connected. Valves in insulated piping are to be complete with stem extensions. Acceptable manufacturers are:

.1 Toyo Valve Co.

.2 Milwaukee Valve Co.

.3 Kitz Corporation

.4 Combraco Industries Inc. Apollo

.5 Watts Water Technologies Inc.

.2 CPVC Ball Valves: Ipex “AquaRise” One-Piece CPVC ball valves, 15 mm to 25 mm (½” to 1”) diameter, 1600 kPa (232 psi) rated at 23° C (73° F).

.5 Drain Valves:

.1 Refer to Part 2 of the mechanical work Section entitled Basic Mechanical Materials and Methods

.6 Chlorine

.1 Sodium hypochlorite to AWWA B-300, Hypochlorites.

3 EXECUTION

3.1 PREPARATION

.1 Demolition / Removal :

.1 Do all required domestic water system demolition work. Refer to demolition requirements specified in the mechanical work Section entitled Demolition and Revision Work.

3.2 INSTALLATION

.1 Piping Installation Requirements

.1 Provide all required domestic water piping.

.2 Piping, unless otherwise specified, is to be as follows:

.1 for pipe inside the building and above ground in sizes to 100 mm (4") diameter- Ipex “AquaRise” rigid CPVC

.2 for branch hot and cold piping above ground from mains and risers to fixtures, fittings, and equipment where fire rated construction is not penetrated, and at your option, PEX tubing installed and joined in strict accordance with the manufacturer’s printed instructions

.3 for pipe inside building and above ground - Type "L" hard copper with solder joints or, **at your option**, Type "L" hard copper with pressure coupled mechanical joints, or Type 304/304L stainless steel with screwed joints or grooved end coupling joints

.3 Lay pipes true to line and grade with bells upgrade. Fit sections together so that, when complete, the pipe has a smooth and uniform invert. Keep pipe thoroughly clean so that jointed compound will adhere. Inspect the pipe for defects before being lowered into the trench.

.4 Slope all piping so that it can be completely drained.

.5 Provide proper dielectric unions in all connections between copper pipe and ferrous pipe or equipment.

.6 Secure trap seal primer tubing embedded in concrete to reinforcing steel in a secure manner and be present during the concrete pour to ensure that the tubing is not damaged or dislodged.

.2 Installation Of Shut-Off And Check Valves

.1 Refer to Part 3 of the mechanical work Section entitled Basic Mechanical Materials and Methods.

.2 Valves to and including 100 mm (4”) diameter are to be ball type. Valves larger than 100 mm (4”) diameter are to be butterfly type.

.3 Valves in CPVC rigid piping are to be Ipex “Aquarise” CPVC ball valves.

.3 Installation of Drain Valves

.1 Refer to Part 3 of the mechanical work Section entitled Basic Mechanical Materials and Methods.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Provide domestic water piping specialties.

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 22 11 13 – Domestic Cold Water Booster Pump Set

.2 Section 22 11 16 – Domestic Water Piping and Valves

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 National Sanitation Foundation (NSF):

.1 NSF/ANSI/CAN 61 – Drinking Water System Components-Health Effects

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers listed throughout Part 2 are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification.

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

.1 All products specified in this Section that are in contact with domestic water are to be NSF/ANSI/CAN 61 certified to NSF/ANSI/CAN 61, Drinking Water Components-Health Effects.

.2 Water Hammer Arrestors:

.1 Piston type, sealed, pressurized water hammer arrestors suitable for either horizontal or vertical installation, each complete with a hard drawn copper body, "O"-ring piston seals, an air charge, and an inlet opening equal to the diameter of the pipe in which the arrestor is required.

.3 Air Vents:

.1 Cast brass, 1035 kPa (150 psi) rated, float type automatic air vent with anti-drip hygroscopic cap to automatically close when in contact with water, EDPM seal, and 15 mm (½") diameter NPT threaded connection.

3 EXECUTION

3.1 INSTALLATION

.1 Water Hammer Arrestors

.1 Provide accessible water hammer arrestors in domestic water piping in locations as follows:

.2 in headers at groups of plumbing fixtures

.3 line size at the top of risers

.4 at ends of long horizontal runs of piping

.5 in piping connecting solenoid valves or equipment with integral solenoid valves

.6 wherever else shown or required by Code

.7 Install each unit in a piping tee complete with a shut-off valve, either horizontally or vertically in the path of potential water shock in accordance with the manufacturer’s published instructions and details.

.2 Air Vents

.1 Provide accessible air vents with shut-off valves in domestic water piping where shown to prevent air binding.

.2 Locate exact vent locations on as-built record drawings.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Provide drainage waste and vent piping and valves.

.2 Related sections: The following is included for reference only and shall not be presumed complete:

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 American Society for Testing and Materials (ASTM):

.1 ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

.2 ASTM B306 - Standard Specification for Copper Drainage Tube (DWV)

.2 Canadian Standards Association (CSA):

.1 CAN/CSA-B70 -

.2 CAN/CSA B182.2 - PVC Sewer Pipe and Fittings (PSM Type)

.3 CAN/CSA-B602 -

.3 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC-S102.2 – Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.

.2 CAN/ULC-S115 - Standard Method Of Fire Tests Of Firestop Systems

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers listed throughout Part 2 are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification.

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of valve from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

.1 Pipe, Fittings and Joints:

.1 Above Ground PVC - DWV: Rigid IPS PVC drain, waste and vent pipe and fittings to CAN/CSA B181.2, complete with a flame spread rating less than 25 and a smoke developed rating less than 50 when tested to CAN/ULC-S102-2, solvent weld joints, and, for fire barrier penetration, approved firestop conforming to CAN4-S115.

.2 Copper- Solder Joint: Type DWV hard temper to ASTM B306, with forged copper solder type drainage fittings and 50% lead - 50% tin solder joints.

.3 Cast Iron: Class 4000 cast iron pipe and fittings to CAN/CSA-B70, cast iron soil pipe, fittings, and means of joining, and mechanical coupling joints to CAN/CSA-B602, Mechanical couplings for drain, waste, and vent pipe and sewer pipe, equal to Anaco “Husky” Series 400, 4-strap type for pipe to 100 mm (4”) and 6-strap type for piping larger than 100 mm (4”).

.4 Galvanized Steel - Victaulic Coupling Joint: Schedule 40 mild steel, galvanized, ASTM A53, factory or site rolled grooved, complete with Victaulic galvanized ductile iron grooved end fittings and, unless otherwise specified, Victaulic Style 77 hot dip galvanized mechanical joint couplings with Grade M gaskets.

3 EXECUTION

3.1 PREPARATION

.1 Demolition / Removal:

.1 Do all required drainage and vent piping demolition work. Refer to demolition requirements specified in the mechanical work Section entitled Demolition and Revision Work.

3.2 INSTALLATION

.1 Drain and Vent Piping Installation Requirements:

.1 Provide all required drainage and vent piping. Pipe, unless otherwise specified, is to be as follows:

.1 for pipe inside the building and above ground in sizes to and including 65 mm (2½") diameter - type DWV copper

.2 for pipe inside the building and above ground in sizes 75 mm (3") diameter and larger - Class 4000 cast iron with 4-strap couplings for pipe to and including 100 mm (4”) diameter, and 6-strap couplings for piping larger than 100 mm (4”) diameter, all with torque wrench tightened bolts, and, where pipe riser/building expansion will or may be a problem, cast iron pipe expansion joints equal to Bibby-Ste-Croix 654 Series

.3 for pipe inside the building and above ground in lieu of type DWV copper and cast iron, at your option and where permitted by governing Codes and Regulations – 25/50 rated rigid IPS PVC drain, waste and vent pipe

.4 for drainage pump discharge pipe connections inside the building and above ground from the pump(s) to the nearest gravity riser or buried main, including shut-off and check valve connections - Type "DWV" copper with Victaulic" Copper Connection" fittings and couplings, or Schedule 40 galvanized steel with Victaulic fittings and couplings

.5 for piping inside the building above equipment in areas such as Electrical Rooms, Communication Rooms, etc., PVC carrier/containment piping, 25/50 rated where required

.2 Unless otherwise specified, slope horizontal drainage piping above ground in sizes to and including 75 mm (3") diameter 25 mm (1") in 1.2 m (4'), and pipe 100 mm (4") diameter and larger 25 mm (1") in 2.4 m (8').

.3 Unless otherwise specified, slope horizontal branches of vent piping down to the fixture or pipe to which they connect with a minimum pitch of 25 mm (1") in 1.2 m (4').

.4 Extend vent stacks up through the roof generally where shown but with exact locations to suit site conditions and in any case a minimum of 3 m (10') from fresh air intakes. Terminate vent stacks a minimum of 330 mm (13") above the roof (including roof parapets) in vent stack covers.

.5 Provide mechanical joint couplings at connections between copper pipe and ferrous pipe or equipment. Fitting shall include interior shoulder which provides a smooth surface for drainage and prevents contact between dissimilar metals.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

.2 Comply with Enbridge Master Construction Agreement and General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Provide domestic water filtration equipment.

.2 Products furnished/supplied but not installed under this section:

.1 Supply to xxxxx the following xxxxx.

.2 Supply to xxxxx the following xxxxx.

.3 Products installed but not furnished/supplied by this section:

.1 Installation of xxxxx.

.2 Installation of xxxxx.

.4 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 22 11 16 – Domestic Water Piping and Valves

.2 Section 22 11 19 – Domestic Water Piping Specialties

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 National Sanitation Foundation (NSF):

.1 NSF/ANSI 53 – Drinking Water Treatment Units-Health Effects

.2 NSF/ANSI/CAN 61 – Drinking Water Components-Health Effects

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Submit manufacturer's Product data sheets for Products proposed for use in the Work of this Section. Include printed technical data, installation instructions and general recommendations for all materials and components. Include certification indicating compliance of materials with project requirements

.2 Submit shop product data sheets for all products specified in this Section.

.3 Certificates:

.1 Manufacturer's Certification: Submit filter manufacturer's certification of correct installation and operation as specified in Part 3 of this Section..

.4 Test and Evaluation Reports:

.1 Water Test Results: Submit filtered water test results as specified in Part 3 of this Section.

1.5 MAINTENANCE MATERIALS SUBMITTALS

.1 Spare parts:

.1 Spare Filter Media: Submit a complete spare charge of media for each filter in original packaging and store on site where directed by the Owner prior to Substantial Performance of the work..

2 PRODUCTS

2.1 OWNER FURNISHED PRODUCTS

.1 New products:

.1 Xxxxx

.2 Existing products:

.1 Xxxxx

2.2 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Culligan Canada

.2 WaterGroup Companies Inc.

.3 Petwa Ltd.

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.3 MATERIALS

.1 Water filtration equipment is to be certified to NSF/ANSI 53 and NSF/ANSI/CAN 61 Standards.

.2 Mineral Media Depth Type Filter:

.1 Package depth type, 115/24 volt water filter assembly to filter suspended solids and to act as a neutralizer for pH balancing, certified to NSF 61, equipped with a phenolic epoxy lined steel tank with an opening in the top head for mineral filling and inspection. And the following:

.1 A full charge of multi-layer media, and a complete spare charge of media in original container(s).

.2 An integral, non-corrosive, prewired, NEMA 3R power and control panel with seven day time clock to control backwash and purge, backwash flow control so that regardless of fluctuating incoming water pressure no mineral loss will occur.

.3 Activated Carbon Filter:

.1 Package type, 115/24 volt water filter to filter chlorine and organic absorption, certified to NSF 61, equipped with a phenolic epoxy lined steel tank with an opening in the top head for mineral filling and inspection, and the following:

.1 A full charge of 12 x 40 mesh activated carbon media, and a complete spare charge of media in original container(s)..

.2 An integral, non-corrosive, prewired, NEMA 3R power and control panel with seven day time clock to control backwash and purge, backwash flow control so that regardless of fluctuating incoming water pressure no mineral loss will occur

3 EXECUTION

3.1 INSTALLATION

.1 Installation of Water Filters:

.1 Provide package type water filters where shown.

.2 Secure each assembly in place, level, and plumb, on a concrete housekeeping pad.

.3 Provide all required media to fill the tanks.

.2 Interface with Other Work:

.1 Seismic Control and Restraint:

.1 Seismic control and restraint is a requirement for this Project. Refer to the mechanical work Seismic Control and Restraint Section, and ensure that appropriate seismic control and restraint hardware is supplied with equipment specified in this Section.

3.2 SITE QUALITY CONTROL

.1 Manufacturer's Services:

.1 Manufacturer's Certification: Refer to requirements of the article entitled Equipment and System Manufacturer's Certification in the Mechanical Work General Instructions Section. Submit a copy of the letter prior to Substantial Performance.

3.3 SYSTEM STARTUP

.1 Start-Up: Refer to requirements of the article entitled Equipment and System Start-Up in the Mechanical Work General Instructions Section.

3.4 CLOSEOUT ACTIVITIES

.1 Commissioning:

.1 Refer to commissioning requirements specified in the Mechanical Work General Instructions Section.

.2 Demonstration and Training:

.1 Refer to the article entitled Equipment and System O & M Demonstration and Training in the Mechanical Work General Instructions Section. Include for 2 hours of on-site training for 2 groups of 2 people.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Provide plumbing fixtures and fittings.

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 22 11 16 – Domestic Water Piping and Valves

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 Canadian Standards Association (CSA):

.1 CSA B125.3 - Plumbing Fittings

.2 ASSE 1070/ASME A112.1070/CSA B125.70 - Performance Requirements for Water Temperature Limiting Device

.3 CAN/CSA-B651 - Accessible Design for the Built Environment

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-19.22

.3 American National Standards Institute (ANSI):

.1 ANSI/ISEA Z358.1 - Standard for Emergency Eye Wash and Shower Stations

.4 American Society of Mechanical Engineers (ASME):

.1 ASME A112.18.1/CSA B125.1 - Plumbing Supply Fittings

.2 ASME A112.18.2/CSA B125.2 - Plumbing Waste Fittings

.3 ASME A112.18.6/CSA B125.6 - Flexible Water Connections

.4 ASME A112.14/CSA B125.14 - Manually Operated Valves for Use in Plumbing Systems

.5 American Society of Sanitary Engineering (ASSE):

.1 ASSE 1037/ASME A112.1037/CSA B125.37 - Performance Requirements for Pressurized Flushing Devices for Plumbing Fixtures

.6 National Sanitation Foundation (NSF):

.1 NSF/ANSI/CAN 61 - Drinking Water Components-Health Effects

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Stainless Steel Fixtures:

.1 American Standard

.2 Novanni Stainless Inc.

.3 Elkay Manufacturing Co.

.4 Franke Kindred Canada Ltd.

.2 Fixture Fittings:

.1 Zurn Industries Ltd.

.2 Moen Inc.

.3 Kohler Co.

.4 American Standard

.5 Delta Faucet

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

.1 General RE: Plumbing Fixtures And Fittings:

.1 Unless otherwise specified, all fittings and piping exposed to view are to be chrome plated and polished.

.2 All fittings located in areas other than private washrooms are to be vandal-resistant

.3 Fixture Carriers: All fixture carriers are to be suitable in all respects for the fixture they support and the construction in which they are located.

.4 Fixture Exposed Traps and Wastes: Exposed traps and wastes for fixtures not equipped with integral traps, such as wall mounted lavatories/sinks and free-standing sinks, are to be adjustable chrome plated cast brass "P" traps with cleanouts, minimum #17 gauge chrome plated tubular extensions, and chrome plated escutcheons, all to suit the fixture type and drain connection.

.5 Fixture Concealed Traps and Wastes: Concealed traps and wastes for fixtures not equipped with integral traps, such as counter sinks, are to adjustable cast brass with cleanout plugs, all to suit the fixture type and drain connection.

.6 Fixture Exposed Supplies: Exposed supplies for fixtures which do not have supply trim/fittings with integral stops, i.e. lavatories, are to be solid chrome plated brass angle vales with screwdriver stops for public areas, wheel handle stops for private areas, flexible stainless steel risers, and stainless steel or chrome plated steel escutcheons, all arranged and sized to suit the fixture. Dahl Brothers Canada Ltd, chrome plated “mini-ball” valve assemblies will be acceptable.

.7 Fixture Concealed Supplies: Water piping as specified, complete with ball type shut-off valves as specified with the water piping or Dahl Bros. Canada Ltd. ¼ turn “mini ball” valves.

.2 Plumbing Fixtures And Fittings:

.1 Plumbing fixtures and fittings are to be in accordance with the drawing schedule.

.3 Caulking:

.1 Non-toxic, mould, mildew, and fungus resistant 1-part silicone rubber sealant in accordance with CAN/CGSB-19.22, with primers as recommended by the sealant manufacturer. Caulking colour(s) for fixtures other than white, if any, will be selected by the Consultant from the sealant manufacturer’s standard colour range.

3 EXECUTION

3.1 INSTALLATION

.1 Demolition:

.1 Do all required plumbing fixture and fitting demolition work. Refer to demolition requirements specified in the mechanical work Section entitled Demolition and Revision Work.

.2 Installation Of Plumbing Fixtures And Fittings:

.1 Provide all required plumbing fixtures and fittings.

.2 Where new fixtures and fittings are to be connected to existing piping, include for all required piping revisions.

.3 Connect plumbing fixtures and fittings with piping sized in accordance with the drawings.

.4 Confirm the exact location of all plumbing fixtures and trim prior to roughing-in. Refer to architectural plan and elevation drawings.

.5 When installation is complete, check and test the operation of each fixture and fitting. Adjust or repair as required.

.6 Counter Mounted Fixtures and Trim: Supply templates for all counter mounted fixtures and trim and hand to the trades who will cut the counter. Ensure openings in the counter are properly located.

.3 Caulking At Plumbing Fixtures And Fittings:

.1 Caulk around plumbing fixtures and fittings where they contact walls, floors, and any other building surface.

.2 Clean areas/surfaces to be caulked and prime in accordance with the sealant manufacturer’s instructions. Where damage to a building surface may occur, mask the surface to prevent damage and ensure a clean exact edge to the caulking bead.

.3 Apply caulking using a gun with the proper size and shape of nozzle and force the sealant into joints to ensure good surface contact and a smooth and even finished bead of sealant.

.4 If joints have been masked the sealant may be tooled in a continuous stroke to obtain complete void filling. Remove masking tape immediately after tooling and before the sealant begins to skin.

.4 Commissioning:

.1 Commission plumbing fixtures and fittings by proving proper operation.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Provide hydronic piping and valves.

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 23 21 16 – Hydronic Piping Specialties

.2 Section 23 25 00 – HVAC Water Treatment

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 American Society of Testing and Materials (ASTM):

.1 ASTM A53, Standard Specification for Pipe, Steel, Black, and Hot-Dipped, Zinc-Coated, Welded and Seamless

.2 ASTM B88, Standard Specification for Seamless Copper Water Tube

.3 ASTM A105, Standard Specification for Carbon Steel Forgings for Piping Applications

.4 ASTM A234, Standard Specification for Piping Fittings of Wrought Carbon Steel for Moderate and High Temperature Service

.5 ASTM A536, Standard Specification for Ductile Iron Castings

.2 American National Standards Institute (ANSI):

.1 ANSI/ASME B16.4, Cast Iron Threaded Fittings

.2 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Valves (Bronze, Cast Iron)

.1 Kitz

.2 Nibco

.3 Toyo

.2 Valves (Steel)

.1 Bonney Forge

.2 Kitz

.3 Beric

.3 Butterfly Valves

.1 Kitz

.2 Bray

.3 Nibco

.4 Toyo

.5 W-K-M

.4 Circuit Balancing Valves

.1 Tour & Andersson

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

.1 Pipe, Fittings And Joints:

.1 Black Steel - Screwed Joint: Mild black carbon steel, Grade B, ERW, ASTM A53, complete with Class 125 cast iron threaded fittings to ANSI/ASME B16.4, and screwed joints.

.2 Black Steel - Welded Joint: Mild black carbon steel, Grade B, ERW, ASTM A53, mill or site bevelled, complete with factory made seamless carbon steel butt welding fittings to ASTM A234, Grade WPB, with long sweep pattern elbows unless otherwise specified, and welded joints.

.3 Black Steel - Grooved End Mechanical Joint: Mild black carbon steel, Grade B, ERW, ASTM A53, factory or site roll grooved, complete with Victaulic Co. (or equal) cast ductile iron grooved end fittings, including full flow elbows, conforming to ASTM A536, and Victaulic Style 07 "Zero-Flex" (or equal) rigid couplings for piping in the Mechanical Rooms and for piping risers, Style 77 (or equal) standard flexible couplings for all other piping.

.4 Black Steel - Pressure Coupled Joint: Schedule 10 mild black steel, ASTM A53, square cut, deburred and clean, complete with Viega “MegaPress” 2070 kPa (300 psi) rated, formed, cold drawn steel fittings and couplings with Grade "E" EDPM O-rings and “Smart Connect” feature, and pressure type crimped joints made by use of an electro-hydraulic crimping tool supplied by the fitting manufacturer.

.5 Soft Copper Pipe: Type "L" seamless soft copper to ASTM B77.

.6 Hard Copper - Solder Joint: Type "L" hard drawn seamless copper to ASTM B88, complete with wrought copper fittings to ANSI B16.22, and 95% tin/5% Antimony solder joints.

.2 Piping Unions:

.1 Screwed Piping: Malleable iron, ground joint, bronze or brass to iron or bronze to bronze seat screwed unions and union elbows with a minimum pressure rating of 1725 kPa (250 psi) steam at 260° C (500° F).

.2 Flanged Piping: Forged carbon steel slip-on type raised faced welding flange unions to ASTM A105, 150 lb. Class for steel pipe, and slip-on type 150 lb. Class bronze flanges for copper pipe.

.3 Shut-off valves:

.1 Ball Type: Class 600, 4140 kPa (600 psi) WOG rated full port 2-piece ball valves, each complete with:

.1 A forged brass or bronze body and cap.

.2 Blowout-proof stem.

.3 Solid forged brass chrome plated ball.

.4 "Teflon" or "PTFE" seat.

.5 Ends to suit the piping being connected.

.6 Removable and identified lever handle.

.2 Butterfly Type: Cast ductile iron, lug body style, 1200 kPa (175 psi) rated butterfly valves, each suitable for bubble-tight dead end service with the valve closed and either side of the connecting piping removed, and each complete with:

.1 A neck to permit 50 mm (2") of insulation above the flange.

.2 A field replaceable EPDM seat.

.3 Ductile iron disc.

.4 Stainless steel shaft with EPDM seal.

.5 A lever handle for valves to and including 150 mm (6") diameter, and a handwheel and gear type operator for valves larger than 150 mm (6") diameter.

.4 Swing Check Valves:

.1 Bronze - Screwed: Class 125, 1380 kPa (200 psi) WOG rated horizontal swing check valves, each complete with:

.1 A "Y" pattern bronze body.

.2 Hinged brass disc.

.3 Easy access screw-in cap.

.4 Screwed ends.

.2 Steel - Grooved Ends: Victaulic Co. of Canada Ltd. Series 716 "Vic-Check" grooved end carbon steel check valves suitable for mounting horizontally or vertically.

.3 Cast Iron - Screwed and Flanged: Cast iron, bronze trim, 1380 kPa (200 psi) rated swing check valves, each complete with

.1 A bronze disc and seat.

.2 Malleable iron hinge.

.3 Bolted cover.

.4 Screwed or flanged ends as required.

.5 Vertical Lift Check Valves:

.1 Class 150, 1380 kPa (200 psi) WOG rated bronze body vertical lift check valves, each complete with:

.1 A conical brass disc.

.2 Stainless steel, bushing, guide rod, and spring.

.3 PTFE seat.

.4 Screwed ends.

.6 Drain Valves:

.1 Refer to Part 2 of the mechanical work Section entitled Basic Mechanical Materials and Methods.

.7 Circuit Balancing Valves:

.1 Globe style, “Y” pattern circuit balancing valves designed to facilitate precise flow measurement, precision flow balancing, and positive shut-off, each rated for 2070 kPa at 120° C (300 psi at 250° F) and complete with:

.1 A brass body, stem and plug for valves to 50 mm (2”) diameter, and a cast or ductile iron body with bronze plug disc and stem for valves larger than 50 mm (2”) diameter.

.2 A multi-turn, 360° adjustment handwheel with micrometer type indicators and a lockable hidden memory feature.

.3 Two 6.4 mm (¼”) threaded brass metering ports with check valves and gasketed caps on the inlet side of the valve for connection to a differential pressure meter.

.8 Radiator Shut-Off And Balancing Valves:

.1 Heavy pattern, straight, 1750 kPa (250 psi) rated at 120° C (250° F) bronze or brass radiator valves, each complete with:

.1 A replaceable composition disc with brass disc holder.

.2 A self-adjusting, spring loaded packing system.

.3 A brass union tailpiece.

.4 A handle for inlet valves.

.5 A brass throttle and brass operating cap key for flow balancing for outlet valves.

3 EXECUTION

3.1 INSTALLATION

.1 Demolition:

.1 Do all required hydronic piping system demolition/revision work. Refer to demolition requirements specified in the mechanical work Section entitled Demolition and Revision Work.

.2 Piping Installation Requirements:

.1 Provide all required hydronic piping. Pipe, unless otherwise specified, is to be:

.1 For pipe to and including 65 mm (2½") diameter, Schedule 40 black steel, screwed, or type "L" hard copper with solder joints or pressure coupled joints, or, for runout piping from mains and risers to terminal equipment, Schedule 10 black steel with Viega "MegaPress" fittings and couplings.

.2 For pipe 65 mm (2½") diameter and larger, Schedule 40 black steel with grooved ends and Victaulic fittings and couplings, or, Schedule 40 black steel with welding fittings and welded joints.

.3 For short branch connections to heating equipment where structural obstructions occur and site bending of pipe is advantageous, a single length of type "L" soft copper.

.2 Slope horizontal piping mains to provide a minimum continuous up-grade of 25 mm (1") in 6 m (20') to high points. Slope branch supply and return piping connections to equipment a minimum of 25 mm (1") in 1.2 m (4'). Leave sufficient room at high points for installation and maintenance of air vents.

.3 Install automatic control valves, piping wells and similar piping and/or equipment mounted control components required for automatic temperature control systems supplied as part of the control. Refer to drawing control diagrams and details.

.4 Connect equipment provided as part of the work of other Sections of the Specification with piping as indicated and/or required. Refer to pipe connection details on drawings.

.5 Unions: Provide screwed unions, removable mechanical joint couplings, or weld-on or solder-on flanges in piping at all connections to valves, strainers and similar piping system components which may need maintenance or repair, at all equipment connections, in runs of piping exceeding 9 m (30') at 4.5 m (15') regular intervals to permit removal of sections of piping, and wherever else indicated on the drawings.

.6 Shut-off Valves: Provide shut-off valves in piping connections to equipment, to isolate piping risers, to isolate other sections of systems as shown, and wherever else indicated on the drawings. Valves in piping to and including 50 mm (2") diameter are to be ball type. All other shut-off valves are to be ball or butterfly type unless otherwise specified. Locate all valves so that they are easily accessible. Wherever possible, install valves at uniform height. Provide chain operators for valves which are inaccessible for operation from floor level.

.7 Check Valves: Provide a check valve in the discharge piping of every pump, and elsewhere in piping where shown on the drawings. Where check valves are required in vertical piping, ensure that they are suitable in all respects for the application. Note that check valves for vertical in-line and/or base mounted circulating pumps are integral with the discharge accessory.

.8 Drain Valves: Refer to Part 3 of the mechanical work Section entitled Basic Mechanical Materials and Methods.

.9 Circuit Balancing Valves: Provide circuit balancing valves in piping generally where shown on the drawings but with exact locations in accordance with instructions of personnel doing system flow balancing work. Confirm locations prior to installation.

.3 Flushing And Cleaning Piping:

.1 Flush and clean new piping in accordance with requirements specified in the mechanical work Section entitled HVAC Water Treatment.

.4 Testing, Adjusting And Balancing:

.1 When work is complete and equipment is operating as intended, test, adjust and balance water flows in accordance with requirements specified in the mechanical work Section entitled Testing, Adjusting, and Balancing.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Provide standard ductwork

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 23 31 07 – Ductwork Cleaning

.2 Section 23 33 00 – Duct System Dampers and Accessories

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 American National Standards Institute (ANSI):

.1 ANSI/SMACNA HVAC Duct Construction Standards- Metal and Flexible

.2 American Society of Testing and Materials (ASTM):

.1 ASTM A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Coated (Galvannealed) by the Hot-Dip Process

.3 Underwriters Laboratories Canada (ULC):

.1 CAN/ULC-S110, Standard Methods of Test for Air Ducts

.2 CAN/ULC-S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.4 National Fire Protection Association (NFPA):

.1 NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilation Systems

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for duct and fittings.

.3 Test and Evaluation Reports:

.1 Duct Pressure Tests

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Flexible Ductwork

.1 Flexmaster

.2 Continental

.3 Wiremold

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

.1 Galvanized Steel Ductwork:

.1 General: Galvanized steel sheet is to be hot dipped in accordance with requirements of ASTM A653. Galvanizing for bare uncovered duct to be finish painted is to be G60. All other galvanizing is to be G90.

.2 Rectangular: Lock forming grade hot dip galvanized steel, ASTM A653, shop fabricated, minimum #26 gauge.

.3 Round: Factory machine fabricated, spiral, mechanically locked flat seam, single wall duct, fittings and couplings.

.4 Flat Oval: Factory machine fabricated, single wall, 4-ply spiral lock seam duct, fittings and couplings.

.2 Flexible Metallic Ductwork

.1 Bare: Spirally wound, semi-rigid, self-supporting corrugated aluminum duct with continuous triple lock seams, ANSI/SMACNA Form "M-UN", ULC-S110 listed and labelled as a Class 1 Air Duct, constructed of dead soft aluminum strip, and supplied in 3 m (10') lengths.

.2 Insulated: Spirally wound, semi-rigid, self-supporting corrugated aluminum duct with continuous triple lock seams, ANSI/SMACNA Form "M-I", ULC-S110 listed and labelled as a Class 1 Air Duct, constructed of dead soft aluminum strip, supplied in 3 m (10') lengths and factory covered with 40 mm (1½") thick, 12 kg/m^3 (0.75 lb/ft^3) density, minimum 6 R-value fibreglass insulation with a vinyl jacket meeting flame spread and smoke developed requirements of CAN/ULC-S102.

.3 Metal Duct System Joint Sealant

.1 ULC listed and labelled, premium grade, grey colour, water base, non-flammable duct sealer, brush, or gun applied, with a CAN/ULC S102 maximum flame spread rating of 5 and smoke developed rating of 0.

.4 Acoustic Lining

.1 Minimum 25 mm (1") thick acoustic lining material meeting NFPA 90A requirements and flame spread and smoke developed fire hazard ratings of CAN/ULC-S102, flexible for round ducts, board type for rectangular ducts, consisting of a bonded fiberglass mat coated on the inside (airside) face with a black fire-resistant coating.

3 EXECUTION

3.1 INSTALLATION

.1 Demolition:

.1 Do all required standard ductwork system demolition/revision work. Refer to demolition requirements specified in the mechanical work Section entitled Demolition and Revision Work.

.2 Fabrication And Installation Of Galvanized Steel Ductwork:

.1 Provide all required standard galvanized steel ductwork, rectangular and/or round and/or flat oval as shown. Note that where rectangular ductwork is shown, round or flat oval ductwork of equivalent cross-sectional area is acceptable.

.2 Unless otherwise specified, construct and install ductwork in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible to suit the duct pressure class designation of minimum 500 Pa (2" w.c.) positive or negative as applicable, a minimum velocity of 10 m/s (2000 fpm), and so that the ductwork does not "drum". All flat surfaces of rectangular ductwork are to be cross-broken. Duct system sealing is to meet ANSI/SMACNA Seal Class A requirements.

.3 Variable air volume ductwork from supply fans to boxes is to be as above but rectangular duct take-offs are to be double side straight taper type with a take-off length equal to 0.5 times the branch duct width but minimum 150 mm (6") length, and the double taper side is to have an included angle of minimum 60°.

.4 Duct Routing and Dimensions: Confirm the routing of all ductwork at the site and site measure ductwork prior to fabrication. Note that duct dimensions may be revised to suit site routing and building element requirements, if dimension revisions are reviewed with and approved by the Consultant. Duct routing and/or dimension revisions to suit conditions at the site are not grounds for a claim for an extra cost.

.5 Ducts Run Within or Through OWSJ: Refer to structural drawings. Where ductwork is to be run within or through open web steel joists, note that ductwork shown on the mechanical drawings is schematic only and is to be altered as required to suit the steel joist configuration, spacing, panel points, and cross-bridging at no additional cost.

.6 Ductwork Located at Sprayed Fireproofing: Wherever ductwork is required at locations where sprayed fireproofing is applied to building construction, install the ductwork only after the fireproofing work is complete and do not compromise the fire rating of the sprayed fireproofing.

.7 Automatic Control Components: Install (but do not connect) all duct system mounted automatic control components supplied as part of the automatic control work.

.8 Heat Transfer Equipment Connections: Where indicated, provide duct connections to fan powered heat transfer equipment with integral coils.

.9 Separate Hot Water Reheat Coils: Flange connect ductwork to hot water reheat coils in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible. The coils will be suspended independent of connecting ductwork as part of the heat transfer work.

.10 Rectangular Duct Support Inside Building: Support horizontal rectangular ducts inside the building in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, but use trapeze hangers with, unless otherwise specified, galvanized steel channels, and galvanized steel hanger rods for all ducts that are exposed, and all concealed ducts wider than 500 mm (20").

.11 Round and Flat Oval Duct Support Inside Building: Support round and flat oval ducts inside the building in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, but, unless otherwise specified, for both uninsulated and insulated ducts exposed in finished areas, use bands and secure at the top of the duct to a hanger rod, all similar to Ductmate Canada Ltd. type "BA". If the duct is insulated, size the strap to suit the diameter of the insulated duct.

.12 Flanged Duct Joints: Where flanged duct joints are used, do not locate the joints in wall or slab openings, or immediately at wall or slab openings. Do not use flanged joints for exposed uninsulated ducts in finished areas.

.13 Application of Sealants: Apply sealants by brush or gun to cleaned metal surfaces. Where bare ductwork is exposed apply neat uniform lines of sealant. Randomly brushed, sloppy looking sealant applications will be rejected and must be repaired or replaced with a neat application of the sealant.

.14 Connection of Dissimilar Metal Ducts: Where dissimilar metal ducts are to be connected, isolate the ducts by means of flexible duct connection material as specified in the Section entitled Duct System Dampers and Accessories.

.3 Installation Of Flexible Ductwork:

.1 Provide maximum 3 m (10') long lengths of flexible ductwork for connections between galvanized steel duct mains and branches, and necks of ceiling grilles and diffusers. Do not install flexible ductwork through walls, even if shown on the drawings.

.2 Stretch out lengths of duct prior to cutting and installation.

.3 At rectangular galvanized steel duct, accurately cut holes and provide flanged or "Spin-in" round flexible duct connection collars. Seal joints with duct sealer.

.4 Install flexible ducts as straight as possible and support in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, and secure at each end with nylon or stainless steel gear type clamps, and seal joints. Provide long radius duct bends where they are required.

.5 Do not penetrate fire barriers with flexible duct.

.4 Installation Of Acoustic Lining:

.1 Provide acoustic lining in ductwork in locations as follows:

.1 Wherever shown and/or specified on the drawings.

.2 Supply ductwork downstream of air terminal boxes for a distance of 2.4 m (8') measured along the duct and outward from the box in all directions.

.3 For all transfer air ducts.

.2 Install lining in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, however, for all installations regardless of velocity, at leading and trailing edges of duct liner sections, provide galvanized steel nosing channel as per the detail entitled Flexible Duct Liner Installation found in the ANSI/SMACNA manual referred to above.

.5 Duct System Protection, Cleaning And Start-Up:

.1 Temporarily cover all open ends of new ducts during construction.

.2 Vacuum all dirt and foreign matter from the entire duct systems and clean duct system terminals and the interior of air handling units prior to operating fans.

.3 Prior to starting any supply air handling system provide 50 mm (2") thick glass fibre construction filters at fan equipment in place of permanent filters.

.4 Provide cheesecloth over all duct system inlets and outlets and run the system for twenty-four hours, after which remove the cheesecloth, the construction filters, and install new permanent filters.

.5 Include all labour for a complete site walk-through with testing and balancing personnel following the route of all duct systems to be tested, adjusted and balanced for the purpose of confirming the proper position and attitude of dampers, the location of pitot tube openings, and any other work affecting the testing and balancing procedures. Perform all corrective work required as a result of this walk-through.

.6 Testing, Adjusting And Balancing:

.1 When work is complete and equipment is operating as intended, test, adjust and balance air flows and temperatures in accordance with requirements specified in the mechanical work Section entitled Testing, Adjusting, and Balancing.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Cleaning of ductwork

.2 Related Sections

.1 Section 23 31 05 – Standard Ductwork

.2 Section 23 33 00 – Duct System Dampers and Accessories

.3 Section 23 33 05 – Silencers

1.3 REFERENCES

.1 Abbreviations and Acronyms: See ACR, The NADCA Standard.

.2 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 American National Standards Institute/Institute of Inspection Cleaning and Restoration Certification (ANSI/IICRC).

(1) ANSI/IICRC S520 - Standard for Professional Mold Remediation.

.2 National Air Duct Cleaners Association (NADCA):

(1) ACR, The NADCA Standard for Assessment, Cleaning & Restoration of HVAC Systems (Current Version).

.3 National Fire Protection Association (NFPA):

(1) NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.
(2) NFPA 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems.

.4 North American Insulation Manufacturers Association (NAIMA):

(1) Cleaning Fibrous Glass Insulated Air Duct Systems.

.5 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):

(1) HVAC Duct Construction Standards - Metal and Flexible.

.6 Underwriters’ Laboratories (UL):

(1) UL Standard 181 - UL Standard for Safety Factory-Made Air Ducts and Connectors.
(2) UL Standard 181A - UL Standard for Safety Closure Systems for Use with Rigid Air Ducts.

(3) UL Standard 181B - Standard for Closure Systems for Use With Flexible Air Ducts and Air Connectors
(4) UL Standard 723 - Standard for Test for Surface Burning Characteristics of Building Materials

.7 US Green Building Council (USGBC)

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate the Work of this section with the work of other trades, and the work of different contractors.

.2 Precleaning Meeting:

.1 Conduct precleaning meeting with representatives of Owner, Contractor, and facility occupants affected by cleaning work.

.3 Sequencing:

.1 Perform duct cleaning work after HVAC system construction and duct leakage testing are complete.

.4 Scheduling:

.1 Prepare and submit HVAC system cleaning activities schedule in according with Division 01 section describing project scheduling requirements.

1.5 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for duct and fittings.

.3 Shop Drawings

.1 Duct cleaning plan: Before commencing cleaning work, submit written work plan including following information:

(1) Scope of Work identifying HVAC components to be cleaned or restored.
(2) Itemize specific environmental engineering controls required for workspace, and special work requirements.
(3) Detail cleaning work means and methods.
(4) Name, contact information, and functional tasks performed by each representative of each firm and contractor involved with the work.

.4 Test and Evaluation Reports:

.1 Field Quality Control Submittals:

(1) Submit laboratory analysis results if NADCA Vacuum Test is used for cleanliness verification.
(2) Submit documentation detailing chain of custody for test samples if outside laboratories or testing agencies performed sample analysis or testing.

.2 Qualification Statements: Show membership status, project experience, and certifications for:

(1) HVAC Cleaning Contractor.
(2) Supervisor.
(3) Inspector.
(4) Hygienist.
(5) Testing Agency.

.5 Closeout Submittals:

.1 Record Documentation: Submit documentation verifying compliance with this specification for work performed. This documentation may include:

(1) Completion of cleaning work, as verified by owner and consultant, visual inspection and verification of cleanliness.
(2) Photo images, HVAC plans and other supporting documents such as submittal forms for materials used and/or warrantees or guarantees.
(3) System areas found to be damaged or in need of repair.

.6 Quality Assurance:

.1 Regulatory Agency Sustainability Approvals.

.2 Qualifications.

1.6 QUALIFICATIONS

.1 HVAC System Cleaning Contractor: Current member of NADCA experienced in HVAC cleaning projects of similar size and complexity.

.1 Supervisor: Employ NADCA-certified Air Systems Cleaning Specialist (ASCS) responsible for project oversight.

.2 Inspector: Employ NADCA-Certified ASCS, or NADCA-Certified Ventilation Inspector (CVI) to perform site inspections.

.2 Licensing:

.1 Submit copy of proper licenses, required to legally perform work in Ontario, Canada in which work is located.

.2 Comply with applicable federal, state, provincial, and local, rules, regulations, and licensing requirements.

.3 Comply with requirements of Authorities Having Jurisdiction.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

(1) Duct Cleaning
(a) Powervac
(b) Modern Purair

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 CLEANING MATERIALS

.1 Cleaning Agents:

.2 Water: Potable.

2.3 DUCT LINER MATERIALS

.1 Duct Liner: Fibrous glass insulation

.1 Where replacing internal insulation, furnish materials conforming to UL, NFPA 90A, NFPA 90B and SMACNA standards.

.2 Match thickness and insulation thermal resistance of existing duct liner.

3 EXECUTION

3.1 EXAMINATION

.1 HVAC System Assessment and Site Survey:

.1 Before commencing work, assess HVAC system condition to determine appropriate engineering controls, safety measures, tools, equipment and cleaning products and methods required to complete the work.

.2 Perform HVAC system assessment by ASCS, Certified Ventilation Inspector (CVI), or equivalent.

.3 If microbial testing or sampling are required, engage services of technicians trained and acceptable to authorities having jurisdiction.

.2 Work Plans:

.1 Project Schedule: Outline starting date, dates and times when work will take place, and completion date.

.3 Determine sequence of cleaning each system or portion of the work and coordinate with work of other trades and activities.

.1 Product Data and Safety Data Sheets: Product data submittals listing general use and specific chemical cleaning products and coatings used while performing the work, along with Safety Data Sheets for chemical products used to perform the work.

.2 Safety Plan: Define responsibilities of each organization's designated representative involved with executing work plan throughout project.

3.2 PROTECTION OF IN-PLACE CONDITIONS

.1 Protect existing structures, surfaces, and systems from damage resulting from duct cleaning work.

.2 Report damage caused by this work to owner and consultant.

3.3 HVAC SYSTEM PREPARATION

.1 Service Openings:

.2 Access duct cleaning work through existing or new service openings, allowing safe access and thorough cleaning throughout specified components.

.3 Work through service openings sized to allow mechanical tool entry and visual inspection, as required for cleaning activities.

.4 Where possible, work through existing service openings.

.1 Where new service openings are required, install openings as follows:

.2 Do not degrade structural, thermal, or functional system integrity, and comply with applicable SMACNA duct construction methods.

.3 Install service openings complying with applicable UL and SMACNA standards, federal, state, and local code requirements, and requirements of Authorities Having Jurisdiction.

.4 Where required, install duct access doors and service panels fabricated with materials complying with SMACNA and UL 723.

.5 Where required, install tapes and mastics complying with UL 181A/B.

.6 Where required, install closure panels fabricated from equivalent material and same or heavier gage.

.7 Mechanically fasten closure panels over service openings with screws or rivets at perimeter, maximum 100 mm (4 inches) spacing.

.8 Fabricate closure panel to overlap duct opening perimeter, minimum 25 mm (1 inch) .

.9 Insulate closure panels to match adjacent duct interior and exterior surfaces.

.10 Seal rigid fibrous glass duct systems in accordance with NAIMA recommended practices.

(1) Install closure techniques: UL Standard 181 or UL Standard 181A.

.11 Close service openings installed in rigid fibrous glass ductwork and metal ductwork with fibrous glass liner with no exposed fibrous glass edges exposed to airstream.

.5 Install service openings that can be reopened for future inspection or remediation.

.1 Mark outside of duct and report service opening locations to Owner in project closeout documents.

.6 Do not cut service openings into flexible duct.

.1 Disconnect flexible duct at both ends as required for inspection and cleaning.

.2 Reconnect flexible duct ends in accordance with SMACNA standards.

3.4 CLEANING EQUIPMENT MAINTENANCE AND USE

.1 Maintain equipment employed in work performance in good working order, consistent with equipment manufacturer's written instructions and applicable jurisdictional requirements.

.2 Clean and inspect equipment before bringing to work site.

.3 Do not introduce contaminants from cleaning equipment into indoor environment or HVAC system.

.4 Service equipment to limit possible HVAC system contamination from insufficient service equipment cleaning, and unsafe operating conditions for service personnel and building occupants.

.5 Perform activities requiring opening contaminated vacuum collection equipment on-site, including servicing or filter maintenance, in appropriate containment area or outside building.

.6 Clean and seal collection devices, vacuums and other tools and devices before relocating to different building areas, moving equipment through occupied spaces, and before removing equipment from building.

.7 Locate fuel-powered equipment to prevent combustion emissions and air exhaust emissions from entering building envelope.

.1 Monitor and manage equipment operation and location to prevent introduction of combustion emissions into occupied space.

.8 Furnish HEPA-filtered equipment with minimum collection efficiency of 99.97 percent at 0.3 micron particle size, when vacuum collection equipment exhausts within building envelope.

3.5 CLEANING – GENERAL

.1 Perform HVAC system cleaning in accordance with ACR, The NADCA Standard.

.2 Remove visible non-adhered substances.

.1 Clean HVAC components employing agitation device to dislodge contaminants from HVAC component airside surfaces, and then capturing contaminants with vacuum collection device.

(1) Acceptable methods include those that do not damage integrity of ductwork and other system components and does not damage porous surface materials including internal insulation and duct lining.

.2 Clean HVAC components using source removal mechanical cleaning methods designed to extract contaminants from within HVAC system components and safely remove contaminants from facility.

.3 Select source removal methods rendering HVAC system components visibly clean and capable of passing cleanliness verification methods as described in ACR, The NADCA Standard.

.4 Do not employ cleaning method, or combination of methods, that can damage HVAC system components or negatively alter system integrity.

.5 Do not damage HVAC system and components with wet cleaning, power washing, steam cleaning and other wet process cleaning.

.3 Apply cleaning materials in accordance with manufacturer's instructions.

.1 Do not apply cleaning agents or water to electrical, fibrous glass or other porous HVAC system components.

.4 Capture removed contamination and cleaning materials and legally dispose.

.5 Verify HVAC system surface and component cleanliness in accordance with ACR, The NADCA Standard.

.6 Particulate Collection:

.1 Employ contaminant removal methods incorporating vacuum collection devices operated continuously during cleaning.

(1) Connect vacuum collection device to component being cleaned through service opening.
(2) Employ vacuum collection device of sufficient capacity to maintain areas being cleaned under negative pressure, containing debris and preventing contaminant migration to adjacent areas.

.2 When possible, discharge ducted exhaust air from vacuum collection devices outdoors, keeping discharge air clear of outdoor air intakes, operable windows, and other locations allowing outdoor air entry.

(1) Do not violate outdoor environmental standards, codes or regulations.
(2) Do not discharge unfiltered air from vacuum collection devices outdoors.

.3 When necessary to exhaust vacuum collection devices indoors, including hand-held and wet-vacuum machines, keep discharge air in work area, and provide machine air discharge HEPA filtration, rated at 99.97 percent collection efficiency for 0.3 micron particles and larger.

3.6 TYPE 1 DRY CLEANING METHOD

.1 Operate HEPA-filtered negative air machines that discharge continuously during Type 1 cleaning process.

.2 Mechanically remove non-adhered substances and debris in accordance with ACR, The NADCA Standard.

3.7 TYPE 2 WET CLEANING METHOD

.1 Employ Type 2 wet cleaning method when visual inspection reveals suspect microbial matter on coil or drain pan. Access both upstream and downstream sides of each coil section for cleaning.

.2 Employ engineering controls required for coil cleaning in accordance with ACR, The NADCA Standard.

.3 Verify cleanliness after cleaning has been performed as described in ACR, The NADCA Standard.

.4 Perform Type 2 cleaning if adhered substances still remain on the coil or the coil is impacted after Type 1 cleaning has been completed and post-cleaning inspection has been performed.

.5 After cleaning, verify cleanliness of HVAC coils in accordance ACR, The NADCA Standard.

3.8 DUCT-MOUNTED INLINE COILS

.1 Perform visual inspection of coil to determine whether Type 1 dry cleaning, or Type 2 wet cleaning is required.

.2 Employ cleaning methods which will render coil visibly clean in accordance with ACR, The NADCA Standard.

.3 Isolate coil from duct system during cleaning process. Do not allow removed particles to migrate to, or redeposit on, unintended areas.

.4 Apply coil cleaning products in accordance with manufacturer’s published data and labeling.

.5 Clean and flush coil.

.6 Apply cleaning methods and products that do not cause damage to, or erosion of, coil surface or fins.

.7 Type 1 Dry Cleaning Method:

.1 Operate negative air machines with HEPA-filtered discharge continuously during Type 1 cleaning process.

.2 Mechanically remove non-adhered substances and debris in accordance with ACR, The NADCA Standard.

.8 Type 2 Wet Cleaning Method:

.1 Employ Type 2 wet cleaning method when visual inspection reveals suspect microbial matter on coil or drain pan. Access both upstream and downstream sides of each coil section for cleaning.

.2 Employ engineering controls required for coil cleaning in accordance with ACR, The NADCA Standard.

.3 Verify cleanliness after cleaning has been performed as described in ACR, The NADCA Standard.

.4 Perform Type 2 cleaning if adhered substances still remain on the coil or the coil is impacted after Type 1 cleaning has been completed and post-cleaning inspection has been performed.

.5 Capture rinse water when cleaning duct mounted coils without drain pans. Do not allow water to remain in cleaned ductwork.

.9 After cleaning, verify cleanliness of HVAC coils in accordance ACR, The NADCA Standard.

3.9 INTERNALLY INSULATED DUCT SYSTEM COMPONENTS AND SOUND ATTENUATORS

.1 Employ cleaning methods that do not damage internal insulation or sound attenuating components, and that render system capable of passing cleanliness verification tests.

.2 Clean fibrous glass duct liner or duct board present in equipment or air ducts employing mechanical agitation methods to remove non-adhered substances.

.3 Do not create abrasions, breaks, or tears to fibrous glass liner or duct board surfaces.

.4 Maintain HVAC system under constant negative pressure when cleaning internal insulation components.

.5 Do not wet insulation components.

.6 Identify for replacement fibrous glass materials with evidence of damage, deterioration, delaminating, friable materials, biological growth, or moisture that cannot be restored by cleaning or resurfacing/coating.

.7 When required, remediate exposed, damaged insulation exposed to HVAC system air stream.

.1 Scrape insulation and adhesive residue from metal duct system component surfaces that have undergone degraded insulation removal.

.2 Remove loose, visible debris prior to installation of new insulation.

3.10 SPECIAL TECHNIQUES

.1 Engineering Controls:

.1 Employ engineering controls to prevent contaminating surfaces outside work area.

(1) Comply with government regulations, and industry standards and guidelines relevant to working in the facility environment in which the work is located.
(2) Control odors, mists, and aromatic vapors during cleaning process.

.2 Controlling Product Emissions:

.1 Apply cleaning agents and other chemicals in accordance with manufacturer’s recommended procedures and product application instructions, including exhaust ventilation.

.3 Negative Duct Pressurization:

.1 Throughout cleaning process, keep HVAC system and associated air ducts at negative differential pressure, relative to indoor non-work area.

.2 Maintain negative pressure differential between portion of HVAC duct system being cleaned and surrounding indoor occupant spaces.

.3 Continuously monitor and verify correct pressure differential.

.4 When performing vacuum collection, employ negative air machine drawing air from equipment being cleaned.

.5 When negative air machine is not fitted with HEPA filtration, duct exhaust air from negative air machine to outdoor location, keeping discharge air clear of outdoor air intakes, operable windows, and other locations where outdoor air enters building.

(1) Do not violate outdoor environmental standards, codes, or regulations by releasing debris.
(2) Do not discharge unfiltered air from vacuum collection devices outdoors.

.4 Microbial Agents:

.1 Apply antimicrobial agents only when active biological growth is reasonably suspected, or where unacceptable levels of biological contamination have been verified through testing.

.2 Apply antimicrobial agents after removal of surface deposits and debris.

.3 Apply antimicrobial agents in accordance with antimicrobial agent manufacturer's written recommendations and associated EPA registration listing.

3.11 FIELD QUALITY CONTROL

.1 Inspect work to verify cleanliness immediately after HVAC system component cleaning and prior to placing system in operation.

.2 Do not apply treatment, coating, or antimicrobial agent to cleaned HVAC system components until the work has been inspected and determined to be acceptable.

.3 Visual Inspection:

.1 When cleaning is complete, perform final inspection in presence of Owner and Consultant.

.2 Perform visual inspection of porous and non-porous HVAC system component surfaces. Verify HVAC system components are visibly clean as defined in ACR, The NADCA Standard.

.3 If no contaminants are evident through visual inspection, HVAC system components are considered clean and acceptable.

.4 If contaminants are evident through visual inspection, repeat cleaning system areas where contaminants are visible.

(1) Notify Owner and Consultant to schedule cleanliness re-inspection.

.4 Surface Comparison Test for Porous Surfaces Only:

.1 If visual inspection of porous surfaces is inconclusive or disputed, then perform Surface Comparison Test in accordance with ACR, The NADCA Standard.

(1) Attach vacuum brush to operating contact vacuum.
(2) Employ contact vacuum with HEPA-filtered discharge, capable of achieving minimum 20 kPa (80 in. w.g.) static lift and fitted with 65 mm (2.5 in.) diameter round nylon brush attached to 40 mm (1.5 in.) diameter vacuum hose.
(3) Pass brush over surface test area four times.
(4) Visually compare tested and untested surfaces to determine whether visible surface characteristics are detectable.

.2 When surface comparison test is complete, HVAC component surface is considered acceptably clean if there is no visually detectable difference between tested and untested surface characteristics.

.5 NADCA Vacuum Test for Non-Porous Surfaces Only:

.1 When required, perform Vacuum Test in presence of Owner and Consultant, and in accordance with ACR, The NADCA Standard.

.2 Apply NADCA Vacuum Test template to ducted airside of component's surface.

.3 Attach closed-face vacuum cassette with filter media to calibrated air sampling pump and pass closed-face of filter cassette over two 2 cm x 25 cm (3/4 in. x 10 in.) openings marked on template.

.4 The cassette shall be moved at a rate not greater than 5 cm per second (5 seconds per slot in each direction).When sampling is complete, prepare filter cassette and weigh it to determine total amount of debris collected.

.5 Surface is considered acceptably clean, when net weight of debris collected on filter cassette is less than 0.75 mg/100 cm^2.

3.12 SYSTEM STARTUP

.1 Install closures over services access openings before allowing system restart for normal facility operation.

.2 When system is placed in operation, remove temporary filter elements after minimum 24 hours operation.

3.13 DISPOSAL OF JOB SITE DUCT CLEANING WASTE

.1 Seal HVAC system debris and removed contaminated materials in containers before removal from work area.

.2 Handle materials classified as hazardous by governmental agencies in accordance with applicable federal, state, and local, regulations and codes.

.3 Dispose of debris removed from HVAC systemin accordance with applicable federal, state, and local requirements.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Provide duct system dampers and accessories

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 23 31 05 – Standard Ductwork

.2 Section 23 31 07 – Ductwork Cleaning

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 American National Standards Institute (ANSI):

.1 ANSI/SMACNA HVAC Duct Construction Standards- Metal and Flexible

.2 American Society of Testing and Materials (ASTM):

.1 ASTM A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Coated (Galvannealed) by the Hot-Dip Process

.3 Underwriters Laboratories Canada (ULC):

.1 CAN/ULC-S110, Standard Methods of Test for Air Ducts

.2 CAN/ULC-S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.4 National Fire Protection Association (NFPA):

.1 NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilation Systems

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

.3 Test and Evaluation Reports:

.1 Combination Fire/Smoke Damper test report and fire alarm verification report.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers listed throughout Part 2 are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

.1 Round To Rectangular Duct Connections:

.1 Galvanized steel, flared, flanged or notched as required, "SPIN-IN" type round duct take-off collars with locking dampers in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.

.2 Splitter Dampers:

.1 Minimum #20 gauge damper blade constructed of the same material as the duct, reinforced as required to suit blade size, system velocity, and to prevent "chatter", and complete with operating hardware equal to Dyn Air Inc. #Q-50 "DYN-A-QUAD S-S" quadrant regulator with RW-50 backup washers to prevent leakage, long square bearing pin, and slide pin.

.3 Air Turning Vanes:

.1 For square elbows - multiple-radius turning vanes, interconnected with bars, adequately reinforced to suit the pressure and velocity of the system, constructed of the same material as the duct they are associated with, and in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.

.2 For short branch ducts at grille and diffuser connections - air extractor type, each equipped with a matching bottom operated 90º opposed blade volume control damper, constructed of the same material as the duct it is associated with and in accordance with requirements and details in ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.

.4 Manual Balancing (Volume) Dampers:

.1 Flanged and drilled, low leakage, single or parallel blade (depending on damper size) manual balancing dampers with AMCA certified maximum leakage through a 1.2 m x 1.2 m (4' x 4') damper of 52 L/s/m^2 (110 ft^3/min) against 1 kPa (0.145 psi) differential static pressure, each constructed of the same material as the connecting ductwork unless otherwise specified, each designed to maintain the internal free area of the connecting duct, and each complete with:

.1 Rectangular dampers: such as a Nailor Industries Inc. Model 1010 and 1020 damper, maximum size 1.2 m x 1.2 m (4' x 4') for a single damper and complete with:

.1 #16 gauge hat channel frame with reinforced corners and #16 gauge blades, galvanized steel for galvanized steel ductwork, Type 304 stainless steel for other ductwork unless otherwise specified.

.2 Dual durometer bulb type extruded PVC blade seals, and compression type cambered metal jamb seals.

.3 A hexagonal or square shaft extension through the frame.

.4 Non-stick, non-corrosive synthetic bearings for rectangular dampers, flange stainless steel bearings for round dampers, with an outboard support bearing and outboard support bearing bracket.

.5 Blade stops for single blade dampers, designed to prevent the blade from moving more than 90°.

.6 Plated steel linkage for multiple blade dampers, totally enclosed within the frame and out of the airstream.

.7 A locking hand quadrant damper operator with, for insulated ducts 50 mm standoff mounting.

.2 Round dampers: such as a Nailor Industries Inc. Model 1090 butterfly style damper, maximum 600 mm (24") diameter, equipped with:

.1 A #20 gauge frame with stiffening beads.

.2 2 #20 gauge blades laminated together, equivalent to #14 gauge, 90º rotation, with open/close end stops and a cross-linked polyethylene blade steel.

.3 12 mm (½") diameter drive shaft bolted to the blade and extended approximately 100 mm (6") beyond the frame.

.4 "Celcon" or equal bearings.

.5 A locking hand quadrant damper operator with, for insulated ducts 50 mm standoff mounting.

.2 Multiple Damper Section Assembly: An assembly supplied with the dampers or site constructed of the same material as the damper and designed for tight and secure mounting of the individual dampers.

.3 Acceptable manufacturers are:

.1 Nailor Industries Inc.

.2 T.A. Morrison & Co. Inc. "TAMCO"

.3 NCA Manufacturing Ltd.

.4 Greenheck Fan Corp.

.5 Ruskin Co.

.5 Backdraft Dampers:

.1 Counterbalanced backdraft dampers such as a T. A. Morrison & Co. Inc. "TAMCO" Series 7000, sized as shown and complete with:

.1 Extruded aluminium frame and blades, with captive extruded silicone blade and frame seals.

.2 Hard aluminum alloy crank arms, pivot rods, and linkage rod located out of the airstream.

.3 Maintenance free bearing system with an aluminum pivot point rotating in a "Celcon" or equal bearing.

.2 Acceptable manufacturers are:

.1 T.A. Morrison & Co. Inc. "TAMCO"

.2 Nailor Industries Inc.

.3 NCA Manufacturing Ltd.

.4 Greenheck Fan Corp.

.5 Ruskin Co.

.6 Fusible Link Dampers:

.1 Curtain blade type, dynamic, galvanized steel (unless otherwise specified) fusible link dampers, ULC classified to Standard CAN/ULC-S112 and in accordance with NFPA 90A requirements, factory tested for closure under airflow, 1 1/2 hour or 3 hour rated as required, and complete with:

.1 A constant force type 301 stainless steel closure spring.

.2 A blade lock assembly.

.3 A steel sleeve.

.4 Retaining angles.

.5 Unless otherwise specified, a 74°C (165°F) rated standard fusible link.

.2 Fusible link dampers are to be Type "B" or Type "C" (as required) with the folded curtain blade out of the air stream except where damper size or location requires the use of type "A" dampers with the curtain blade in the air stream.

.3 Fusible link dampers in ductwork other than galvanized steel are to be as specified above but constructed of Type 316 stainless steel.

.4 Acceptable fusible link damper manufacturers are:

.1 Nailor Industries Inc.

.2 Greenheck Fan Corp.

.3 Pottorff

.4 Ruskin Co.

.7 Combination Fire/Smoke Dampers:

.1 Multi-blade type, fail-safe, dynamic, galvanized steel (unless otherwise specified) combination fire/smoke dampers, ULC classified to Standard CAN/ULC-S112, 1 1/2 hour fire rated, leakage Class I smoke rated, normally closed, low pressure drop design, dynamically tested, type "B" or "C" as required, each complete with:

.1 Jamb and blade seals.

.2 Linkage concealed in the frame.

.3 A steel sleeve to suit the fire barrier opening.

.4 An electronic fusible link to close and lock the damper without disengaging the actuator.

.5 An electric 115 volt actuator to automatically close the damper upon receiving an external signal, and to automatically open the damper when the system is reset.

.2 Acceptable combination fire/smoke dampers are:

.1 Nailor Industries Inc.

.2 Greenheck Fan Corp.

.3 Pottorff

.4 Ruskin Co.

.8 Flexible Connection Material:

.1 Waterproof, indoor-outdoor type flexible connection material meeting requirements of NFPA 90A, consisting of woven glass fibre fabric coated on both sides with synthetic rubber. Acceptable products are:

.1 Duro Dyne Canada Inc. "DUROLON"

.2 Dyn Air Inc. "HYPALON"

.9 Duct Access Doors:

.1 In accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, with sizes suitable in all respects for the purpose for which they are provided, and, unless otherwise specified, constructed of the same material as the duct they are associated with.

.10 Ductwork Drain Points:

.1 Equal to Ductmate Canada Ltd. "DUCTMATE MOISTURE DRAIN", 20 mm (¾") diameter moisture drains with galvanized sheet metal funnel, and chrome plated brass threaded drain, nut and cap.

.11 Instrument Test Ports:

.1 Equal to Duro-Dyne of Canada Ltd. #IP1 or #IP2 (to suit insulation thickness where applicable) gasketed, leak-proof instrument test ports for round or rectangular ducts as required, each complete with a neoprene expansion plug and a plug securing chain.

.12 Wire Mesh (Bird Screen):

.1 Heavy-gauge galvanized steel or aluminum mesh, 12 mm x 12 mm (½" x ½") secured in a rigid galvanized steel or aluminum framework, sized as indicated on the drawings, and constructed so as to be removable.

3 EXECUTION

3.1 INSTALLATION

.1 Installation Of Round To Rectangular Duct Connections:

.1 Cut round holes in rectangular ducts using a purpose made hole cutter and provide round to rectangular “Spin-In fittings with dampers for connection of flexible round ductwork. Seal the cut duct around the fitting.

.2 Installation Of Splitter Dampers:

.1 Provide splitter dampers in supply ductwork at branch duct connections off supply air mains, and wherever else shown and/or specified on the drawings. Install splitter dampers so they cannot vibrate and rattle and so that the damper operation mechanisms are in an easily accessible and operable location. Ensure that operators for dampers in insulated ducts are equipped with stand-off mounting brackets.

.3 Installation Of Turning Vanes:

.1 Provide turning vanes in ductwork elbows where shown on the drawings and wherever else required where, due to site installation routing and duct elbow radius, turning vanes are recommended in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.

.2 Provide volume extractor type turning vanes in short branch supply duct connections off mains to grilles and diffusers where shown and/or specified.

.4 Installation Of Manual Balancing (Volume) Dampers:

.1 Provide manual balancing dampers in all open end ductwork, in all duct mains, and wherever else shown and/or specified.

.2 Install the dampers so that the operating mechanism is accessible and positioned for easy operation, and so that the dampers cannot move or rattle. Ensure that operating mechanisms for dampers in insulated ducts are complete with stand-off mounting brackets.

.3 Dampers in fresh air ducts, exterior wall/roof openings, etc., are to be insulated type.

.4 Where a duct for which a balancing damper is required has dimensions larger than the dimensions of the maximum size volume damper available, provide multiple dampers bolted together in a properly sized assembly, or bolted to a heavy-gauge black structural steel angle or channel framework which is properly sized. Seal to prevent air by-pass, and provide connecting linkage.

.5 Confirm exact damper locations with personnel doing air quantity balancing testing work and install dampers to suit. Include for providing five additional dampers at no additional cost.

.5 Installation Of Backdraft Dampers:

.1 Provide backdraft dampers where shown.

.2 Install and secure the dampers so that they cannot move or rattle.

.6 Installation Of Fusible Link Dampers:

.1 Provide fusible link dampers where shown and/or specified on the drawings. Ensure that the damper rating (1½ or 3 hr.) is suitable for the fire barrier it is associated with.

.2 Install dampers with retaining angles on all 4 sides of the sleeve on both sides of the damper and connect with ductwork in accordance with the damper manufacturer’s instructions and details to meet Code requirements.

.3 Provide expansion clearance between the damper or damper sleeve and the opening in which the damper is required. Ensure that the openings are properly sized and located, and that all voids between the damper sleeve and the opening are properly sealed to maintain the rating of the fire barrier.

.4 Where the size of the fire barrier opening requires the use of a sectionalized fire damper assembly, provide multiple fusible link dampers (sized to CAN/ULC - S112) bolted together in a properly sized assembly or bolted to a heavy-gauge black structural steel angle or channel framework.

.7 Installation Of Combination Fire/Smoke Dampers:

.1 Provide combination fire/smoke dampers where shown and/or specified on the drawings. Install dampers with retaining angles on all four sides of each side of the damper, and, where required, connect with ductwork, all in accordance with the damper manufacturer’s instructions and details, and Code requirements.

.2 Coordinate damper installation with the electrical work where electrical connections to damper actuators are specified.

.8 Installation Of Flexible Connection Material:

.1 Provide a minimum of 100 mm (4") of flexible connection material where ducts, plenums, and/or casings connect to fans, and wherever else shown or specified.

.2 Rigidly secure a minimum of 75 mm (3") of duct material (minimum #24 gauge) to each edge of the flexible fabric and to the fan, duct, plenum, etc., in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible. Ensure that connections to the flexible fabric material are arranged and supported so as to not impose any external forces on the fabric.

.9 Installation Of Duct Access Doors:

.1 Provide access doors in ductwork for access to all components which will or may need maintenance and/or repair, including reheat coils. Install in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.

.2 Identify access doors provided for fusible link damper maintenance with "FLD" stencil painted or marker type red lettering and ensure that the doors are properly located for damper maintenance.

.3 When requested, submit a sample of proposed duct access doors for review.

.4 Where sectionalized fusible link dampers and/or balancing dampers are provided in large ducts, provide a plenum type access door to suit, and adequately reinforce the ductwork to suit the access door installed.

.10 Installation Of Instruments Test Ports:

.1 Provide instrument test ports in all main ducts at connections to fans, plenums or casings, in all larger branch duct connections to mains, and wherever else required for proper air quantity balancing and testing.

.2 Locate test ports where recommended by personnel performing air quantity testing and balancing work.

.11 Installation Of Wire Mesh (Bird Screen) :

.1 Provide framed, removable wire mesh panels over openings in ducts and/or walls where shown and/or specified on the drawings. Rigidly secure in place but ensure the panels are removable.

.2 Provide wire mesh panels for open-end return air ducts in ceiling spaces whether shown on the drawings or not.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Provide centrifugal inline fans

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 23 31 05 – Standard Ductwork

.2 Section 23 33 00 – Duct System Dampers and Accessories

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 American National Standards Institute (ANSI):

.1 ANSI/AMCA Standard 210, Laboratory Method of Testing Fans for Certified Aerodynamic Performance Rating

.2 ANSI/AMCA Standard 300, Reverberant Room Method for Sound Testing of Fans

.2 Air Movement and Control Association (AMCA):

.1 AMCA Standard 211, Product Rating Manual for Fan Air Performance

.2 AMCA Standard 311, Product Rating Manual for Fan Sound Performance

.3 AMCA Standard 99-2408, Operating Limits for Centrifugal Fans

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Twin City Fan and Blower Co.

.2 Loren Cook Co.

.3 Greenheck Fan Corp.

.4 JencoFan

.5 Carnes Company Inc.

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

.1 Centrifugal Inline Fans:

.1 Centrifugal, ULC listed, factory run tested rectangular inline fans as per the drawing schedule.

.2 Housing: Heavy-gauge galvanized steel with removable side panels to permit removal of the power assembly without disturbing duct connections, universal mounting brackets and hardware including spring vibration isolators to accommodate horizontal or vertical mounting as required, a flanged inlet panel with inlet venturi, a flanged outlet panel, both with duct connection collars, and galvanized steel wire grid fan inlet/outlet guard(s).

.3 Fan Wheel: Non-overloading aluminium wheel with backward inclined blades with matching inlet venturi, statically and dynamically balanced as an assembly.

.4 Motor and Disconnect Switch: TEFC motor conforming to requirements specified in the mechanical work Section entitled Basic Mechanical Materials and Methods, mounted out of the airstream, complete with a cover, and factory prewired to a NEMA 4 disconnect switch.

.5 Accessories: For fans as scheduled, factory supplied accessories as follows:

.1 For fans as scheduled, housing insulation (lining), consisting of neoprene spray coated glass fibre semi-rigid insulation meeting NFPA 90A requirements and 25/50 smoke developed/flame spread requirements of CAN/ULC S102, permanently secured in place with no exposed edges.

.2 For fans as scheduled, a galvanized steel filter box with frame suitable for 25 mm (2") thick MERV 7 disposable panel type filters.

3 EXECUTION

3.1 INSTALLATION

.1 Installation Of Centrifugal Inline Fans:

.1 Provide inline centrifugal fans where shown.

.2 Secure each fan in place from the structure with vibration isolation, either horizontally or vertically as indicated, independent of connecting ductwork and in accordance with the fan manufacturer's published instructions.

.3 Ensure that duct connections are made using flexible connection material.

.4 Equipment and System Manufacturer's Certification: Refer to the article entitled Equipment and System Manufacturer's Certification in the Mechanical Work General Instructions Section.

.5 Start-Up: Refer to the article entitled Equipment and System Start-up in the Mechanical Work General Instructions Section.

.6 Commissioning: Refer to commissioning requirements specified in the Mechanical Work General Instructions Section.

.7 Demonstration and Training: Refer to the article entitled Equipment and System O & M Demonstration & Training in the Mechanical Work General Instructions Section. Include for 4 hours of on-site operation demonstration and training for 2 groups of 6 people.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Provide grilles and diffusers

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 23 31 05 – Standard Ductwork

.2 Section 23 33 00 – Duct System Dampers and Accessories

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 American National Standards Institute (ANSI):

.1 ANSI/ASHRAE Standard 70, Method of Testing the Performance of Air Outlets and Air Inlets

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Price Industries Inc.

.2 Krueger Division of Air System Components Inc.

.3 Titus HVAC

.4 Nailor Industries Inc.

.5 Metalaire

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

.1 Grilles And Diffusers:

.1 Grilles and diffusers of the type, size, capacity, finish, and arrangement as shown on the drawings and as per the drawing schedule, each equipped with all required mounting and connection accessories to suit the mounting location and application.

.2 For all hard ceiling applications (architectural wooden slats and drywall), provide remote cable operated volume dampers accessible through the air device. Coordinate with all requirements of the section entitled “Duct System Dampers and Accessories”.

3 EXECUTION

3.1 INSTALLATION

.1 Installation Of Grilles And Diffusers:

.1 Provide grilles and diffusers where shown on the drawings. Wherever possible, grilles and diffusers are to be the product of one manufacturer.

.2 Unless otherwise specified connect grilles and diffusers in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.

.3 Exactly locate grilles and diffusers to conform to the final architectural reflected ceiling plans and detailed wall elevations, and to conform to the final lighting arrangement, ceiling layout, ornamental and other wall treatment.

.4 Equip supply diffusers having a basic four-way or all round air pattern for operation in one, two, or three way pattern where indicated on the drawings.

.5 Provide sheet metal plenums, constructed of the same material as the connecting duct, for linear grilles and/or diffusers where shown. Construct and install the plenums in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible. Where individual sections of linear grilles or diffusers are not equipped with a volume control device, equip the duct connection collar(s) with volume control device(s).

.6 Where linear type diffusers/grilles are installed in suspended T-bar ceilings, clip the diffusers/grilles in place using clip supplied by the diffuser/grille manufacturer.

.7 Confirm grille and diffuser finishes prior to ordering.

.8 Bolt grilles, registers, and diffusers in place in floor applications or areas where the grille, register and diffuser may be subject to damage.

.9 For all hard ceiling applications (architectural wooden slats and drywall), provide remote cable operated volume dampers accessible through the air device. Coordinate with all requirements of the section entitled “Duct System Dampers and Accessories”.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Provide air filters and accessories

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 23 31 05 – Standard Ductwork

.2 Section 23 33 00 – Duct System Dampers and Accessories

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 Canadian Standards Association (CSA):

.1 CAN/ULC-S111, Standard Method of Fire Tests for Air Filter Units

.2 American National Standards Institute (ANSI):

.1 ANSI/ASHRAE Standard 52-2, Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Sizes

.2 ANSI/AHRI Standard 850-I-P, Performance Rating of Commercial and Industrial Air Filter Equipment

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Air Filters:

.1 AAF International

.2 Camfil Farr Inc.

.3 Modern Air Filter Corp.

.2 General Filter Inc.

.2 Filter Gauges:

.1 Dwyer Instrument Inc.

.2 General Air Filter

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

.1 General:

.1 Unless otherwise specified or noted, filters are to be synthetic and/or glass fibre disposable media type in accordance with the drawing schedule(s).

.2 Minimum Efficiency Reporting Values (MERV) ratings are to be as per ASHRAE Standard 52.2.

.2 Construction Filters:

.1 Roll type, disposable, MERV 7 to 9 woven glass fibre media.

3 EXECUTION

3.1 INSTALLATION

.1 Installation Of Construction Filters:

.1 Provide roll type medium efficiency disposable media filter(s) across the entire filter bank of each supply air handling unit, either at the factory where the fan is produced or at the site as soon as the fan is installed. Secure the media in place so it will not be dislodged by fan operation. Replace the roll media periodically if it becomes loaded and clogged prior to time for removal.

.2 For exhaust systems, secure the filter media across exhaust air openings and ductwork to prevent construction dirt and dust from fouling the fan

.3 Leave the media in place until fan start-up, at which time remove and dispose of the construction media.

.2 Installation Of Air Filters:

.1 Provide all required filter media when fan equipment is ready for start-up and performance testing. Provide any required filter framing/racks.

.2 Prior to Substantial Performance supply a complete spare set of filter media in original packaging and clearly identified as to the applicable system for each air handling system with filters. Store the filters at the site where directed by the Owner.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Provide radiation units

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 23 21 13 – Hydronic Piping and Valves

.2 Section 23 21 16 – Hydronic Piping Specialties

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 Canadian Standards Association (CSA):

.1 CSA-B214, Installation Code for Hydronic Heating Systems

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

2 PRODUCTS

2.1 OWNER FURNISHED PRODUCTS

.1 Existing products:

.1 Scope 1 perimeter radiation units.

2.2 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable radiation unit manufacturers are:

.1 Mestek Inc. “Sterling”

.2 Sigma Corp.

.3 Runtal North America Inc.

.4 Siwa HVAC Corp.

.5 Stelrad (Express Radiant Ltd.)

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.3 MATERIALS

.1 Flat Tube Radiant/Convective Panel Radiation:

.1 Hot water flat tube panel type radiation units with corrugated steel fins of the capacities and dimensions as indicated on the drawings. Heating capacities and dimensions are based on 50° C (120° F) average entering water temperature at a velocity of 0.0762 m/s (0.25 ft/sec) with 18° C (65° F) entering air temperature. Note that the existing heating system to remain operates at higher temperature and shall be balanced to existing flows.

.2 Each assembly is to be factory tested and individually wrapped, and complete with:

.1 All welded flattened steel tube panels welded to headers at each end. Welded to the inside of each panel shall be steel corrugated fins to increase the convective output of the radiator. The fins shall start at no less than 3” from the end of the radiator and shall have no less than 32 fins per foot. Headers shall include all necessary inlet, outlet and vent connections as required. Internal baffling is provided where required for proper water flow.

.2 Finished panels on the backside for applications visible from the outside (floor to ceiling glass).

.3 Tapered thread design pipe connections sized as shown, and a 3.2 mm (⅛") diameter air vent tapping. Same or opposite end piping connections to suit the existing piping distribution site verified by the contractor.

.4 All required ribbed pipe cover trims and pedestal floor posts.

.5 A powder coated finish with a colour as selected from the manufacturer’s custom colour range.

3 EXECUTION

3.1 INSTALLATION

.1 Installation Of Flat Tube Radiant/Convective Panel Radiation:

.1 Provide flat tube panel type radiation where shown.

.2 Secure each assembly in place in accordance with the manufacturer’s instructions and details. Provide all required pipe trims and pedestals.

.3 Provide radiator type valves in piping at each panel or group of series connected panels, shut-off type in supply piping, balancing type in return piping.

.4 Equip each panel or group of series connected panels with a manual air vent.

.5 Ensure that all valves are located behind removable panel trim pieces, unless otherwise indicated.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Provide fan coil units

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 23 21 13 – Hydronic Piping and Valves

.2 Section 23 21 16 – Hydronic Piping Specialties

.3 Section 23 21 23 – Hydronic Pumps

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 Canadian Standards Association (CSA):

.1 CAN/CSA-C22.2 No. 236, Heating and Cooling Equipment

.2 Underwriters Laboratories (UL):

.1 UL/ANSI 1995, Heating and Cooling Equipment

.3 Air Conditioning, Heating, and Refrigeration Institute (AHRI):

.1 ARI Standard 350, Sound Rating of Non-Ducted Indoor Air-Conditioning Equipment

.2 ARI Standard 440, Performance Rating of Room Fan-Coils

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

2 PRODUCTS

2.1 OWNER FURNISHED PRODUCTS

.1 Existing products:

.1 Scope 5 fan coil unit FC-9A

2.2 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Johnson Controls Co. “Enviro-Tec”

.2 Trane Canada

.3 Daikin

.4 First Co.

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.3 MATERIALS

.1 Fan Coil Units:

.1 ARI rated and certified capacity fan coil units as per the drawing schedule and complete with components specified below.

.2 Cabinet Construction: Heavy-gauge galvanized steel construction with all exterior panels insulated with minimum 15 mm (½") thick neoprene spray coated glass fibre lining material secured in place with adhesive and with all exposed edges treated and sealed to prevent any fibres from entering the airstream, all meeting NFPA 90A requirements and flame spread and smoke developed fire hazard ratings of CAN/ULC-S102. Each cabinet is to be complete with:

.1 Filters: an accessible galvanized steel filter holding frame and glass fibre, 25 mm (1") thick, disposable, 25-30% efficient MERV7 filters and complete with a cardboard frame.

.2 Coils: factory tested coils consisting of 12 mm (½") O.D. seamless copper tubes mechanically expanded into plate type aluminium fins and equipped with copper pipe headers, a manual air vent, and a drain plug.

.3 Cooling coil drain pans: full width, watertight stainless steel primary drain pans sloped for positive drainage and equipped with two 20 mm (¾") O.D. drain connections, and factory insulated with 25/50 rated closed cell insulation conforming to CAN/ULC-S102 and NFPA 90A requirements, with secondary drain pans, constructed and insulated as for primary drain pans, to be provided where required to collect condensate from pipe headers and field supplied valves.

.3 Fans: Centrifugal, forward curved, double width and inlet galvanized steel fan wheel, each dynamically balanced, complete with a 3-speed, resiliently mounted, thermal overload protected, direct drive electronically commutated motor (ECM) conforming to requirements specified in the Basic Mechanical Materials and Methods Section, and complete with a 3-speed plus "off" motor control switch with faceplate factory mounted in an electrical box which is secured to the unit in an accessible location and factory connected to the motor. Fan assemblies are to be accessible and easily removable.

.4 Horizontal Units: Horizontal units are to be suspended, equipped with four top casing holes for hanger rod connections, and the following:

.1 Rubber-in-shear vibration isolation elements factory supplied with each unit for each suspension point.

.2 A double deflection discharge grille or flanged discharge duct connection collar as indicated, and either a bottom or rear single deflection return air grille as shown.

.3 Removable bottom and side panels, and bottom access to the filter holding frame.

.5 Vertical Units: Vertical units are to be, unless otherwise shown or specified, floor mounted on neoprene-steel-neoprene vibration isolation pads and complete with the following:

.1 A condensate drain pan "P" trap factory piped to the condensate drain riser.

.2 A shield to cover the entire fan assembly to prevent air by-pass and accidental contact with the fan.

.3 For exposed front units, a removable decorator front panel with architectural grade aluminium double deflection discharge grille and return air grille, all factory finished with heat cured acrylic powder epoxy enamel with colour as selected from the manufacturer's standard colour chart.

.6 Sound Power Levels: Fan coil sound power levels shall not exceed the below values:

UNIT TAG	**SOUND POWER (db)**								
	Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
FCU-1	Inlet	81	77	70	67	69	60	57	49
	Discharge	93	86	81	77	79	74	74	71
	Radiated	69	65	57	51	55	51	35	29
FCU-2	Inlet	75	76	65	62	63	54	52	43
	Discharge	87	85	76	72	73	68	68	64
	Radiated	63	63	52	46	49	45	29	23
FCU-3	Radiated	-	63	62	62	61	58	52	47

3 EXECUTION

3.1 INSTALLATION

.1 Installation Of Fan Coil Units:

.1 Provide all required fan coil units.

.2 Secure each horizontal fan coil unit in place from the structure by means of galvanized steel hanger rods, and vibration isolation elements supplied with the fan coil units. Provide additional structural steel for fan coil unit installation support as required.

.3 Unless otherwise shown or specified, secure each vertical fan coil unit in place on the floor, complete with vibration isolation pads supplied with the fan coil units.

.4 Provide shut-off valves and install a control valve in piping for each coil. Refer to the drawing detail and piping schematic.

.5 Equipment and System Manufacturer’s Certification: Refer to the article entitled Equipment and System Manufacturer’s Certification in the Mechanical Work General Instructions Section.

.6 Start-Up: Refer to the article entitled Equipment and System Start-up in the Mechanical Work General Instructions Section.

.7 Commissioning: Refer to commissioning requirements specified in the Mechanical Work General Instructions Section.

.8 Demonstration and Training: Refer to the article entitled Equipment and System O & M Demonstration & Training in the Mechanical Work General Instructions Section. Include for 4 hours of on-site operation demonstration and training for 2 groups of 6 people.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Provide duct-mounted hydronic heating coils

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 23 21 13 – Hydronic Piping and Valves

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 Air Conditioning, Heating, and Refrigeration Institute (AHRI):

.1 AHRI 410, Forced-Circulation Air-Cooling and Air-Heating Coils.

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Product Data:

.1 Product Data: Submit product data sheets for all products specified in Part 2 of this Section except for pipe and fittings, and chlorine.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Aerofin Canada Services Inc.

.2 Carrier Corp.

.3 Daikin Applied

.4 Greenheck Fan Corp.

.5 MultiTherm LLC

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 Comparable Products from manufacturers not listed herein may be accepted provided they meet requirements of this Specification.

.4 Single source responsibility: Obtain each type of piping specialty from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.2 MATERIALS

.1 Duct Mounted Hydronic Heating Coils:

.1 Hydronic heating coils as per the drawing schedule, single or multi-row as indicated/scheduled, each certified to AHRI Standard 410, each factory leakage tested at 2070 kPa (300 psi) under water, drainable, self-venting, and complete with:

.1 Tubes and fins: horizontal, continuous, 15.9 mm (5/8") diameter, 0.050 mm (0.020") wall thickness seamless copper tubes permanently bonded to plate or spirally wound aluminium fins and equipped with threaded female same end connections.

.2 Casing: flanged galvanized steel casing arranged to prevent air bypass around the coil and factory punched for duct connections.

.2 Where required, coils are to be manufactured as "Registered Fittings" with a Canadian Registration Number (CRN).

3 EXECUTION

3.1 INSTALLATION

.1 Installation Of Duct-Mounted Hydronic Heating Coils:

.1 Provide duct mounting heating coils in supply ductwork where shown.

.2 Secure each coil in place from the structure by means of hanger rods, independent of connecting ductwork but ready for duct connection and located for easy removal and access to the power and control panel. Where possible, reuse existing support points from structure and modify as required. Include for relocation of local ceiling services to accommodate increased size of replacement units.

.3 Connect with piping in accordance with the drawing detail.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, the General Requirements of Division 01 and Division 20.

1.2 SUMMARY

.1 Section includes: Provide a complete building automation system as further described in this Section including but not limited to the following:

.2 Products furnished/supplied but not installed under this section:

.1 Supply to Division 23 the following

.1 Control valves

.2 Control dampers

.3 Thermowells.

.3 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 23 21 13 – Hydronic Piping and Valves

.2 Section 23 22 13 – Steam and Condensate Piping and Valves

.3 Section 23 33 00 – Duct System Dampers and Accessories

1.3 REFERENCES

.1 Abbreviations used in this Specification are as follows:

.1 AI: analog input

.2 AO: analog output

.3 BAS: building automation system

.4 CPU: central processing unit

.5 DDC: direct digital controls

.6 DC: digital controller

.7 DI : digital input

.8 DO: digital output

.9 EEPROM: electronically erasable programmable read only memory

.10 Ethernet: a family of computer networking technologies commonly used in LAN’s

.11 I/O: input/output

.12 LAN: local area network

.13 LCD: liquid crystal display

.14 LED: light Emitting diode

.15 OWS: operator's workstation

.16 PC: personal computer

.17 RAM: random access memory

.18 TCP/IP: transmission control panel/internet protocol

.19 WAN: wide area network

.2 Definitions used in this Specification are as follows:

.1 Analog: a continuously variable system or value having discrete levels, and typically exists within a defined range of limiting values

.2 Binary: a 2-state system where an "ON" condition is represented by one discrete signal level and an "OFF" condition is represented by a second discrete signal level

.3 Direct Digital Control: the digital algorithms and pre-defined arrangements included in the BAS software to provide direct clos-looped control for the designated equipment and controlled variables

.4 BAS Network: the total digital on-line real-time interconnected configuration of BAS digital processing units, workstation(s), panels, sub-panels, controllers, devices, and associated elements individually known as network nodes, which may exist as one or more fully interfaced and integrated sub-networks, LAN, AN, or the like

.5 Node: a/ digitally programmable entity existing on the BAS network

.6 Protocol: a defined set of rules and standards governing the on-line exchange of data between BAS network nodes

.3 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 American National Standards Institute (ANSI):

.1 ANSI/ASHRAE Standard 135 – BACnet A Data Communications Protocol for Building Automation and Control Network

.2 ANSI/UL 2017 – Standard for General-Purpose Signaling Devices and Systems

.3 ANSI/UL 2034 – Standard for Single and Multiple Station Carbon Monoxide Alarms

.4 ANSI/UL 2075 – Standard for Gas and Vapor Detectors and Sensors

.5 ANSI/ASHRAE Standard 135 – Data Communication protocol for Building Automation and Control Systems

.6 ANSI/AMCA Standard 610 – Laboratory Methods of Testing Airflow Measurement Stations for Performance rating

.2 Canadian Standards Association (CSA):

.1 CAN/CSA C22.2 No. 24 – Temperature-Indicating and Regulating Equipment

.2 CSA C22.2 No. 24 – Temperature-Indicating and Regulating Equipment

.3 Underwriters Laboratories (UL):

.1 UL 916 – Standard for Energy Management Equipment

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with General Conditions and Section 01 33 00 – Submittals and Division 20.

.2 Shop Drawings/Product Data: Submit shop drawings/product data sheets for all BAS components. As a minimum, submit the following:

.1 BAS network architecture diagrams, including all nodes and interconnections

.2 systems schematics, sequences, and flow diagrams

.3 points schedule for each point in the BAS, including point type, object name, expanded ID, display units, controller type, and address

.4 samples of graphic display screen types and associated menus

.5 a detailed Bill of Materials for each system or application, identifying quantities, part numbers, descriptions, and optional features

.6 control damper schedules including a separate line for each damper and a column for each of the damper attributes including code number, fail position, damper type, damper operator, duct size, damper size, mounting and actuator type

.7 control valve schedules including a separate line for each valve and a column for valves as for control dampers

.8 a room schedule including a separate line for each HVAC terminal unit indicating type, location and address

.9 details of all BAS interfaces and connections to other systems

.10 product data sheets or marked catalogue pages including part number, photograph and description for all BAS hardware and software

.3 Manufacturer Reports:

.1 Site Inspection and Start-Up Report: Submit a site inspection and start-up report from the manufacturer’s representative as specified in Part 3 of this Section.

1.5 CLOSEOUT SUBMITTALS

.1 Submittals under this Section shall be in conformance with Section 01 77 00 and the Mechanical Work General Instructions Section.

.2 Record "As-Built" drawings are to include:

.1 A schematic outline of the BAS for quick reference of the overall system scope.

.2 An adequate record of the work as installed, including the locations and routing of system wiring.

.3 The Operation and Maintenance Manual is to contain:

.1 A hardware specification manual which gives a functional description of all hardware components.

.2 An operator's manual which outlines concise instructions for operation of the system and an explanation and recovery route for all system alarms.

.3 An engineering manual which outlines and defines system set-up, definition and application.

.4 A data manual which indicates the applications data programmed into the system.

.5 System software documentation.

1.6 QUALITY ASSURANCE

.1 All BAS components and associated enclosures and hardware must be suitable in all respects for the installation location and application.

.2 The BAS hardware and software is to be installed by experienced personnel employed and trained by the system equipment manufacturer/supplier. All system wiring is to be installed by journeyman electricians or under direct on-site supervision of journeyman electricians.

.3 The BAS supplier/installer is to have a branch facility with parts within a 100 km radius of the building and have available complete maintenance and support services on a 24 hour, 7 day-a-week basis.

.4 All network controllers are to include a lifetime license for free software upgrades.

.5 Codes and Standards: BAS work is to be in accordance with requirements of all applicable Codes and Standards.

2 PRODUCTS

2.1 OWNER FURNISHED PRODUCTS

.1 Existing products:

.1 Existing Siemens BAS

2.2 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Siemens Building Technologies Inc.

.2 Requests for substitutions shall be made in conformance with Section 01 25 00 – Substitution Procedures.

.3 Substitution Limitations:

.1 No further substitutions will be permitted.

.4 Single source responsibility: Obtain each type of sensor, valve, and control actuator from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work. Products installed as part of the Work of this Section shall be from the same production run including all extra stock materials.

2.3 DESCRIPTION

.1 The building automation system is to be a seamless expansion of the existing Siemens BAS, consisting of a modular, BACnet protocol, open architecture system incorporating direct digital control and monitoring of equipment and systems and consisting of all hardware and software required for the complete system.

.2 The BAS is to be accessible through standard personal computers within the building through a wireless application protocol device, or remotely through the Internet by means of a standard web browser.

.3 The BAS is to be field expandable, with an architectural design to eliminate dependence upon any single device for alarm reporting and control execution. Failure of any single component or network connection is not to interrupt the execution of control strategies at other operational devices.

.4 The BAS is to maintain all settings and overrides through a system re-boot, and is to incorporate, as a minimum, the following integrated features, functions and services:

.1 operator information, alarm management, and control features

.2 enterprise-level information and control access

.3 information management including monitoring, transmission, archiving, retrieval, and reporting functions

.4 diagnostic monitoring and reporting of BAS functions

.5 off-site monitoring and management access

.6 energy management

.7 standard applications for terminal HVAC systems

.8 fault detection and diagnostics software

.9 The BAS is to include, but not be limited to, the following:

.10 a personal computer based operator work station with colour monitor for colour graphic displays, and a colour printer

.11 standalone network automation engine(s)

.12 field equipment controllers

.13 input/output modules

.14 local display devices

.15 distributed user interfaces

.16 network processing, data storage and communication equipment

.17 all other components required for a complete and operating BAS

2.4 MATERIALS

.1 General RE: Building Automation System:

.1 Control System Components: Control system components (field devices) other than those specified in this Section are generally specified in the mechanical work Section entitled Automatic Control Systems. Components factory installed with equipment or supplied with equipment are specified in mechanical work Sections with the equipment.

.2 BAS Architecture:

.1 Automation Network: The BAS is to be based on a PC industry standard of Ethernet TCP/IP. Where used, LAN controller cards are to be standard "off-the-shelf" products available through normal PC vendor channels. The BAS is to be capable of operating at a communication speed of 100 Mbps, with full peer-to-peer network communication. The BAS is to be compatible with other enterprise-wide networks, and where indicated, the BAS is to be connected to the enterprise network and share resources with it by way of standard networking devices and practices.

.2 Control Network: Network automation engines are to provide supervisory control over the control network and are to support the BACnet Standard MS/TP bus communication protocol (ASHRAE SSPC-135, Clause 9). The control networks are to provide either a "peer-to-peer", master-slave, or supervised token passing communications and are to operate at a minimum communication speed of 9600 baud. DDC controllers are to reside on the control network.

.3 Integration: The BAS is to include appropriate hardware and software to allow BACnet bi-directional data communications between the BAS and building equipment/system control panels. The BAS is to receive, react to, and return information from the equipment and systems. All data required by the application is to be mapped into the automation engine’s data base and is to be transparent to the operator. Point inputs and outputs from building equipment/system control panels is to have real-time inter-operability with BAS software features such as control software, energy management, custom process programming, alarm management, historical data and trend analysis, totalization, and local area network communications.

.3 Control Valves And Operators:

.1 General RE: Valves: Unless otherwise specified, valves are to generally conform to requirements specified in the appropriate mechanical work piping and valve specification sections, and are to be in accordance with the following requirements:

.1 Each control valve must be suitable in all respects for the application, including system temperature and pressure.

.2 Valve design output and flow rates with maximum pressure drops are to be as follows:

.1 Chilled water valves for coils: 28 kPa (4 psi).

.2 Heating water/glycol solution valves for coils: 17.5 kPa (2.5 psi).

.3 Heating water valves for radiation units: 7 kPa (1 psi).

.3 Unless otherwise indicated, control valves for proportional operation are to have equal percentage characteristics, and control valves for open/shut 2 position operation are to have straight line flow characteristics.

.4 All valves are to have position indicators.

.5 Heating valves are to be normally open unless otherwise specified/required.

.6 Cooling valves are to be normally closed unless otherwise specified/required.

.2 Operators: Electronic, direct coupling design, spring return type for fail safe operation, sized for the torque required to tightly shut the control valves against differentials imposed by the system, equipped with position indicators, enclosures suitable in all respects for the environment in which they are located, and the following:

.1 Double insulated construction requiring no ground connection.

.2 Factory installed colour coded and numbered wiring leads for site connection.

.3 Reversible mounting for either clockwise or counter-clockwise operation.

.4 Capable of being mechanically or electrically paralleled where required.

.5 Overload protected dc motor, microprocessor controlled brushless type for modulating control, brush type for on-off control.

.4 Control Dampers And Operators:

.1 Dampers: Flanged,100 mm (4') deep, AMCA low leakage certified aluminium dampers, parallel blade type for modulating and mixing applications, opposed blade type for open-shut service, and additional requirements as follows:

.1 Maximum blade length is to be 1 m (4'), and dampers greater than 2 sections wide are to be complete with a jackshaft.

.2 Extruded 6063T5 aluminum frame and airfoil blades, each with an integral slot to receive a gasket.

.3 Extruded TPE frame gaskets and extruded EPDM blade gaskets.

.4 Slip-proof aluminium and corrosion resistant plated steel linkage of a metal thickness to prevent warping or bending during damper operation, concealed in the frame, equipped with seal-sealing and self-lubricating bearings consisting of a Celcon inner bearing fixed on the hexagonal blade pin and rotating in a polycarbonate outer bearing inserted in the frame.

.5 For cold service dampers such as fresh air intakes and exhaust air applications, above but with all 4 sides of the frame insulated with polystyrene, and the blades thermally broken and insulated with expanded polyurethane foam.

.6 For use where the duct/plenum/casing material is not galvanized steel or aluminium, as above but constructed of type 316 stainless steel and equipped with Teflon blade bearings.

.2 Electronic Damper Operators: Damper shaft mounted, spring return, fail safe in the normally open or normally closed position, sized to control the damper against maximum pressure or dynamic closing pressure, whichever is greater, to suit the sizes of dampers involved, and to provide sufficient force to maintain the damper rated leakage characteristics. Each operator is to be complete with:

.1 A damper position indicator.

.2 External adjustable stops to limit the length of stroke in either direction.

.3 A corrosion resistant adjustable mounting bracket.

.4 Operating arms with double yoke linkages and double set screws for fastening to the damper shaft.

.5 Double insulated construction requiring no ground connection.

.6 Factory installed colour coded and numbered wiring leads for site connection.

.7 Reversible mounting for either clockwise or counter-clockwise operation.

.8 Capable of being mechanically or electrically paralleled where required.

.9 Overload protected DC motor, microprocessor controlled brushless type for modulating control, brush type for on-off control.

.10 For operators for dampers to be connected to the building fire alarm system or to freeze protection devices, additional relays to permit the dampers to respond and go to the required position in less than 15 seconds upon receipt of a signal.

.11 Enclosures suitable in all respects for the environment in which they are located.

.5 Sensors And Transmitters:

.1 Sensors and transmitters must be suitable in all respects for the application and mounting location. Devices are to be as follows:

.2 General Re: Temperature Sensors: Resistance type, either two-wire 1000 ohm nickel RTD or two-wire 1000 ohm platinum RTD, equipped with type 316 stainless steel thermowells with CRN for pipe mounting applications, and with accuracy values (includes errors associated with the sensor, lead wire, and A to D conversion), as follows:

.1 Chilled water, room temperature, and duct temperature points, ±1° C (± 0.5° F).

.2 All other points, ± 0.75° C (± 1.3° F).

.3 Room Temperature Sensors: Constructed for surface or recessed wall box mounting, 24 volt, and complete with the following capabilities

.1 An integral LCD display and either a set-point adjustment dial or set-point adjustment pushbuttons.

.2 Display of room temperature.

.3 Display and adjust room comfort set-point

.4 Display and adjust fan operation status via push button.

.5 Override request via Occupancy Override pushbutton with LED status for activation of after-hours operation.

.6 Toggle pushbutton for either °F or °C temperature indication.

.7 Toggle pushbutton for % RH temporary display.

.4 Outside Air Sensors: Designed and constructed for ambient temperatures and to withstand the environmental conditions to which they are exposed, complete with:

.1 A NEMA/EEMAC 3R enclosure, and a solar shield.

.2 A perforated plate surrounding the sensor element where exposed to wind velocity pressure.

.3 A mounting bracket and hardware to suit the mounting location.

.4 For relative humidity, 0 to 100% full range accurate measurement.

.5 Duct/Plenum Mounting Sensors: Insertion type with lock nut and mounting plate, designed to mount in an electrical box (weather-proof with gasket and cover where outside) through a hole in the duct/plenum, and easily accessible for repair or replacement.

.6 Duct/Plenum Averaging Sensors: For ducts greater than 1.2 m (4') or for ducts where air temperature stratification occurs, averaging type sensors with multiple sensing points, and for plenums for applications such as mixed air temperature measurement to account for air turbulence and/or stratification, a continuous averaging sensor or a string of sensors with a minimum of 4 sensing points per 3.65 m (12’), and capillary supports on the sides of the duct/plenum.

.7 Humidity Sensors: Solid-state relative humidity sensors of the Thin Film Capacitance or Bulk Polymer Design with factory pre-calibrated transmitters, and:

.1 Non-interactive span and zero adjustments, and a two-wire isolated loop powered, 4-20 mA, 0-100% linear proportional output.

.2 A factory calibrated humidity transmitter which is accurate (including lead loss and analog to digital conversion) to 3% between 20 to 80% RH at 25° C (77° F) .

.3 An element that resists contamination.

.4 For outside air humidity sensors, a rain-proof perforated cover with transmitter installed in a weather-proof NEMA/EEMAC 3R or 4 enclosure with sealed fittings.

.5 For duct mounting applications, a type 304 stainless steel sensing probe with neoprene grommet, bushings, mounting bracket and hardware.

.8 General Re: Differential Pressure Transmitters: Requirements for differential pressure transmitters are as follows:

.1 Transmitters are to be constructed to withstand 100% pressure over-range without damage and to hold calibrated accuracy when subject to a momentary 40% over-range input.

.2 Transmitters are to transmit a 0 to 5 VDC, 0 to 10 VDC, or 4 to 20 mA output signal.

.3 Transmitters used for flow measurement are to be sized to the flow sensing device and supplied with a tee fitting and shut-off valves in the high and low sensing pick-up lines to allow permanent ease of use connection for testing, adjusting and balancing.

.4 Transmitter housings are to be suitable in all respects for the mounting location, and where possible, transmitters are to be located in local control panels.

.5 Transmitters are to be as follows:

.1 Low Differential Water Pressure Transmitters, 0 to 5 kPa (0 to 20" wc): Industrial quality transmitter capable of transmitting a linear 4 to 20 mA output in response to variation of flow meter differential pressure or water pressure sensing points, each complete with non-interactive zero and span adjustments that are adjustable from outside the cover, and performance as follows:

.1 Maintain accuracy up to 20 to 1 ratio turndown.

.2 Reference accuracy of +0.2% of full scale.

.2 Medium to High Differential Water Pressure Transmitters, over 5 kPa (20" wc): As specified above for low pressure transmitters but with a pressure range of from 2.5 kPa (10" wc) to 2070 kPa (300 psi), a reference accuracy of ±1% of full span (includes non-linearity, hysteresis, and repeatability)

.3 Building Differential Air Pressure Transmitters: Industrial quality transmitter with a range suitable for the application, capable of transmitting a linear 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points, each complete with non-interactive zero and span adjustments that are adjustable from outside the cover, and performance as follows:

.1 Maintain accuracy up to 20 to 1 ratio turndown.

.2 Reference accuracy of +0.2% of full span.

.4 Low Differential Air Pressure Transmitters, 0 to 1.25 kPa (0" to 5" wc): equal to Industrial quality transmitter with a range suitable for the application, capable of transmitting a linear 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points, each complete with non-interactive zero and span adjustments that are adjustable from outside the cover, and performance as follows:

.1 Maintain accuracy up to 20 to 1 ratio turndown.

.2 Reference accuracy of +0.2% of full span.

.5 Medium Differential Air Pressure Transmitters, over 1.5 kPa (5" wc): Transmitters as specified above for low pressure air transmitters but with performance requirements as follows:

.1 Zero & span: (c/o F.S./Deg. F); .04% including linearity, hysteresis, and repeatability.

.2 Accuracy: 1% F.S. (best straight line); static pressure effect: 0.5% F. S.

.3 Thermal effects: <+0.33 F.S./Deg. F over 40° F to 100° F (calibrated at 70° F).

.9 Duct Static Pressure Traverse Probe: Duct mounting to monitor duct static pressure where required, complete with multiple static pressure sensors located along the exterior surface of the cylindrical probe.

.10 Shielded Static Air Probe: Indoor type or outdoor type for locations at ends of the building as required, each with multiple sensing ports, an impulse suppression chamber, and air flow shielding.

.6 Status And Safety Switches

.1 Designed and constructed to monitor equipment status, safety conditions, and generate alarms at the BMS when a failure or abnormal condition occurs. each equipped with 2 sets of contacts for site interlock wiring for equipment shutdown. Switches are to be as follows:

.1 Current sensing switches: for run status for motor loads, each consisting of a current transformer, a solid-state current sensing circuit, adjustable trip point, solid-state switch, SPST relay, and a LED to indicate on-off status, capable of accepting overcurrent up to twice its trip point range, and calibrated to show a positive run status when a motor is operating under load and a negative status when a broken drive belt or drive coupling condition occurs.

.2 Air filter status switches: automatic reset type with SPST contacts rated for 2 amperes at 120 VAC, each with the appropriate scale range and differential adjustment for the intended service, and supplied with a complete installation kit including static pressure tops, tubing, fittings, and air filters.

.3 Air flow switches: differential pressure flow switches, bellows actuated mercury switch type or snap acting micro-switches, each with the appropriate scale range and differential adjustment for the application.

.4 Air pressure safety switches: manual reset type with SPST contacts rated for 2 amperes at 120 VAC, each with the appropriate scale range and differential adjustment for the intended service.

.5 Water flow switches: manual reset differential pressure control switches constructed and designed to suit the mounting location and application, arranged to measure pressure drop across 2 different points, each adjustable and equipped with a calibrated scale, the required capillary tubing, and installation hardware.

.6 Low temperature limit switches: manual reset, DPST snap-acting contacts rated for 16 amperes at 120 Vac, each complete with a sensing element a minimum 4.5 m (15') in length but in any case able to be installed horizontally across the duct/plenum and reach the coldest 450 mm (18") area of the installation location, and, for large areas where required, multiple switches.

.7 Control Pilot Relays:

.1 Modular plug-in design with retaining springs or clips, snap-mount bases, and:

.1 DPDT, 3PDT, or 4PDT as appropriate for the application.

.2 10 ampere, 120 VAC contacts.

.3 An integral indicator light and check button.

.8 Lighting Control Relays:

.1 Latching type with integral dry type status contacts, designed and constructed such that a power outage will not result in a change-of-state and so that multiple same state commands will simply maintain the commanded state, i.e. multiple OFF command pulses will simply keep the contacts in the OFF position.

.9 Smoke Detectors:

.1 Ionization type duct mounting detectors supplied as part of the electrical work, mounting as part of the control system work, and connected to the fire alarm system as part of the electrical work.

.10 Digital To Analog Output Converter:

.1 24 VAC, 500 mA converter to communicate digitally with up to 8 sensor/transmitter units and control panel within a daisy-chain network to convert the digital signal from transmitters to analog outputs to permit each transmitter to produce up to 8 dedicated 4-20 mA signals to a BAS or variable frequency drive from 1 central location which can be a maximum of 600 m (2000') from the control panel.

.11 BMS Web Based User Interface Equipment:

.1 User interface is to be dedicated web based by means of a personal computer for command entry, information management, network alarm management, and database management functions. All real-time control functions including scheduling, history collection, and alarming is to be resident in the BAS network automation engines to facilitate greater fault tolerance and reliability.

.12 Distributed Web Based User Interface:

.1 All features and functions of the dedicated web based user interface described above are to be available on any computer connected directly or via a wide area or virtual private network to the BAS network, which conforms to the following specifications:

.1 The software is to run on the Microsoft Internet Explorer (6.0 or higher) browser.

.2 Minimum hardware requirements are:

.1 256 MB RAM.

.2 2.0 GHz clock speed Pentium 4 microprocessor.

.3 40.0 GB hard drive.

.4 Keyboard with 83 keys minimum.

.5 SVGA 1024 x 768 resolution display with 64K colours and 16 bit colour depth..

.6 Mouse or other pointing feature.

.13 User Interface Application Components:

.1 Operator Interface: An integrated browser based client application is to be used as the user operator interface program. The system is to employ an event-driven rather than a device polling methodology to dynamically capture and present new data to the user. Additional features are as follows:

.1 All inputs, outputs, set-points, and other parameters as defined in Part 3 of this Section, shown on the drawings, or required as part of the system software are to be displayed for operator viewing and modification from the operator interface software

.2 The user interface software is to provide help menus and instructions for each operation and/or application

.3 The system is to support customization of the user interface configuration and a home page for each operator

.4 The system is to support user preferences in alarm, trend, display, and applications screen presentations

.5 All controller software operating parameters are to be displayed for the operator to view/modify from the user interface, and these parameters are to include set-points, alarm limits, time delays, PID tuning constants, run times, point statistics, schedules, etc.

.6 The operator interface is to incorporate comprehensive support for functions including but not limited to the following:

.1 User access for selective information retrieval and control command execution.

.2 Monitoring and reporting.

.3 Alarm, non-normal, and return to normal condition annunciation.

.4 Selective operator override and other control actions.

.5 Information archiving, manipulation, formatting, display and reporting.

.6 BAS internal performance supervision and diagnostics.

.7 On-line access to HELP menus.

.8 On-line access to current BAS as-built records and documentation.

.9 Means for controlling, re-programming, and re-configuration of the BAS operation and for the manipulation of the BAS database information in compliance with applicable Codes and Regulations for individual BAS applications.

.7 The system is to support a list of application programs configured by the users that are called up by the Tools Menu, hyperlinks within the graphic displays, and key sequences.

.8 The operation of the control system is to be independent of the user interface, which is to be used for operator communication only.

.2 Navigation Trees: The system is to have a minimum of five levels of nesting, and the capability of displaying multiple navigation trees to aid the operator in navigating throughout all systems and points connected, adding custom trees, defining any logical grouping of points and arranging them on a tree in any order, and nesting groups within other groups. The navigation tress are to be "dockable" to other displays such as graphics, meaning that the trees will appear as part of the display but can be detached and then minimized to the Windows task bar or closed altogether, however, a simple keystroke will reattach the navigation to the primary display of the user interface.

.3 Alarms: Alarms are to be routed directly from network automation engines to PC’s and servers, and it is to be possible for specific alarms from specific points to be routed to specific PC’s and servers. The BAS is to annunciate diagnostic alarms indicating system failures and non-normal operating conditions annunciate application alarms as required by points lists and sequences, and as a minimum, permit four categories of alarm sounds customizable through user defined wav files. The alarm management segment of the user interface is to provide, as a minimum, the following alarm functions:

.1 Log, date, and time of alarm occurrence.

.2 Generate a "pop-up" window with audible alarm to inform a user that an alarm has been received.

.3 Permit a user with the appropriate security level to acknowledge, temporarily silence, or discard an alarm.

.4 Provide an audit trail on the PC hard drive for alarms by recording user acknowledgement, deletion or disabling of an alarm, the name of the user, the alarm, the action taken, and the time/date of the alarm.

.5 Facilitate the ability to direct alarms to an email address or alphanumeric pager, in addition to the pop-up window described above.

.6 Any attribute of any object in the system may be designated to report an alarm.

.4 Reports and Summaries: Reports and summaries are to be generated and directed to the user interface displays with subsequent assignment to printers or discs. Summaries and reports are to be accessible via standard user interface functions, and selection of a single menu item, tool bar item, or tool bar button is to print any displayed report or summary. The system is to permit the creation of custom reports and queries via a standard web services XML interface and commercial of-the-shelf software such as Microsoft Access, Microsoft Excel, or Crystal Reports. As a minimum the BAS is to provide the following reports and summaries:

.1 All points in the BAS.

.2 All points in each BAS application.

.3 All points in a specific controller.

.4 All points in a user-defined group of points.

.5 All points currently in alarm.

.6 All points locked out.

.7 All BAS schedules

.8 All user defined and adjustable variables, schedules, interlocks, etc.

.5 Schedules: A graphical display for time-of-day scheduling and override scheduling of building operations is to be provided, with weekly schedules for each group of equipment with a specific time use schedule, and it is to be possible to define one or more exception schedules for each schedule including reference to calendars, with monthly calendars provided to permit simplified scheduling of holidays and special days for a minimum of five years in advance, user selected with the pointing device or keyboard. Changes to schedules made from the user interface are to directly modify the network automation engine schedule database. Selection of a single menu item or tool bar button is to print any displayed schedule. As a minimum the following functions are to be provided:

.1 Weekly schedules.

.2 Exception schedules.

.3 Monthly calendars.

.6 Passwords: The BAS Is to be complete with multiple-level password access protection to permit the user/manager to user interface control and display, database manipulation capabilities deemed appropriate for each user, based on an assigned password. Password access protection features are to include:

.1 Each user is to have a user name (24 characters minimum), a password (12 characters minimum), and access levels.

.2 Each user may change his or her password at any time.

.3 When editing or entering passwords the system is not to echo the actual characters for display on the monitor.

.4 A minimum of one hundred unique password is to be supported.

.5 Operators are to be able to perform only those commands available for their respective passwords, and display of menu selections is to be limited to only those items defined for the access level assigned to the password of each use.r

.6 The bas is to automatically generate a report of log-on/log-off and system activity for each user, and any action that results in a change in the operation or configuration of the control system is to be recorded, including the acknowledgement and deletion of alarms.

.7 A minimum of five levels of access is to be supported individually or in any combination of the following:

.1 Level 1 – view data

.2 Level 2 – command

.3 Level 3 – operator overrides

.4 Level 4 – database modification

.5 Level 5 – database configuration

.6 Level 6 – all privileges including password add/modify

.7 Screen Manager: The user interface is to be equipped with screen management capabilities that allow the user to activate, close, and simultaneously manipulate a minimum of four active display windows plus a network of user defined navigation trees.

.8 Dynamic Colour Graphics: The graphics application program is to be an integral part of the user interface and is to include a create/edit function and a runtime function, and the system architecture is to support an unlimited number of graphic documents (graphic definition files) to be generated and executed. The graphics are to be capable of displaying and providing animation based on real-time data that is acquired, derived, or entered. Additional features include the following:

.1 Graphics runtime functions: a maximum of sixteen graphic applications are to be able to be executed at any one time on a user interface or workstation with four visible to the user, and each graphic application is to capable of the following functions:

.1 All graphics are to be fully scalable.

.2 Graphics are to support a maintained aspect ratio.

.3 Multiple fonts are to be supported.

.4 A unique background is to be assigned on a per graphic basis.

.5 The colour of all animations and values on displays is to indicate the status of the object attribute.

.2 Operation from graphics: it is to be possible to change values (set-points) and states in the system controlled equipment by using drop-down windows accessible via the pointing device.

.3 Graphic editing tool: a graphic editing tool is to be provided to permit the creation and editing of graphic files, and the graphic editor is to be capable of performing/defining all animations, defining all runtime binding, and:

.1 In general, facilitate the creation and positioning of point objects by dragging from tool bars or drop-downs and positioning where required.

.2 Be capable of adding additional content to any graphic by importing backgrounds in the SVG, BMP, or JPG file formats.

.4 Aliasing: many graphic displays representing part of the building and various building components are exact duplicates, with the exception that the various variables are bound to different field values, consequently, it is to be possible to bind the value of a graphic display to aliases, as opposed to physical field tags.

.9 Historical Trending and Data Collection: Trend and change of value data is to be stored within the automation engines and uploaded to a dedicated trend database or exported in a selectable data format via a data export utility. Uploads to a dedicated database are to occur based on one of user-defined interval, manual command, or when the trend buffers are full. Exports are to be as requested by the user or on a time scheduled basis. The system is to be equipped with a configurable data storage sub-system for the collection of historical data which can be stored in either Microsoft Access or SQL database format. Each automation engine is to store, trend, and point history data for all analog and digital inputs and outputs as follows:

.1 Any point, physical or calculated, may be designated for trending, and methods of collection are to be defined time interval or a change of value.

.2 Each automation engine is to capable of storing multiple samples for each physical point and software variable based on available memory, including an individual sample time/date stamp, and points may be assigned to multiple history trends with different collection parameters.

.10 Trend Data Viewing and Analysis: A trend viewing utility with access to all data points and the capability of defining trend study displays to include multiple trends is to be provided, and is to include:

.1 The capability of retrieving any historical database point for use in displays and reports by specifying the point name and associated trend name.

.2 Displays which are able to be single or stacked graphs with on-line selectable display characteristics such as ranging, colour, and plot style.

.3 Display magnitude (zoom capability) and units selectable by the operator at any time without reconfiguration the processing or collection of data.

.4 Display magnitude is to be automatically scaled to show full graphic resolution of the data being displayed.

.5 Trend studies are to be capable of calculating and displaying calculated variables including highest value, lowest value, and time based.

.6 The display is to support the user's ability to change colours, sample sizes, and types of markers.

.11 Database Management: The BAS is to be equipped with a database manager that separates the database monitoring and management functions by supporting two separate windows. Database secure access is to be accomplished using standard SQL authentication including the ability to access data for use outside of the BAS application. Additional features are as follows:

.1 The database management function is to include summarized information on trend, alarm, event, and audit for backup, purge, and restore database management functions.

.2 The database manager is to support four tabs as follows:

.1 Statistics, which is to display database server information and trend, alarm (event), and audit information on the bas database.

.2 Maintenance, which is to be an easy method of purging records from the BAS server trend, alarm (event), and audit databases by supporting separate screens for creating a backup prior to purging, selecting the database, and allowing for the retention of a selected number of day's data.

.3 Backup, which is to provide the means to create a database backup file and select a storage location.

.4 Restore, which is to provide a restricted means of restoring a database by requiring the user to log into an expert mode in order to view the Restore Screen.

.3 The status bar is to appear at the bottom of the BAS database manager tabs and is to indicate information on the current display activity with icons as follows:

.1 Ready

.2 Purging Record From Database

.3 Action Failed

.4 Refreshing Statistics

.5 Restoring Database

.6 Shrinking A Database

.7 Backing-Up A Database

.8 Resetting Internet Information Services

.9 Shutting Down The BAS Deice Manager

.10 Action Successful

.4 The database manager monitoring functions are to be accessed through the Monitoring Settings window and are to continuously read database information once after the user has logged in.

.5 The system is to advise the user via task bar icons and email messages when a database value has exceeded a warning or alarm limit.

.6 The Monitoring Settings window is to have the following sections:

.1 General, to allow the user to set and review scan intervals and start times.

.2 Email, to allow the user to create and review email and telephone text messages to be delivered when a Warning or Alarm is generated.

.3 Warning, to allow the user to define the warning limit parameters, set the Reminder Frequency, and link the email message.

.4 Alarm, to allow the user to define the alarm limit parameters, set the Reminder Frequency, and link the email message.

.5 Database Login, to protect the system from unauthorized database manipulation by creating a Read Access and Write Access for each of the trend, alarm (event), and audit databases as well as an Expert Mode required to restore a database.

.7 The Monitoring Settings taskbars to display the following informational icons:

.1 Normal, which indicates by colour and size that all databases are within their limits.

.2 Warning, which indicates by colour and size that one or more databases have exceeded their warning limit.

.3 Alarm, which indicates by colour and size that one or more databases have exceeded their alarm limit.

.8 The BAS is to indicate via taskbar icons and email messages when a database value has exceeded a warning or alarm limit.

.14 Network Automation Engines:

.1 Network automation engines are to be UL/ULC listed and labelled; BACnet Testing Labs certified and labelled, fully user programmable supervisory controllers to monitor a network of a minimum of one hundred distributed application-specific controllers for a global strategy and direction and to communicate on a peer-to-peer basis with other network automation engines.

.2 User Interface: Each network automation engine is to have the ability to deliver a web based user interface as specified above, and all computers connected physically or virtually to the automation network are to have access to the web based user interface. Additional characteristics/requirements are as follows:

.1 The web based user interface software is to be imbedded in each network automation engine.

.2 Each network automation engine is to support a minimum of four concurrent users.

.3 The user is to be capable of accessing all system data through one network automation engine.

.4 Remote users connected to the network through an internet service provider or by telephone dial-up are also to have total system access through one network automation engine.

.5 Each network automation engine is to be capable of generating web based user interface graphics, and this capability is to be imbedded in the network automation engine.

.6 The user interface is to support the following functions using a standard version of Microsoft Internet Explorer:

.1 Configuration

.2 Commissioning

.3 Data archiving

.4 Monitoring

.5 Commanding

.6 System diagnostics

.7 Each network automation engine is to permit temporary use of portable devices without interrupting the normal operation of permanently connected modems.

.3 Processor: Each network automation engine is to be a multi-tasking, multi-user, microprocessor based real time digital control processor sized to meet requirements of the system with a minimum word size of 32 bits, and standard operating systems.

.4 Memory: Each network automation engine is to have sufficient memory to support its own operating system, databases, and control programs to provide supervisory control for all control level devices.

.5 Real Time Clock: Each network automation engine is to include an integrated, hardware based real time clock.

.6 LED Indicators: Each network automation engine is to be equipped with LED indicators to identify the following conditions:

.1 Power, On/Off

.2 Ethernet Traffic, Ethernet Traffic/No Ethernet Traffic

.3 Ethernet Connection Speed, 10 Mbps/100 Mbps

.4 FC Bus A, Normal Communications/No Field Communications

.5 FC Bus B, Normal Communications/No Field Communications

.6 Peer Communication, Data Traffic Between Network Automation Engines

.7 Run, NAE Running/NAE in Start-up/NAE Shutting Down/Software Not Running

.8 Battery Fault, Battery Defective/Data Protection Battery Not Installed

.9 24 VAC, 24 VAC Present/Loss of 24 VAC

.10 Fault, General Fault

.11 Modem RX, NAE Modem Receiving Data

.12 Modem TX, NAE Modem Transmitting Data

.7 Communications Ports: Each network automation engine is to be equipped with ports for operation of operator input/output devices such as industry standard computers, modems, and portable operator’s terminals. Ports are to be as follows:

.1 Two USB ports.

.2 Two URS-232 serial data communication ports.

.3 Two RS-485 ports.

.4 One Ethernet port.

.8 Diagnostics: Each network automation engine is to continually perform self-diagnostics, communications diagnostics, and diagnostics of all pane components, and transmit both local and remote annunciation of any detected component failure, low battery condition, and repeated failures to establish communication.

.9 Power Failure: In the event of loss of normal power each network automation engine is to continue to operate for a user adjustable period of up to ten minutes after which there is to be an orderly shut-down of all programs to prevent the loss of database or operating system software, and:

.1 During a loss of normal power the control sequences are to go to the normal system shutdown conditions, and all critical configuration data is to be saved into Flash memory.

.2 Upon restoration of normal power and after a minimum off-time delay the controller is to automatically resume full operation through a normal soft-start sequence without manual intervention.

.15 Field Equipment Controllers:

.1 Each field equipment controller is to be a fully user programmable BACnet Testing Labs certified and labelled digital controller that communicates via BACnet MS/TP protocol. Each controller is to be housed in a plenum rated plastic housing with removable base to permit pre-wiring of analog and binary input/output field points without the controller in place.

.2 Each controller is to employ a finite state control engine to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences, and are to be factory programmed with a continuous adaptive tuning algorithm that sense changes in the physical environment and continually adjusts loop tuning parameters appropriately.

.3 Each field equipment controller is to:

.1 Include troubleshooting LED’s to identify the following conditions:

.1 Power On

.2 Power Off

.3 Download or Start-Up In Progress-Not Ready For Normal Operation

.4 No Faults

.5 Device Fault

.6 Field Controller Bus-Normal Data Transmission

.7 Field Controller Bus-No Data Transmission

.8 Field Controller Bus-No Communication

.9 Sensor Actuator Bus-Normal Data Transmission

.10 Sensor Actuator Bus-No Data Transmission

.11 Sensor Actuator Bus-No Communication

.2 Support universal inputs, configured to monitor any of the following:

.1 Analog Input, Voltage Mode

.2 Analog Output, Current Mode

.3 Analog Input, Resistive Mode

.4 Binary Input, Dry Contact Maintained Mode

.5 Binary Input, Pulse Counter Mode

.3 Support binary inputs configured to monitor either of the following:

.1 Dry Contact Maintained Mode

.2 Pulse Counter Mode

.4 Support analog outputs configured to output either of the following:

.1 Analog Output, Voltage Mode

.2 Analog Output, Current Mode

.5 Support binary outputs, 24 VAC Triac.

.6 Support configurable outputs capable of the following:

.1 Analog Output, Voltage Mode

.2 Binary Output Mode

.7 Have the ability to reside on a master-slave/token-passing field controller bus supporting BACnet standard protocol as follows:

.1 Support communications, including input/output communications between the field controllers and the network automation engines.

.2 Support a minimum of one hundred input/output modules and field equipment controllers in any combination.

.3 Operate at a maximum distance of 4560 m (15,000') between the field controller and the furthest connected device.

.8 Have the ability to monitor and control a network of sensors and actuators over a master-slave/token-passing sensor-actuator bus supporting BACnet standard protocol as follows:

.1 The bus is to support a minimum of ten devices per trunk.

.2 The bus is to operate at a maximum distance of 365 m (1200') between the field controller and the furthest connected device.

.9 The capability of executing complex control sequences involving direct wired input/output points as well as input and output devices communicating over the field controller bus or sensor-actuator bus

.10 Support, but not limited to, the following:

.1 Hot water, chilled water/central plant applications.

.2 Custom air handling units for special applications.

.3 Terminal units.

.4 Special programs as required for systems control.

.11 Support a password protected local controller LCD back-lit display with six key keypad as an integral part of the field controller or as a remote device communicating over the sensor-actuator bus to permit the user to view monitored points without logging into the system, and to view and change set-points, modes of operation, and parameters

.16 Input/Output Modules:

.1 Input/output modules to facilitate additional inputs and outputs for use in the field equipment controllers are to be similar to the field equipment controllers but less the display and with a minimum of four and a maximum of seventeen points.

.17 System Configuration Tools:

.1 System Configuration Tool: The system configuration tool is a software package supplied with the BAS to enable a computer platform to be used as a stand-alone engineering configuration tool for a network automation engine and to permit programming of field equipment controllers. The configuration tool is to provide an archive database for the configuration and application data and is to have the same look and feel at the user interface regardless of whether the configuration is being done online or offline. Additional features and characteristics are as follows:

.1 The tool is to include:

.1 Basic system navigation tree for connected networks.

.2 Integration of system enabled devices.

.3 Customized user navigation trees.

.4 Point naming operator parameter setting.

.5 Graphic diagram configuration.

.6 Alarm and event message routing.

.7 Graphical logic connector tool for custom programming.

.8 Downloading, uploading, and archiving databases.

.2 The tool is to have the capability to automatically discover field devices on connected buses and networks.

.3 The tool is to be capable of configuring from a library of standard applications, simulating to verify applications, and commissioning field equipment controllers and field devices.

.4 The tool is to be complete with a Bluetooth Wireless Technology wireless access point to enable a wireless enabled portable computer to make a temporary Ethernet connection to the automation network.

.2 Wireless MS/TP Converter: The Bluetooth Wireless Technology converter is to provide temporary wireless connection between the sensor-actuator bus or field-controller bus and a wireless enabled portable computer. The converter is to be powered through a connection to either the sensor-actuator bus or the field-controller bus and is to support downloading and troubleshooting field equipment controllers and field devices from the portable computer over the wireless connection. The converter is to be complete with LED indicators for the following conditions:

.1 Power: On/Off

.2 Fault: Fault/No Fault

.3 SA/FC Bus: Bus Activity/No Bus Activity

.4 Bluetooth: Bluetooth Communication Established/Bluetooth Communication Not Established

.18 Wiring Materials:

.1 System wiring, conduit, boxes, and similar materials are to be in accordance with requirements specified in the appropriate Section(s) of the Electrical Work Division of the Specification.

3 EXECUTION

3.1 INSTALLATION

.1 General: Installation Of The BAS:

.1 Provide a complete expansion of the building automation system in accordance with requirements of this Section of the Specification, the mechanical work Section entitled Automatic Control Systems, the drawings, and the input/output points list(s).

.2 Unless otherwise specified do all BAS work in accordance with the system manufacturer's instructions.

.2 Direct Digital Control System Components:

.1 Provide all required direct digital control hardware, software, accessories, and wiring for a complete BAS. Refer to drawing control diagrams and sequences, the points list(s), and the mechanical work Section entitled Automatic Control Systems.

.2 Surface mount control units in mechanical, etc., rooms housing the equipment/systems to be controlled and monitored. Connect a maximum of two major mechanical systems to each field controller. Ensure that mounting surfaces do not vibrate.

.3 Consult with the Owner and Consultant to ensure that all required input/output points are entered into the system.

.4 All thermostats, room temperature sensors, and humidistats shall be installed at 1200mm above finished floor.

.3 Control Wiring:

.1 Do all required BAS wiring from 15A-1P circuits terminated as part of the electrical work in junction boxes in equipment rooms/areas.

.2 Except as specified below, install all wiring in conduit. Unless otherwise specified the final 600 mm (2') connections to sensors and transmitters, and wherever conduit extends across flexible duct connections is to be liquid-tight flexible conduit.

.3 Control wiring in ceiling spaces and wall cavities may be plenum rated cable installed without conduit but neatly harnessed, secured, and identified.

.4 All wiring work is to be in accordance with the BAS manufacturer's certified wiring schematics and instructions, and the wiring standards specified in the electrical work Division of this Specification.

.4 Identification and Labelling of Equipment And Circuits:

.1 Refer to the Basic Mechanical Materials and Methods Section.

.2 Identify BAS equipment as follows:

.1 Enclosures: engraved laminated nameplates with lettering such as BAS Panel CP2, or BAS Relays, or BAS E/P Transformers, with all wording listed and approved prior to manufacture of the nameplates.

.2 Panel points: a weather-proof input/output layout sheet for each controller with the name of each point connected to the controller, and the associated wire labelling information.

.3 Wiring: numbered sleeves or plastic rings at both ends of the conductor, with numbering corresponding to conductor identification on shop drawings and "as-built" record drawings.

.4 Interface components: a weather-proof layout sheet clearly illustrating/identifying the purpose of each component within the enclosure such that an operator or service technician can quickly identify the exact use of each relay, transducer, contactor, etc., with each sheet fastened securely to the back of the enclosure door.

.5 System Startup:

.1 Testing, Adjusting, Certification, Start-Up, Commissioning:

.1 Equipment and System Manufacturer's Certification: Refer to the article entitled Equipment and System Manufacturer's Certification in the Mechanical Work General Instructions Section.

.2 Start-Up: Refer to the article entitled Equipment and System Start-up in the Mechanical Work General Instructions Section.

Commissioning: Refer to commissioning requirements specified in the Mechanical Work General Instructions Section.

.6 Closeout Activities:

.1 Demonstrations and Training: Refer to the article entitled Equipment and System O & M Demonstration & Training in the Mechanical Work General Instructions Section. Include for demonstration and training sessions for each of 2 groups of 6 people as follows:

.1 3 full day orientation sessions at the system manufacturer's office to educate personnel on BAS architecture, hardware, and software, with an overview of BAS operation and capabilities including but not limited to operational programmes, equipment functions (both individually and as part of a total integrated system), BAS commands, advisories, alarms, and appropriate operator intervention required in responding to the BAS operation.

.2 2 full day sessions at the site using the BAS for a "hands-on" demonstration of all BAS functions and features with instruction regarding the chronological flow of information from field devices, contacts and sensors to the operator's work station, an overview of the communications network describing the interplay between initiating devices, field hardware panels, systems communications, and their importance within the operating BAS, and alarm indications and appropriate responses.

.3 2 full day seasonal (summer-winter) site sessions to perform additional instruction regarding seasonal changes and how they affect the BAS.

.2 Additional Training: Include for 2 follow-up site training and troubleshooting visits, 1 six months after Substantial Performance and the other at the end of the warranty period, both when arranged by the Owner and for a full day to provide additional system training as required.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, and Division 01 – General Requirements.

1.2 SUMMARY

.1 This Section specifies requirements and instructions that are common to Electrical Division of the Specification and it is a supplement to each section and is to be read accordingly.

.1 Any item or subject which is shown, mentioned, or reasonably implied on either drawings or in the specifications, is considered to be properly and sufficiently specified and shown; and must be provided. Provide all material, labour, equipment, tools, consumables, etc. required to complete all the work of the Electrical Division

.2 These common works relate to all scope of work related within the Electrical Divisions which incorporates:

.1 Electrical Drawings

.2 Telecommunications Drawings

.3 Division 26 Electrical specification

.4 Division 27 Communications specifications

.5 Division 28 Electronic Safety and Security specifications

.3 These common works also have the following Sections which are applicable to all Sections within this Division and supplement this Section:

.1 26 05 02 – Firestopping and Smoke Seal Systems

.2 26 05 05 – Demolition and Revision Work

.3 26 05 53 – Identification for Electrical Systems

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Division 02 Existing Conditions

.2 Division 09 Finishes

.3 Division 26 Electrical

.4 Division 27 Communications

.5 Division 28 Electronic Safety and Security

1.3 PRICE AND PAYMENT PROCEDURES

.1 Alternate Prices:

.1 Under Alternate Prices on the Bid Form, identify in the applicable space, costs for the following work. Refer to the Instructions to Bidders and Bid Form for further pricing instructions and details and price title definitions.

.1 Scope 2 (4th year design studio) and Scope 3 (Faculty and Student Lounge)

.2 Scope 4 (PHD Offices)

.3 Scope 6 3rd floor corridor

.4 Scope 6 4th floor corridor

.2 Measurement and Payment:

.1 If a change to the work is requested, the Contractor to submit pricing for the change including an itemized list of the associated material and labour changes and costs. Apply mark-up as indicated in the Contract.

.2 A change must be approved by the Contractor before the work is to proceed. If work is performed without such approval, it is performed at the Contractor's or Sub-Contractors' risk.

.3 In the event of a disagreement by the Contractor over valuation of the change in work, resolution will follow the procedure outlined below:

.1 Labour hours are derived using the RSMeans Electrical Costing Book.

.2 Labour rates are as stated in the Instructions to Bidders.

.3 Material prices are "Trade" prices provided by a local supplier or distributor.

.4 Material requirements are obtained from field measurements.

.5 Major equipment prices are reasonably negotiated.

.3 Progress Payment Breakdown:

.1 Submit, prior to submittal of the first progress payment draw, a breakdown of the cost of the electrical work to assist the Consultant in reviewing and approving monthly progress payment claims.

.2 The payment breakdown is subject to the Consultant's approval and progress payments will not be processed until an approved breakdown is in place. The breakdown is to include one-time claim items such as mobilization and demobilization, insurance, bonds (if applicable), shop drawings and product data sheets, commissioning, and project closeout submittals.

.3 Breakdown to include the following line items as a minimum:

.1 Job costs (permits, bonds, mobilization, supervision, and job foreman)

.2 Demolition and relocation

.3 Distribution and service (panels, feeders, and main service)

.4 Mechanical equipment wiring (to include starters, motor control centres, disconnect switches, and wiring)

.5 Electric heating

.6 Branch wiring (to include devices, cover plates, installation, and wiring)

.7 Lighting (to include fixtures, poles, mounting, installation, and wiring)

.8 Lighting control system

.9 Structured Cabling System (to include cabling, outlets, patch panels, racks, and telecommunication grounding)

.10 Access control system

.11 Fire alarm system

.12 Miscellaneous equipment, systems, and associated wiring

1.4 REFERENCES

.1 Definitions:

.1 The following are definitions of words found in electrical work Sections of the Specification and on associated drawings:

.1 "concealed" – means work hidden from normal sight in furred spaces, shafts, tunnels, ceiling spaces, walls and partitions

.2 "exposed" – means work normally visible, including work in electrical and equipment rooms and similar spaces

.3 "provide" (and tenses of provide) – means supply and install complete

.4 "install" (and tenses of install) – means install and connect complete

.5 "supply" – means supply only

.6 "finished area" - means any area or part of an area which receives a finish such as paint, or is factory finished

.7 "governing authority" and/or "regulatory authority" and/or "Municipal authority" – means all government departments, agencies, standards, rules and regulations that apply to and govern the electrical work and to which the work must adhere

.8 "Consultant" – means the Architect or Consulting Engineer who has prepared the Contract Documents on behalf of the Owner

.2 Wherever the words "indicated", "shown", "noted", "listed", or similar words or phrases are used in the specification they are understood, unless otherwise defined, to mean that the product referred to is "indicated", "shown", "listed", or "noted" on the drawings.

.3 Wherever the words "approved", "satisfactory", "as directed", "submit", "permitted", "inspected" or similar words or phrases are used in the specification or on the drawings they are understood, unless otherwise defined, to mean that work or product referred to is "approved by", "inspected by", etc., the Consultant.

.4 In the electrical specification, singular may be read as plural, and vice-versa.

.2 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Division. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC-S1001 – Standard for Integrated Systems Testing

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Plan work well in advance to eliminate delivery, installation and co-ordination difficulties. Be held equally responsible with other Sections or Divisions to resolve interferences and to co-operate with other Sections to satisfactorily complete the project. Being there first will not be accepted as a legitimate reason.

.2 Examination of site and documents:

.1 When estimating the cost of the work and prior to submitting a bid for the work carefully examine all the bid documents and visit the site to determine and review all existing site conditions that will or may affect the work and include for all such conditions in the bid price.

.2 Report to the Consultant, prior to bid submittal, any existing site condition that will or may affect performance of the work as per the drawings and specifications. Failure to do so will not be grounds for additional costs.

.3 Drawings and Specification:

.1 Read the electrical work drawings in conjunction with all work drawings including but not limited to civil, landscaping, structural, architectural, sprinkler, and mechanical.

.2 The electrical drawings are performance drawings, diagrammatic, and show approximate locations of equipment and connecting services. Any information regarding accurate measurement of the building is to be taken at the site. Do not scale the drawings, and do not use the drawings for prefabrication work.

.3 The drawings are intended to convey the scope of work and do not show architectural and structural details. Include cost for all offsets, fittings, transformations, and similar products required as a result of obstructions and other civil, architectural and structural details but not shown on the drawings.

.4 The locations of equipment and materials shown may be altered, when reviewed by the Consultant. Include cost to meet requirements of the equipment and/or materials, other equipment or systems being installed, and of the building.

.5 Sections of the Electrical Division are not intended to delegate functions nor to delegate work and supply of materials to any specific trade, but rather to generally designate a basic unit of work, and the Sections are to be read as a whole.

.6 The electrical specification does not generally indicate the specific number of items or extent of material required. The specification is intended to provide product data and installation requirements. It is necessary to refer to drawing schedules, layouts, schematic diagrams, riser diagrams, and details to determine correct quantities.

.7 The electrical drawings and specification are intended to be cooperative. Perform all work that is shown, specified, or reasonably implied on the drawings but not mentioned in the specification, or vice-versa, as though fully covered by both.

.8 When the scale and date of the drawings are the same, or when the discrepancy exists within the specification, the costliest arrangement will take precedence.

.9 In the case of discrepancies or conflicts between the drawings and specification, the documents will govern in the following order:

.1 the specification

.2 drawings of larger scale

.3 drawings of smaller scale

.4 drawings of later date when the scale of the drawings is the same

.4 Coordination:

.1 Relation to other sections:

.1 Provide all cutting and patching required for the Section work by the appropriate trade at the expense of the Electrical Division, unless otherwise specified or shown. Refer to the Architectural Specifications and drawings for details of cutting and patching provisions and requirements.

.2 Provide all sleeves, inserts, hangers and core drilling of slabs, etc., required for completion of the Section work. Coordinate the location of inserts, sleeves, hangers, holes, back boxes, tubs, junction boxes, etc., with the respective Section into whose materials they are being installed. Extend all floor and roof sleeves 100 mm (4 in) above the finished levels, unless noted otherwise. Complete all roof sleeves with roof flashing and rain shields to ensure a weatherproof seal.

.3 Cut holes and install sleeves for electrical installations piercing fire, smoke, thermal, exterior, and acoustic separations to minimum sizes.

.1 Install firestopping and smoke seals in accordance with Section 26 05 02 – Firestopping and Smoke Seals.

.2 Seal all gaps on both sides of the separation by a qualified tradesman using materials and methods described in the applicable specification section, to maintain the appropriate rating, acoustic, thermal bridge, or water resistance. All costs for such will be paid for by the Electrical Division.

.3 If an existing penetration is not properly sealed to these standards, either provide new penetration for work and seal appropriately, or seal entire opening including existing penetrations. Where multiple Divisions are penetrating the same separation, group services and share sealing costs where appropriate.

.4 Where access doors are required for electrical installations, supply types with self opening screwdriver lock and positive latching mechanism to the appropriate Division 09 subtrade for installation by them in the walls or ceiling. Pay all cost for installation by Division 09. Access doors are required where electrical equipment is located behind non-accessible surfaces and where access to, or servicing of the equipment is necessary. The access door size and fire rating must be approved by the Contractor. Refer to the Architectural Specifications for details of access door installation requirements. Provide installations to avoid the need for access doors where indicated.

.5 Deliver all electrical equipment and fixtures to the site with the specified finish. Provide touch up painting of electrical equipment scratched on site. Finish painting of primed electrical equipment and all concealed or exposed conduit, boxes, etc., as required will be provided by Division 09.

.6 Immediately wrap and seal in plastic “bubble” wrap all fixtures, equipment, and system components delivered to the site and not contained in sealed cardboard cartons. Following installation, the items will be protected from dirt, dust, and damage with similar plastic wrap or protective enclosures until energized and put into full operation.

.7 Coordinate installation of switches, thermostats, and other devices together at one common location with installing Sections and obtain approval on site from the Contractor of exact arrangement.

.2 Work in existing building:

.1 Complete all demolition and revision work in accordance with Section 26 05 05 – Demolition and Renovation Work.

.2 Visit the site to examine the existing conditions and make necessary allowances in bid price for demolition, removal, relocation, re-routing and reconnection of existing electrical equipment and wiring as required for the execution and completion of this project. In general, relocate existing services as required to accommodate new work and architectural changes. In areas being totally renovated, provide all remaining electrical demolition work and replace existing installations with new as shown. Remove all existing redundant installations prior to final acceptance. Include in the bid price extra charges for premium time and temporary provisions, if required, to complete the work as described and according to the schedule provided.

.3 Install all conduit and feeders through the existing building along routes shown on the drawings or approved on site by the Owner and Contractor. New installations will not necessarily be allowed along shortest routes but should follow routes indicated or corridors or routes of other services where possible if not shown.

.4 Unless noted otherwise, all existing electrical equipment and cabling which has not been removed or identified to be turned over to the Owner will become the property of the Division (for disposal or removal from the site as applicable) and have an appropriate salvage value included in the bid amount.

.5 Clean and paint, as appropriate, existing electrical equipment removed and indicated for re-use on this project. Refurbish or replace as required before re-installation.

.6 Re-routed as required wiring location in areas being altered or demolished, by re-feeding outlets or equipment required to remain in service to maintain the continuity of these services.

.7 Coordinate sequence of removal and relocation of existing equipment and wiring with the other Sections and conform to the requirements and conditions outlined.

.8 Provide adequate protection to existing cabling and equipment throughout the project and particularly where cabling and electrical equipment have become exposed to mechanical injury or moisture in the course of alterations or new construction.

.9 In some instances, new outlets and equipment are shown in the same location as the existing outlets, these may be fed through the existing conduits provided that the conduits and cabling are in good condition and are acceptable to the Electrical Authority as reusable. All unused conduit entrance openings will be sealed.

.3 Power Interruptions:

.1 Keep service and distribution system power interruptions to a minimum. Coordinate power interruptions with the Owner and all other Subcontractors. Provide to the Owner written application for electrical interruptions from the Electrical Division indicating the date, time, and estimated duration of the interruption. Submit application for approval of the power interruptions to the Owners and Contractor at least two weeks prior to the requested shut-down date.

.2 Prior to each shutdown or interruption, again inform the Owner in writing seventy-two hours in advance of the proposed shutdown or interruption and obtain written approval to proceed. Do not shutdown or interrupt any system or service without such written approval.

.3 Perform work associated with shutdowns and interruptions as continuous operations to minimize the shutdown time and to reinstate the systems as soon as possible and prior to any shutdown, ensure that all materials and labour required to complete the work for which the shutdown is required are available at the site.

.5 Sequencing:

.1 Phasing of the Work:

.1 Phasing of the work is required to maintain the existing building in operation, all as specified in Division 01. Include all costs for phasing the work including all required "off hours" premium time labour costs.

.6 Planning and layout of the work, and associated drawings:

.1 Properly plan, coordinate, and establish the locations and routing of services with all subcontractors affected prior to installation such that the services will clear each other as well as any obstructions, including structural components of the building. Unless otherwise specified, the order of right-of-way for services is to be as follows:

.1 piping requiring uniform pitch

.2 piping 100 mm (4 in) diameter and larger

.3 large ducts (main runs)

.4 electrical cable tray and bus duct

.5 conduit 100 mm (4 in) diameter and larger

.6 piping less than 100 mm (4 in) diameter

.7 smaller branch ductwork

.8 conduit less than 100 mm (4 in) diameter

.2 Unless otherwise shown or specified, conceal all work in finished areas, and conceal work in partially finished or unfinished areas to the extent made possible by the area construction. Install conduit, raceway, and similar services as high as possible to conserve headroom and/or ceiling space. Install cable tray used for extra-low voltage cables as low as possible where removable finished ceilings are installed. Notify the Consultant where headroom or ceiling space appears to be inadequate prior to installation of the work.

.3 Revise or alter the arrangement of work that has been installed without proper coordination, study and review, even if it was completed in accordance with the Contract Documents, in order to conceal the work behind finishes, or to allow the installation of other work, at no additional cost. In addition, pay for the cost of alterations in other work required by the alterations to your work.

.4 All junction boxes, equipment and similar products, particularly such products located above suspended ceilings must be located for easy access for servicing and/or removal. Products which do not meet this location requirement are to be relocated to an accessible location at no additional cost.

.7 Permits, Fees, And Certificates:

.1 Apply for, obtain and pay for all permits required to complete the electrical work.

.2 Submit to the Consultant, all approval/inspection certificates issued by governing authorities to confirm that the work as installed is in accordance with the rules and regulations of the governing authorities. Pay any costs associated with issue of the certificates.

.8 Workplace Safety:

.1 Comply with requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding the use, handling, storage, and disposal of hazardous materials. Submit WHMIS MSDS (Material Safety Data Sheets) for all products where required and maintain one copy at the site in a visible and accessible location available to all personnel.

.2 Comply with all requirements of Occupational Health and Safety Regulations and all other regulations pertaining to health and safety, including worker’s compensation/ insurance board and fall protection regulations.

.3 Asbestos, Mould, Lead Paint, PCBs, or other hazardous material: If at any time during the course of the work asbestos containing materials, black mould, lead paint, or any other such materials are encountered or suspected, immediately report the discovery to the Contractor and cease all work in the area in question. Do not resume work in affected areas until the material is properly identified as non-hazardous or the situation has been properly corrected with written approval from the Owner.

1.6 SUBMITTALS

.1 Submittals under this Division to be in accordance with Section 01 33 00 – Submittal Procedures.

.2 Regulatory Communications:

.1 Forward to the Contractor copies of all correspondence and instructions from the Electrical Authority or any other Authority having Jurisdiction for clarification and action.

.3 Shop Drawings/Product Data:

.1 Shop drawings are those prepared specifically for the Project. Product data sheets are copies of manufacturer's standard catalogue or literature.

.2 Shop drawings and product data sheets must confirm that the product proposed meets all requirements of the Contract Documents.

.3 Submit for review Shop Drawings and Product Data sheets, in electronic PDF format, covering all items or equipment to be installed under the Contract (faxed and generic documents are not acceptable). Shop drawings and product data sheets to show all physical properties, relevant performance, and installation information. The drawings and data required to generally be as outlined under each Section of the Specification but will not be restricted to the items listed. Distribute reviewed Shop Drawings and data sheets to other relevant Sections as required for completion of their related work.

.4 All submitted Shop Drawings and data sheets must have been reviewed in detail by the Contractor and must bear their stamp. Should the drawings not have been reviewed and stamped, they will be rejected immediately.

.5 Each shop drawing or product data sheet is to be properly identified with the project name and the product drawing or specification reference, for example "Lighting Fixture F1", and all shop drawing or product data sheet dimensions are to be either metric or imperial to match dimensions on the drawings.

.6 Equipment will not be accepted on site until review of shop drawings and data sheets is complete. shop drawings or data sheets marked "Reviewed as Modified" are conditionally approved such that the Contractor to ensure equipment satisfies all Contract requirements. Delivery of equipment may proceed but final, corrected shop drawings and data sheets must be submitted prior to close of Contract.

.7 This review is for the sole purpose of ascertaining conformance with the general design concept. This review will not mean that the reviewer approves the detail design inherent in the shop drawing, responsibility for which will remain with the Section submitting same, and such review does not relieve the Electrical Division of their responsibility for efforts or omissions in the Shop Drawings and data sheets or of their responsibility for meeting all requirements of the Contract Documents. The Electrical Division is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to the fabrication processes or to techniques of construction and installation, for all quantities indicated and for co-ordination of the work of all Sections.

1.7 CLOSEOUT SUBMITTALS

.1 Submittals under this Section shall be in conformance with Section 01 77 00 – Closeout Procedures.

.2 Operation and Maintenance Manuals:

.1 Forward to the Contractor "Maintenance and Instruction Manuals" within four (4) weeks of substantial completion of the project.

.2 Provide all closeout submittals in a digital format. Organize all individual electronic documents in directories similar to the tabs in a binder and filenames in plain English describing of the contents within each file. Provide all documents in unsecured PDF format with searchable text. Provide all audio and video content encoded in a format that can be viewed using standard codecs freely available on the most current version of Microsoft Windows operating system.

.3 Each manual will contain, but not be restricted to, the following information:

.1 each shop drawing (revised as per the reviewed drawings)

.2 each product data sheet (revised as per the reviewed drawings)

.3 equipment parts list

.4 recommended list of spare parts

.5 operating and maintenance instructions

.6 equipment installation details, construction and performance data

.7 list of all manufacturing and equipment service depots including address, email and telephone numbers

.8 Electrical Authority final inspection certificate

.9 emergency lighting test results

.10 fire alarm verification certificate and test report

.11 fire alarm audibility report

.12 integrated systems testing report

.13 telecommunications cabling test results including summary and comprehensive full results

.14 any other certificates, approval letters, etc.

.4 Provide qualified technicians to instruct the Owner's Representatives in the operation and maintenance of the systems and equipment included in the Electrical Division.

.3 Warranty Documents:

.1 Provide warranty documents in conformance with Section 01 77 00.

.2 Provide to the Consultant, all specified warranties, extended warranties, and free manufacturer extended warranties as applies to each individual section.

.3 The warranty period(s) commences on the date of Substantial Performance of the Work and shall be valid for the full duration specified.

.4 Submit warranties to the Consultant prior to Final Payment Certification.

.4 Record Documents:

.1 As-Built Drawings:

.1 During the progress of the work the Electrical Division will always keep on the site, a complete and separate set of prints and will note thereon clearly, neatly, accurately and promptly all Architectural, Structural, Mechanical and Electrical changes, revisions and additions to the work and deviations from the Contract Documents.

.2 Include accurate locations, depth, size, content, and type of all below grade pathways in these as-built drawings.

.3 Indicate also on the as-built drawings the location of access panels or removable ceiling tiles which cover equipment or junction boxes which may require future access or where conduit or wiring for future use is located.

.4 Prepare the final as-built drawings will all changes, revisions, and additions to the work and deviations from the Contract Documents by a qualified draftsperson in AutoCAD at the contractor's expense as an electronic copy and one hard copy to be submitted to the Contractor at the completion of the project with an application for a Certificate of Total Performance. Eradicate obsolete information from final as-built drawings.

.5 Submit as-built drawings in electronic format. All documents will be in both AutoCAD and unsecured PDF format.

1.8 QUALITY ASSURANCE

.1 Regulatory Requirements:

.1 All work carried out under this Contract will comply with, but not be limited to the requirements of the latest edition of the following codes and regulations:

.1 Ontario Electrical Safety Code complete with Bulletins and Amendments.

.2 Ontario Building Code complete with Supplemental Bulletins and its referenced standards.

.3 Applicable Standards from CSA, ULC, and from other standards organizations indicated herein.

.4 All applicable Federal, Provincial, Municipal and Industry standards and regulations.

.2 All electrical items are to be certified and bear the stamp or seal of a recognized testing agency such as CSA, UL, ULC, ETL, or bear a stamp to indicate special electrical authority approval.

.3 Requirements of the Contract Documents are to take precedence when they are more stringent than codes, ordinances, standards, and statutes.

.2 Qualifications:

.1 Installer's:

.1 Installer/Applicator/Erector to have a minimum of 5 years' continuous Canadian experience successfully completing projects similar in size and complexity as the Work of this Division. Submit proof of experience upon Consultant's request.

.2 Provide all work for Division 26 Electrical by qualified journeyman electricians or apprentices, holding valid provincial Certificates of Qualification, and be supervised by a competent foreman.

.3 Provide all work for Division 27 Communications and Division 28 Electronic Safety and Security by qualified technicians with documented certifications by manufacturers of equipment being installed and be supervised by a competent foreman.

.4 The work of the Electrical Division will be reflected in the quality of installations - any unsatisfactory installations will be removed and replaced accordingly.

.5 Provide all changes or alterations to the installations of this project required by an authorized Inspector of an Authority Having Jurisdiction in accordance with the terms and conditions of Contract.

.3 Certifications:

.1 Obtain all permits and certificates bearing upon this Trade and pay all fees and charges for same.

1.9 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials of this Division in accordance with Section 01 61 00 – Common Product Requirements.

1.10 PROJECT CONDITIONS

.1 Existing Conditions:

.1 Visit the site of the building and examine the existing conditions in relation to the work to be done. The Electrical Division to be responsible to allow for any requirements which could have been revealed during such examinations.

.2 Prepare a complete set of Interference drawings in co-ordination with other Sections for all typical or critical locations to indicate site installation conditions where space is limited. Use field measurements to indicate accurate dimensions and configurations of all Electrical services in relation to Structural and Architectural conditions as well as Mechanical services. Coordination with other Sections in the preparation of Drawings and layout of the related work is imperative. Submit these interference drawings to the Contractor for review prior to proceeding with any related work, according to normal Shop Drawing procedure.

1.11 WARRANTY

.1 All materials and installations of the Electrical Division will be guaranteed for a period of one year from the date of final acceptance of the work unless otherwise specified, regardless of the extent of equipment manufacturer’s warranties.

2 PRODUCTS

2.1 MANUFACTURERS

.1 Alternate Manufacturers:

.1 In some sections of this specification, materials and equipment are specifically described and named by manufacturer for the purpose of establishing a minimum standard of materials, product quality and other specified requirements.

.2 The project systems design as per the Drawings and Specifications is based on the specified manufacturer’s equipment but is intended to be appropriate for equivalent equipment of all other manufacturers contained listed in the Approved Manufacturers list within each Section.

.3 Products of manufacturers listed as “Alternates” are subject to product data and shop drawing review to ensure that they are equivalent to the products of the specified manufacturer. Alternate manufacturer’s equipment will conform to the space limitations imposed by the project and the intent as outlined in this Specification and Drawings.

.4 The Electrical Division is encouraged to submit alternative proposals of manufacturers not listed in the Approved Manufacturers List of proposals or modified design with appropriate costs, delivery, and system design adjustments which they feel may be advantageous considerations for the project.

3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions:

.1 Examine all work of other Sections upon which the Work of each Section depends.

.2 Do not proceed with installation until all wet work such as concrete and painting has been completed and thoroughly dried.

.3 Report in writing to the Consultant/Project Manager any defects of surfaces or work prepared by other Sections which affect the quality or dimensions of the Work of each Section.

.4 Do not proceed with Work of each Section until all unsatisfactory conditions have been rectified and site conditions are ready to receive work.

.5 Commencement of work implies acceptance of existing conditions and work by other Sections.

3.2 PREPARATION

.1 Protection of in-place conditions:

.1 Provide temporary protection of adjacent areas and surfaces by means of masking (enclosures) where necessary to prevent contamination by Work of each Section.

3.3 INSTALLATION

.1 Installation of equipment:

.1 Unless otherwise specified all equipment is to be installed in accordance with the equipment manufacturer’s recommendations and instructions, and requirements of governing Codes, Standards, and Regulations. Governing Codes, Standards, and Regulations take precedence over manufacturer’s instructions.

.2 Ensure that proper access and service clearances are maintained around equipment, and, where applicable, access space for future equipment removal or replacement is not impeded. Remove and replace any equipment which does not meet this requirement.

.2 Scaffolding, Rigging, And Hoisting:

.1 Unless otherwise specified or directed, supply, erect and operate all scaffolding, rigging, hoisting equipment and associated hardware required for your work. Immediately remove from the site all scaffolding, rigging, and hoisting equipment when no longer required.

3.4 SITE QUALITY CONTROL

.1 Site Tests and Inspections:

.1 Conduct field inspection and testing as specified in Section 01 40 00

.2 Non-Conforming Work:

.1 Defective materials or quality of work, whenever found, at any time prior to acceptance of the work, shall be rejected regardless of previous inspection. Inspection will not relieve responsibility but is a precaution against oversight or errors.

.2 Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to the satisfaction of the Consultant at no additional cost to the Owner.

.3 Manufacturer Services:

.1 When equipment/system installation is complete, but prior to start-up procedures, arrange and pay for the equipment/system manufacturer's authorized representative to visit the site to examine the installation, and when any required corrective measures have been made, to certify in writing to the Consultant that the equipment/system installation is complete and in accordance with the equipment/system manufacturer's instructions.

3.5 ADJUSTING

.1 Adjust moving or operating parts to operate/function smoothly and properly.

3.6 CLEANING

.1 Clean work area daily in accordance with Section 01 74 00 – Cleaning and Waste Management.

.2 Remove all excess materials from site as Work proceeds and at completion.

.3 On completion of the Work remove all tools, containers, surplus materials, equipment, waste, etc.; and leave site neat, clean, and tidy to the satisfaction of the Owner.

.4 Clean and make good surfaces soiled or otherwise damaged because of Work of each Section at no additional cost to the Owner.

.5 Leave surfaces clean and ready for subsequent Work.

3.7 CLOSEOUT ACTIVITIES

.1 Equipment and System Commissioning:

.1 After successful start-up and prior to Substantial Performance, commission the electrical work in accordance with requirements of CSA Z320, Building Commissioning. Use commissioning sheets included with the CSA Standard, and any supplemental commissioning sheets required. Submit final commissioning data sheets, project closeout documents, and other required submittals.

3.8 PROTECTION

.1 Protect installed materials to prevent damage by other trades for the duration of the construction period. Use materials that may be easily removed without leaving residue or permanent stains.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions and the General Requirements of Division 01 and Section 26 05 00 Common Work Results for Electrical.

1.2 SUMMARY

.1 This Section specifies fire stopping and smoke seal requirements that are common to electrical work Sections of the Specification and it is a supplement to each Section and is to be read accordingly.

1.3 REFERENCES

.1 Acronyms/Abbreviations:

.1 MSDS: Material Safety Data Sheet

.2 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC-S101 Standard Method of Fire Endurance Tests of Building Construction and Materials

.2 CAN/ULC-S115 Standard Method of Fire Tests of Firestop Systems

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with Section 26 05 00 Common Work Results for Electrical.

.2 Product Data:

.1 Submit manufacturer's Product data sheets and MSDS for Products proposed for use in the Work of this Section. Include printed technical data, installation instructions and general recommendations for all materials and components. Include certification indicating compliance of materials with project requirements

1.5 CLOSEOUT SUBMITTALS

.1 Submittals under this Section shall be in conformance with Section 26 05 00 Common Work Results for Electrical.

.2 Test and Evaluation Reports:

.1 Submit a letter of proper firestopping and smoke seal certification as specified in Part 3 of this Section.

1.6 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer:

.1 Installer shall have a minimum of 5 years' continuous Canadian experience successfully completing projects similar in size and complexity as the Work of this Section. Submit proof of experience upon Consultant's request.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 A/D Fire Protection Systems "FIREBARRIER"

.2 Tremco Fire Protection Systems "TREMstop"

.3 3M "Fire Barrier"

.4 Hilti Firestop Systems

.5 Specified Technologies

.2 Requests for substitutions shall be made in conformance with Section 26 05 00 Common Work Results for Electrical.

2.2 MATERIALS

.1 Firestopping and Smoke Seal System Materials

.1 Asbestos-free elastomeric materials tested, listed and labelled by ULC in accordance with CAN4-S115, Standard Method of Fire Tests of Firestop Systems and CAN/ULC-S101, Standard Method of Fire Endurance Tests of Building Construction and Materials for installation in ULC designated firestopping and smoke seal systems to provide a positive fire, water and smoke seal, and a fire-resistance rating (flame, hose stream and temperature) not less than the fire resistance rating of surrounding fire rated construction.

.2 Materials are to be compatible with abutting dissimilar materials and finishes and complete with primers, damming and back-up materials, supports, and anchoring devices in accordance with the firestopping manufacturer's recommendations and the ULC tested assembly.

3 EXECUTION

3.1 PREPARATION

.1 Abide by the following requirements:

.1 examine substrates, openings, voids, adjoining construction and conditions under which the firestop and smoke seal system is to be installed, and confirm compatibility of surfaces

.2 verify penetrating items are securely fixed and properly located with the proper space allowance between penetrations and surfaces of openings

.3 report any unsuitable or unsatisfactory conditions to the Contractor and Consultant in writing, prior to commencement of work, and note that commencement of work will mean acceptance of conditions and surfaces

.4 mask where necessary to avoid spillage and over coating onto adjoining surfaces, and remove stains on adjacent surfaces

3.2 INSTALLATION

.1 Where electrical work penetrates fire rated construction, provide ULC listed and labelled firestopping and smoke seal materials installed in accordance with requirements of CAN4-S115 (ratings F, FT, FH, and FTH as required), CAN/ULC-S101, and all other governing authorities to seal the penetrations.

.2 Application: Conform to the following application requirements:

.1 use an experienced applicator approved by the manufacturer of the firestopping material manufacturer

.2 prime substrates in accordance with the product manufacturer's written instructions

.3 provide temporary forming as required and remove only after materials have gained sufficient strength and after initial curing

.4 tool or trowel exposed surfaces to a neat, smooth, consistent finish

.5 remove excess compound promptly as work progresses and upon completion

.6 at all cable transit locations, seal the perimeter of the angle iron framing on both sides of the wall or slab with ULC listed and labelled sealant materials to provide a positive smoke seal

3.3 SITE QUALITY CONTROL

.1 Site Tests and Inspections:

.1 Notify the Consultant when the work is complete and ready for inspection, and prior to concealing or enclosing firestopping and smoke seal materials and service penetration assemblies. Arrange for final inspection of the work by the Municipal Building Inspector prior to concealing or enclosing work. Make any corrections required.

.2 Non-Conforming Work:

.1 Defective materials or quality of work, whenever found, at any time prior to acceptance of the work, shall be rejected regardless of previous inspection. Inspection will not relieve responsibility but is a precaution against oversight or errors.

3.4 CLOSEOUT ACTIVITIES

.1 Certification:

.1 On completion of the firestopping and smoke sealing installation submit a letter of assurance to the Consultant certifying that the firestopping and smoke sealing installation has been carried out throughout the building to all electrical service penetrations and that the installation has been done in strict accordance with the requirements of the Provincial Building Code, any applicable local Municipal Codes, ULC requirements, and the manufacturer's instructions.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions and the General Requirements of Division 01 and Section 26 05 00 Common Work Results for Electrical.

1.2 SUMMARY

.1 This Section specifies requirements, criteria, methods and execution for electrical demolition work that are common to one or more electrical work Sections, and it is intended as a supplement to each Section and is to be read accordingly.

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 Canadian Standards Association (CSA):

.1 CSA S350 Code of Practice for Safety in Demolition of Structures

2 EXECUTION

2.1 EXAMINATION

.1 Verification of Conditions:

.1 Examine all work of other Sections upon which the Work of this Section depends.

.2 If hazardous materials and/or waste not listed in the Specification is found, stop the associated work and notify the Owner and Consultant immediately and await directions.

.3 Report in writing to the Consultant/Project Manager any defects of surfaces or work prepared by other Sections which affect the quality or dimensions of the Work of this Section.

.4 Do not proceed with Work of this Section until all unsatisfactory conditions have been rectified and site conditions are ready to receive work.

.5 Commencement of work implies acceptance of existing conditions and work by others.

2.2 PREPARATION

.1 Protection of In-Place Conditions:

.1 Provide temporary protection of adjacent areas and surfaces by means of masking (enclosures) where necessary to prevent contamination by Work of this Section.

.2 Disconnection and Removal of Existing Electrical Work

.1 Where indicated on the drawings, disconnect and remove existing electrical work, including hangers, supports, etc. Disconnect at the point of supply, remove obsolete connecting services and make the system safe. Cut back obsolete conduit behind finishes and cap unless otherwise specified.

.2 The scope and extent of the demolition or revision work is only generally indicated on the drawings. Estimate the scope, extent and cost of the work at the site during the bidding period scheduled site visit(s).

.3 Where deemed necessary by the Owner and Consultant, existing shafts, walls, and inaccessible ceilings will be opened by the Owner to permit site visit inspection of services to be removed/revised as part of the work but usually concealed behind such construction.

.4 Claims for extra costs for demolition work not shown or specified but clearly visible or ascertainable at the site during bidding period site visits will not be allowed.

.5 If any re-design is required due to discrepancies between the electrical drawings and site conditions, notify the Consultant who will issue a Site Instruction. If, in the opinion of the Consultant, discrepancies between the electrical drawings and actual site conditions are of a minor nature, the required modifications are to be done at no additional cost.

.6 Where existing electrical services extend through, or are in an area to serve items which are to remain, maintain the services in operation. Include for rerouting existing services concealed behind existing finishes and which become exposed during the renovation work, so as to be concealed behind new or existing finishes.

.7 Unless otherwise specified, remove from the site and dispose of all existing materials which have been removed and are not to be relocated or reused, except for the following which are to be handed over to the Owner at the site:

.1 Speakers

.2 Wireless Access Points

.3 Clocks

2.3 CLEANING

.1 Complete cleaning of this Section in accordance with Section 26 05 00 Common Work Results for Electrical.

2.4 PROTECTION

.1 Protect installed materials to prevent damage by other trades for the duration of the construction period. Use materials that may be easily removed without leaving residue or permanent stains.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, Division 01 – General Requirements, and Section 26 05 00 – Common Work Results for Electrical.

1.2 SUMMARY

.1 Section includes: Provide wire and cable, including but not limited to the following:

.1 This Section, "Wire and Cable", shall apply to all systems of this Contract. Variations or alterations of the requirements for a system, will be specified in that system section.

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 26 05 53 – Identification for Electrical Systems

.2 Section 26 05 33 – Raceway and Boxes for Electrical Systems

.3 Section 27 10 00 – Structured Cabling

1.3 CLOSEOUT SUBMITTALS

.1 Submittals under this Section shall be in conformance with Section 26 05 00.

.2 Record Documents:

.1 Manufacturer’s letter stating the “MI” cable has been properly installed, tested, and is ready to be energized.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Provide local motor and equipment disconnecting switches or devices for all items regardless of Electrical Code exceptions for mechanical equipment, architectural equipment, Owner purchased equipment and system control panels. The wiring for equipment schedules and drawings do not indicate these disconnecting switches or devices. Some equipment items have integral disconnect switches provided and pre-wired with the equipment. In case of equipment manufacturer supplied disconnecting switches, issue a full credit to the contract to delete the switches specified under this section.

.2 Wiring for Mechanical Equipment:

.1 Refer to the "Wiring for Mechanical Equipment Schedule", for the schedule of devices and wiring to be provided.

.2 Wiring for mechanical equipment as described in the specification and as indicated on the drawings are based on the specified mechanical equipment. Wiring for this equipment shall not commence until approved wiring diagrams have been obtained

.3 Provide all required 120 V control equipment and wiring. Only line voltage components built-in to the equipment by the manufacturer or included under the controls or Equipment Sections of mechanical work will be provided by the Mechanical Division. In general, the Mechanical Division will provide all low voltage (24 V or less) control equipment and wiring and all pneumatic control devices and tubing unless otherwise indicated.

.4 Should alternate equipment other than the specified equipment be substituted all alterations to the wiring incurred by the said substitution will be provided at the Mechanical Division's expense. All changes and costs incurred by the substituted equipment, will be subject to the Contractor's approval.

.5 Remote push buttons, pilot lights, and control devices in finished areas shall be heavy duty oil tight devices and contact blocks in flush wall mounted boxes 1100 mm (43 in) above floor level, and finished with stainless steel covers.

.3 Wiring for Architectural/Owner Purchased Equipment:

.1 Provide labour and materials to supply power to Architectural or Owner purchased equipment and make the necessary electrical connections. Provide an approved receptacle circuit termination device, disconnect switch, etc. to suit the item requirements. Also install and wire remote control devices for this equipment as noted on the drawings. Refer to notes on the Electrical Drawings and the Equipment Wiring Schedules for further details. Wiring requirements as indicated are based on the specified equipment. Wiring for this equipment shall not commence until approved equipment shop drawings identifying connection point, outlet requirement, rating and wiring diagram have been received.

.2 Provide a power supply to each electrically operated door, dock leveller, etc., terminating in a disconnect switch at the equipment connection point. The equipment supplier will provide the control devices, starters, limit switches, etc., for installation. Complete the wiring between components according to the equipment supplier’s wiring diagram.

.4 Wiring for Elevator/Lift:

.1 Provide protected power supply and local fused disconnect switch for elevator/lift controller. Provide approved auxiliary contact block (Commander) inside switch enclosure on operating mechanism for electrical indication of switch off condition. Provide power supply wiring from disconnect switch and auxiliary contact to controller.

.2 Provide protected power supply and local fused disconnect switch for elevator car lighting. Provide power supply wiring from disconnect to controller.

.3 Provide a telephone outlet next to the elevator controller for elevator car emergency telephone.

.4 Provide wiring terminated in appropriate electrically held relays with convertible contacts in elevator machine room from fire alarm system for special function operation. Provide wiring from relay to controller.

.5 Verify all component location and wiring requirements with the Elevator Installer prior to installation. All connections to elevator equipment shall be made as directed by Elevator Installer and only in his presence.

2 PRODUCTS

2.1 MATERIALS

.1 Distribution And Branch Circuit Conductors

.1 Conductors to and including 10 AWG are to be solid or stranded type. Conductors larger than 8 AWG are to be stranded. All conductors are to be constructed from 98% conductive copper and are to be approved for 600 volts. Conductors are to be colour coded, factory identified on the insulation with the manufacturer's name, conductor size and metal, voltage rating, and CSA type and designation. Conductors are to be as follows:

.1 "T-90 Nylon" single conductor in accordance with CSA C22.2 No. 75, Thermoplastic-Insulated Wires and Cables, 90° C (195° F) rated, PVC insulated and nylon covered.

.2 "RW-90" single conductor in accordance with CAN/CSA C22.2 No. 38, Thermoset-Insulated Wires and Cable, 90° C (195° F) rated, X-link polyethylene insulated.

.3 "AC-90" flexible cable to CSA C22.2 No. 51, Armoured Cable, with 90° C (195° F) rated, X-linked polyethylene insulated conductors, a concentric ground conductor, and an interlocking aluminium armour jacket.

.4 "FAS" cable in accordance with requirements of CSA C22.2 No. 208, Fire /Alarm and /Signal Cable, FAS90 shielded or un-shielded as required, 90° C (195° F) rated, consisting of a copper conductor, silicone rubber insulation, and a polyolefin outer jacket.

.2 Low Voltage (24 Volt) Conductors

.1 "T-90" or "RW90" stranded copper conductors as specified above.

.2 Equal to Nexans Canada "Securex II" FAS/LVT/FT1300 volt wire to CSA C22.2 No. 208, Fire /Alarm and Signal Wire, 105° C (220° F) rated, consisting of solid copper conductors (stranded for control wiring), flame retardant PVC insulation, an aluminium/Mylar optional shield with a #22 AWG tinned copper insulation and a drain wire, and, if required for the application, interlocking aluminium armour with or without an overall jacket.

.3 Communications Cable:

.1 All cabling used for Ethernet, Telephone, or other IP-based systems shall follow cabling requirements as outlined in 27 10 00 Structured Cabling.

.3 Connectors

.1 Conductors in Conduit: Except as noted, CSA certified flame resistant thermoplastic, colour coded twist type connectors to suit the system voltage and wire gauge.

.2 Conductors 3/0 AWG and Larger: Long barrel, double crimp, compression type lug connectors, unless otherwise specified.

.3 Armoured Cable: Except as noted, proper squeeze type connectors and plastic anti-short bushings at terminations in accordance with requirements of CSA C22.2 No. 18.3, Conduit, Tubing and Cable Fittings.

.4 Corflex/Teck Cable: Connector and termination hardware supplied by the cable manufacturer to

.4 Conductor Pulling Lubricant

.1 Equal to Ideal Industries “Yellow 77” or “ClearGlide”, as required.

3 EXECUTION

3.1 INSTALLATION

.1 Conform to the following conductor installation requirements:

.1 Conductor Routing: Conductor routing indicated on the drawings is schematic and approximate. Determine exact routing and conductor lengths at the site. Route conductors to avoid interference with other work. Unless otherwise specified or shown install conductors parallel to building lines.

.2 Conductor Pulling: When pulling conductors into conduit or duct use lubricant and ensure that the conductors are kept straight and are not twisted.

.3 Securing/Supporting Conductors: Conform to the following requirements:

.1 neatly secure exposed conductors in equipment enclosures with proper supports and/or ties

.2 support flexible armoured cable in ceiling spaces and stud walls with steel two hole cable straps to Code requirements

.4 Conductor Splicing: Generally, conductor splicing is not permitted unless otherwise approved by the Consultant, and if approved splicing is subject to the following conditions:

.1 splicing is permitted to extend existing conductors

.2 for thermoplastic insulated conductors, splices are to be made within an approved electrical box with mechanical compression connectors to suit the type and size of conductors, and the box(es) are to be properly identified and locations are to be indicated on “as-built” drawings.

.3 where multiple conductors are spliced:

.1 use properly sized Wing Nut connectors, or approved equal, for up to two 8 AWG or three 10 AWG conductors

.2 use pressure type sleeve cable connectors, splices, tee's, etc. for all larger size connections and terminations

.4 insulate all bare surfaces of splices with Scotch No. 33 tape, heat shrink sleeving, or equivalent.

.5 conductors connected to ground rods for service or equipment grounding or to building structural or architectural elements to be terminated, connected and spliced using:

.1 a thermoweld process

.2 an approved non-mechanical compression type connectors where serviceable

.6 install service and feeder conductors as continuous lengths without breaks, measured and cut based on field-measured dimensions.

.5 Conductor Termination:

.1 Where a single solid conductor is terminated in a device under one screw or clamping mechanism, no additional terminating hardware is required.

.2 Where multiple or stranded conductors are terminated in a device under one screw or clamping mechanism, self insulated crimpon cable ends or approved equal shall be used up to and including 10 AWG sized conductors. Approved compression lugs shall be used for larger conductor sizes.

.6 Grounding and bonding conductors:

.1 Insulated grounding or bonding conductors shall be the same type as the line conductors.

.2 Each feeder and branch circuit shall be provided with a separate ground conductor sized in accordance with Electrical Code regulations. All 120 V or 347 V (single phase) branch circuits shall be provided with a separate neutral conductor for each circuit.

.2 Installation of distribution and branch circuit conductors

.1 Install all required conductors.

.2 Non-Fire Rated Conductors: Unless otherwise specified herein or on the drawings, non-fired rated conductors are to be used as follows:

.1 conductors underground inside or outside the building, and in non-climate controlled areas – RW-90

.2 unless otherwise specified, conductors within stud wall construction, and in furniture systems to luminaries and wiring devices – AC90 flexible armoured cable, maximum 6 m (20 ft) run permitted

.3 for conductors in accessible ceiling spaces (not walls) to luminaries - AC90 flexible armoured cable, maximum 3 m (10 ft) run permitted

.4 for conductors except as specified above or elsewhere in the Specification or on the drawings – T90 Nylon or RW90

.3 “Teck” Cable Installation Requirements: Install “Teck” cable in accordance with the manufacturer’s instructions, including the following requirements:

.1 support and secure overhead suspended “Teck” cable tray where indicated

.2 secure individual cables to cable tray or, where shown, directly to building surfaces by means of single screw non-ferrous clamps

.3 terminate cable with lugs and termination kits supplied with the cable

.4 Conductor Sizing:

.1 do not use conductors smaller than 12 AWG in systems over 30 volts.

.2 conductor sizes indicated on the drawings are minimum sizes and must be increased, where required, to suit length of run and voltage drop in accordance with the voltage drop schedule found at the end of this Section.

.3 all branch circuit wire feeding a 20 A protected lighting circuit to be minimum 10 AWG wire.

.4 all branch circuit wiring feeding a 15 A protected circuit which is over 45 m (150 ft) in length to be minimum 10 AWG wire.

.5 do not use conductors smaller than 8 AWG for exterior luminaire wiring.

.3 Voltage Drop:

.1 Voltage drop in power and control conductors shall be in accordance with the requirements of the Electrical Code. Size conductors, splicing kits, and termination lugs accordingly when sizes are not identified.

.2 Maximum branch wiring distance from panel to load in metres for 120 V single-phase system at 2% voltage drop based on indicated wire size:

Breaker Size (A)	15	20	30	40	50
Max load at 80% (A)	12	16	24	32	40
12 AWG	16.8	12.2	---------	---------	---------
10 AWG	25.9	19.0	---------	---------	---------
8 AWG	39.6	30.4	12.9	---------	---------
6 AWG	62.4	47.2	32.0	23.6	19.0
4 AWG	99.0	73.1	50.2	38.1	30.4
2 AWG	-------	114.3	77.2	57.9	47.2
1 AWG	-------	-------	96.0	73.1	57.9
1/0 AWG	-------	-------	-------	85.3	68.5
2//0 AWG	-------	-------	--------	102.8	80.7
3/0 AWG	-------	-------	---------	---------	95.2

.3 Maximum branch wiring distance from panel to load in metres for 120 V single-phase system at 3% voltage drop based on indicated wire size:

Breaker Size (A)	15	20	30	40	50
Max load at 80% (A)	12	16	24	32	40
12 AWG	24.4	18.3	---------	---------	---------
10 AWG	38.1	29.0	19.1	---------	---------
8 AWG	59.4	44.2	30.5	22.9	---------
6 AWG	91.4	70.1	47.2	35.1	28.2
4 AWG	-------	109.7	73.2	54.9	42.7
2 AWG	-------	---------	114.3	85.3	68.6
1 AWG	-------	-------	--------	103.6	85.3
1/0 AWG	-------	-------	-------	128.0	102.9
2//0 AWG	-------	-------	--------	--------	122.9

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, Division 01 – General Requirements, and Section 26 05 00 – Common Work Results for Electrical.

1.2 SUMMARY

.1 Section includes: Provide raceway and boxes for electrical systems, including but not limited to the following:

.1 Electrical conduit system throughout the project unless indicated otherwise. The conduit systems shall consist of all the necessary conduit, fittings, fastenings, boxes, special supports, etc.

1.3 REFERENCES

.1 Abbreviations and Acronyms:

.1 EMT: Electrical Metallic Tubing

.2 FRE: Fibreglass Reinforced Epoxy

.3 GRC: Galvanized Rigid Metal Conduit

.4 PVC: Polyvinyl Chloride

.2 Definitions:

.1 Conduit - The definitions of "Conduit" (Rigid Metal, Rigid PVC, Rigid FRE, Flexible, and Electrometallic Tubing) as defined in the Electrical Safety Code. Other definitions shall be as follows.

.2 Slabbed Conduit - Conduit which is installed within a monolithic concrete floor slab. No slabbed conduit shall be allowed to be installed for this project - use underground conduit where approved.

.3 Underground Conduit - Conduit or duct which is installed below the finished earth grades or below the lower edge of an on grade or subgrade floor slab.

.3 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 26 05 43 Underground Ducts and Ductbank

2 PRODUCTS

2.1 MATERIALS

.1 Conduit, Connectors and Fittings:

.1 Use conduit, connectors, and fittings as standard in the trade, unless noted herein or on the drawings to be of a specific type, manufacturer, trade name, series or catalogue number.

.2 Galvanized Rigid Metal Conduit (GRC):

.1 All fittings to be threaded type. Supply bushings with insulated plastic lining for all conduit terminations.

.2 Electric Metallic Tubing (EMT):

.3 All fittings to be steel set screw or raintight type. Supply bushings with insulated plastic lining for all conduit terminations.

.3 Flexible Conduit:

.1 All box connections to have either a nylon lined connector or be provided with an insuliner sleeve. Include sealing ring for fully sealed connection for liquid tight type.

.2 Supply metallic liquid tight type for all exposed flexible conduit.

.3 Supply non-metallic type flexible conduit for inside concrete block walls.

.4 Concealed flexible conduit to be approved galvanized steel or aluminum (where approved) interlocking type, minimum size 12 mm (1/2 in).

.4 Rigid PVC:

.1 Use approved rigid PVC fittings with solvent cement connections for all joints.

.5 Outlet Boxes:

.1 Use outlet boxes, junction boxes, etc. of the types approved for the application. Use the following types for the noted applications:

.1 Recessed boxes in concrete or masonry - Type MBD or MBS boxes.

.2 Surface mounted with EMT conduit - Type 1110 or 2020 "Utility" box.

.3 Surface mounted with rigid conduit - Type FS or FD boxes.

.6 Miscellaneous:

.1 Rigid Metal Expansion Joint - Crouse Hinds "XJ" series with bonding strap or equivalent.

.2 Rigid PVC Expansion Joint - Scepter "O" Ring expansion joint "EJ" series or expansion coupler "EC" series, to suit expected length of movement.

3 EXECUTION

3.1 INSTALLATION / APPLICATION

.1 Application

.1 Electric Metallic Tubing (EMT):

.1 Conduit sizes 103 mm (4 in) and less, where not specified or required to be otherwise due to special applications or conditions.

.2 To carry branch circuit wiring from local distribution or lighting panels to area circuit junction boxes above ceiling systems.

.2 Flexible conduit:

.1 As branch circuit wiring from area circuit junction boxes above ceiling systems to light fixtures and from outlet boxes to suspended fixtures.

.2 Restrict flexible conduit to less than 3600 mm (12 ft) in length. Suitably clip and support every 900 mm (3 ft) in length the flexible conduit used above ceiling systems.

.3 As a raceway in stud walls or partitions.

.4 Do not use flexible conduit where conduit is run exposed.

.3 Liquid tight flexible conduit:

.1 As the raceway between the distribution conduit and equipment terminal boxes of vibrating and rotating equipment.

.2 Restrict length to be less than 600 mm (24 in).

.4 Use corrosion resistant conduit where indicated on the drawings.

.5 Do not use aluminum conduit on this project.

.2 Installation

.1 Where more than one type of product or method of installation could apply, the most restrictive products and methods of installation shall take precedence.

.2 All conduit connections to be as tight as possible. Failure to tighten any conduit connections in block, tile or concrete elements will result in the element being removed and reinstalled at this Section's expense.

.3 Do not use the conduit system as the ground path for the building wiring system. Supply all wiring systems with a separate copper ground conductor sized accordingly to ensure ground path continuity.

.4 Conceal conduit in all finished wall areas but may be run exposed in service and equipment rooms.

.5 Where conduit is run exposed, run parallel to the building lines. Supply grouped concentric bends where two or more conduits are installed.

.6 Do not install conduit horizontally in masonry walls.

.7 Lay out all conduits and install to avoid the proximity of heating pipes and ducts. Do not run conduit within 900 mm (3 ft) of such pipes and ducts.

.8 Plug conduit ends during construction with plastic push pennies. Cap conduits stubbed for future use with conduit caps and seal, if below grade.

.9 Rigidly and securely support conduit systems with conduit straps to the building structure. Support multiple conduit runs, if not easily attached to the building structure directly, by Unistrut hanger assemblies. Bailing wire or flexible metal strapping will not be accepted..

.10 Install two 32 mm (1¼ in) spare empty conduits stubbed into the ceiling space from the top of all recessed panelboards. Terminate in suitable junction box with blank cover labelled accordingly.

.11 Install a nylon pull cord in all empty conduits. Adhere tags at both ends indicating system and destination. Maintain a pull cord in systems conduits used only to partial capacity.

.12 Colour code all conduit systems throughout the building during installation with a patch of paint at all junction and pull boxes and points of concealment as follows:

.1 Black – Power Distribution (also indicate specific source/panel)

.1 Black/Green – 600/347 V Normal

.2 Black/Blue – 208/120 V Normal

.2 Red – Fire Alarm System (also indicate circuits)

.3 Orange – Emergency/Standby Power System (also indicate specific source/panel)

.1 Orange/Green – 600/347 V Emergency/Standby

.2 Orange/Blue – 208/120 V Emergency/Standby

.3 Orange/Purple – Uninterruptible Power

.4 Yellow – Public Address/Intercom/Audio-Visual Systems

.5 Green – Security System

.6 Purple - Controls

.7 Blue – Telecommunications System

.3 Partition Walls:

.1 Feed all conduit in demountable, prefabricated or standard stud partition walls into the wall from the ceiling. Make no connections from the floor or walls unless shown on drawings. Terminate conduit in a junction box in the ceiling space within 900 mm (3 ft) of the ceiling system penetration point.

.2 Restrict flexible conduit in demountable or prefabricated partitions to a maximum 25 mm (1 in) size.

.4 Outlet Boxes:

.1 The location of outlets, fixtures, panels, etc., as shown on the drawings, are approximately correct, but the Consultant reserves the right to alter the location of any number of them up to 3000 mm (10 ft) without incurring extra cost, if altered before installation is commenced on any individual item.

.2 In general, Use 100 mm (4 in) octagon boxes for light fixture outlets.

.3 In concrete slabs or walls, use boxes greater than 50 mm (2 in) deep.

.4 In general, in fire rated partitions, install outlet boxes with openings no larger than 160 cm^2 (25 in^2) in area. Install outlet boxes on opposite side or same side of a fire rated partition offset at least one stud space to maintain the integrity of the fire separation.

.1 Refer to code plans indicating fire rated partitions

.2 Where openings exceed this criteria, install intumescent material that comply with ULC fire rated assemblies.

.5 Use watertight with screw fittings and watertight gaskets to install outlet boxes outside of the building.

.6 In general, install outlet boxes of adequate size and required dimensions for all outlet and conduit junctions.

.7 Rigidly secure all outlet boxes in position by approved methods. For those intended for hanging fixtures, supply with fixture studs, self aligning type for sloping ceilings.

.8 Outlet boxes designated for future use, install with blank-metal coverplates. Install coverplates, on outlet boxes designated for other than future wiring devices, in time to be painted over by the painting Section.

.9 Place all pull boxes and terminal boxes in inconspicuous but accessible locations.

.10 Centre all outlets, panelboards, lighting control, panels and equipment on construction panels, wood paneling or boarding, ceiling tile, etc.

.11 Install components or devices such as lighting controls and receptacles or thermostats, etc., which occur one above the other in the same general location, in the same vertical line.

.12 Install adjacent items such as panels and fire hose cabinets, etc., with the tops of their trims in line.

.13 Locate clocks, bells, horns, speakers, etc. as shown or specified. However, mount these items symmetrically in paneling or tiles, and bear proper relationship to doors, ventilation grilles, etc. Where specific heights are not covered, discuss the relation with, and approved by, the Consultant.

.14 In no case shall luminaires, pipes, ducts or other elements be allowed to obstruct clocks, grilles, exit lights, etc.

.15 Mount recessed or surface ceiling mounted components to replace full tiles where possible or be centred on the tile or grid intersections.

.16 Locate lighting controls on the latch side of door or primary leaf within 150 mm (6 in) of the jamb or sidelight. Where light controls are shown on hinge side of single doors, in cases where glazing makes placing the controls on the latch side not possible, ensure that lighting controls are within 150 mm (6 in) beyond door in fully open position and no part extends behind the open door. Verify door swings and primary leaves on double doors before proceeding with installation of the control box and associated conduit/wiring.

.17 Ensure all outlet boxes are installed with vapour barrier protection integral with specific wall or ceiling construction. For each outlet box installed which pierces a vapour barrier, supply an appropriately sized vapour barrier box surrounding outlet box to seal all air leaks and maintain vapour barrier continuity.

.18 In finished areas of the building, conceal as much conduit/wiring as possible. Where in this Section's opinion it is necessary or advantageous to run wiring on the surface, obtain approval from the Consultant before proceeding. Install all surface raceways as metal and manufactured by Wiremold unless otherwise indicated. Install surface raceways at size to suit conductors being carried. Use only approved components, fittings, and methods of securing, joining and supporting surface raceways and outlet boxes. Where surface mount raceways and outlet boxes are used, paint to match the specific wall or ceiling finish by the painting Section.

.5 Mounting Height:

.1 Where receptacles or other devices interfere with heating equipment, mount horizontally in the toespace below the heating unit unless otherwise noted.

.2 For mounting heights of the various system devices not indicated herein refer to the specific system Section or drawing detail.

.3 Verify mounting heights of outlet boxes in special or decorative wall systems prior to rough-in.

.4 For exact mounting heights and requirements of outlets and devices built into millwork or architectural furnishings, refer to elevations and details shown on the architectural drawings. Verify with millwork Section prior to rough-in.

.6 Conduit Seals:

.1 In areas where conduits pass through walls or other building surfaces in which different temperatures exist (i.e. refrigerated spaces or exterior walls and insulated ceilings or roofs, etc.), seal off the conduits with appropriate materials and methods to prevent breathing and subsequent condensation. Complete the sealing such that moisture is not trapped at the seal.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions and the General Requirements of Division 01 (and Division 20 or 26).

1.2 SUMMARY

.1 Section includes: Provide identification for electrical systems, including but not limited to the following:

.1 Identification nameplates for all electrical apparatus such as: panels, motor starters, switchgear, transformers, disconnect switches, breakers, contactors, and system control panels.

.2 Directory cards for all panelboards such as: power, lighting, low voltage systems, and communications. All power and systems wiring shall be colour coded in accordance with this Section and be provided with appropriate wire markers identifying panel circuits.

2 PRODUCTS

2.1 MATERIALS

.1 Lamicoid Nameplates:

.1 All identification nameplates and nametags unless otherwise specified shall be engraved white letters on black lamicoid stock with bevelled edges. The lamicoid stock shall be 1.5 mm (1/16 in) minimum thickness.

.2 The nameplates shall be engraved with the following information:

.3 Nameplates for panel and cabinet identification shall typically include the following:

LP-A	13 mm (1/2 in) high lettering
120/208 VOLT	8 mm (5/16 in) high lettering
FED FROM MCC-1	8 mm (5/16 in) high lettering

.4 All other electrical equipment shall be typically identified as follows:

SUPPLY FAN SF-1	8 mm (5/16 in) high lettering
208 VOLT - 3 PHASE	8 mm (5/16 in) high lettering
FED FROM MCC-1	8 mm (5/16 in) high lettering

.5 The final wording of all nameplates shall be reviewed and approved by the Owner and Consultant prior to fabrication.

.2 Panel Directories

.1 Each panel circuit directory card shall have clearly typed information as with the following example:

PANEL NAME:	LP-A
PANEL VOLTAGE:	120/208 VOLT – 3 PHASE
PANEL SUPPLY:	150 AMP

Circuit Number	Load	Room No. or Locations
1	Lighting	143
2	Receptacles	029
2	Supply Fan SF-4	Roof

.2 All systems distribution cabinets shall be complete with a directory card showing circuit numbers, room locations, and a blank column for "REMARKS".

.3 Wire and Cable Colour Coding

.1 All power and systems wiring shall be colour coded as follows:

Power	Phase A	Red
	Phase B	Black
	Phase C	Blue
	Identified (Neutral)	White
	Ground	Bare or Green
Motor Control		Yellow

.2 Provide suitable clip-on or stick-on wire markers for all wires at points of termination and interconnection. Wire markers shall identify panel and circuit number in a clear and logical manner.

3 EXECUTION

3.1 INSTALLATION

.1 Lamicoid nameplates shall be mounted behind the panel door, fastened with contact cement.

.2 Temporary panel directory cards shall be provided and filled in as the circuits are installed. The temporary directory card shall be replaced with a typed permanent directory at job completion.

.3 The panel directory card shall be inserted in the card holder on the inside of the panel door and be protected by a clear plastic sheet.

.4 Feeder cables shall be colour coded in each terminal panel and junction box with a minimum 75 mm (3 in) taped band.

.5 All power and systems junction and terminal box covers shall be marked with permanent black marker as to system installed (i.e. "F.A." for Fire Alarm) and other details such as circuit numbers, detection zone, etc. Exposed boxes shall have marking on inside face of cover.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions and the General Requirements of Division 01 and Section 26 05 00 Common Work Results for Electrical.

1.2 SUMMARY

.1 Section includes: Provide lighting control, including but not limited to the following:

.1 Work to include all labour, materials, tools, appliances, control hardware, sensors, wiring, junction boxes and equipment necessary for and incidental to the delivery, installation and furnishing of a completely operational standalone lighting control system, as described herein.

.2 Control lighting in all spaces within scope using the lighting control system. Manual lighting controls may be used where indicated specifically on the drawing.

.3 This section to be read in conjunction with the Lighting Narrative in drawing package and Lighting Narrative Room Designations shown on layout drawings. Refer to Lighting Fixture Schedule on drawings for details about fixture drivers, wattage, fixture mount controls, and dimming methods.

.4 Examine all general specification provisions and drawings for related electrical work required as work under this section.

.5 All lighting control is subject to functional testing. Test all lighting control devices and control system to ensure that control hardware and software are calibrated, adjusted, programmed, and in proper working condition in accordance with this section and the manufacturer’s installation instructions.

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 26 27 26 Wiring Devices

.2 Section 26 50 00 Lighting

1.3 REFERENCES

.1 Abbreviations and Acronyms:

.1 DALI: Digital Addressable Lighting Interface

.2 DMX: DMX512 is a digital communications interface

.3 HMI: Human Machine Interface

.4 NO/NC: Normally Open/Normally Closed contacts

.2 Definitions:

.1 Dual Technology - sensors that combine both passive infrared and another technology into one sensor.

.2 Normally Occupied Spaces - rooms or spaces within the building that are likely to be occupied for 30 minutes or more by a building user.

.3 Occupancy sensor - a motion detecting device used to detect the presence of a person to automatically control lights or temperature or ventilation systems. The sensors use infrared, ultrasonic, sound, microwave, Bluetooth or other technology.

.4 Photosensor - an electronic device that detects the prevailing light level and sends the information either as an analog or a stepped digital output as a relative representation of the light level.

.5 Vacancy Sensor - works like an occupancy sensor; however, lights must be manually turned ON, but will automatically turn OFF when motion is no longer detected. For the purposes of this scope of work the use of Occupancy and Vacancy are equivalent.

.3 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE):

.1 ASHRAE 90.1 Energy Standard for Buildings Except Low Rise Residential Buildings

.2 Canadian Standards Association (CSA):

.1 CSA C22.2 No. 141 Emergency Lighting Equipment

.3 Underwriters Laboratories (UL):

.1 UL 924 Standard for Emergency Lighting and Power Equipment

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate all work described in this section with all other applicable plans and specifications, including but not limited to wiring, conduit, fixtures, HVAC systems, and building management systems.

1.5 SUBMITTALS

.1 Submittals under this Section shall be in accordance with Section 26 05 00.

.2 Product Data:

.1 Submit manufacturer's Product data sheets for Products proposed for use in the Work of this Section. Include printed technical data, installation instructions and general recommendations for all materials and components. Include certification indicating compliance of materials with project requirements

.3 Shop Drawings:

.1 Complete sets of shop drawings shall be submitted indicating the following:

.1 Wiring/Wireless schematics for typical and standalone room types in this project. (i.e. classroom, private office, lobby, open office, boardroom, etc.).

.2 Multi-button wall switch button configurations for each switch.

1.6 CLOSEOUT SUBMITTALS

.1 Submittals under this Section shall be in conformance with Section 26 05 00.

.2 Test and Evaluation Reports:

.1 Submit cybersecurity report or documentation as specified in Part 2 of this Section.

.2 Submit manufacturer's inspection reports and verifications that the Work of this Section is correctly installed.

1.7 QUALITY ASSURANCE

.1 All sensors, accessories and components must have a recognized certification mark (such as CSA or ULC) or a recognized field evaluation mark by Electrical Authority as designated by the Electrical Code.

.2 All control functions shall operate independent of network connectivity. Controls shall not require connection to the building network or the internet to operate. All dimming preferences and last known switch or dimming level shall not be dependant on network connection.

.3 On restoration of power to controlled fixtures, lighting level shall return to dimming level set before power loss within 5 seconds. If fixture was off prior to loss of power, fixture shall remain off after power restoration.

.4 All installation components shall have an installed base of more than 200 successful sites.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Comparable Products from manufacturers listed herein will be accepted provided they meet requirements of this Specification:

.1 nLight/Accuity

2.2 OPERATION

.1 Controls:

.1 Ensure that drivers used by lighting manufacturer are compatible with lighting control system or incur all costs for replacement to a compatible unit at no additional cost to the project.

.2 The system shall operate with multiple users in harmony and not react adversely to manual override inputs. Do not impede personal lighting control and the ability to adjust light levels on a per fixture basis.

.3 The following is the hierarchy of lighting control. Any function higher on the list supersedes any function lower.

.1 Life Safety control

.2 Lower and upper trim settings

.3 Manual Local Control

.4 Occupancy

.5 Time of Day programming

.6 Daylight Harvesting

.7 Demand Response

2.3 MATERIALS

.1 Occupancy Sensors:

.1 Line voltage

.1 Wall switch mount sensors in normally occupied spaces:

.1 White,

.2 0-10 V dimming,

.3 Dual technology,

.4 Minimum IR coverage 50 m^2 (500 ft^2), and

.5 Minimum two manual activation buttons to be 160 mm^2 (0.25 in^2) or larger.

.2 Wall switch mount sensors in normally unoccupied spaces with more than one fixture:

.1 White,

.2 Two relays,

.3 Passive Infrared technology,

.4 Minimum IR coverage 50 m^2 (500 ft^2), and

.5 Minimum two manual activation buttons to be 160 mm^2 (0.25 in^2) or larger.

.3 Wall switch mount sensors in normally unoccupied spaces with one fixture:

.1 White,

.2 One relay,

.3 Passive Infrared technology, and

.4 Minimum one manual activation button to be 160 mm^2 (0.25 in^2) or larger.

.2 Low Voltage

.1 Ceiling mount sensors – Dual Technology

.1 Ultrasonic technology

.2 Minimum IR coverage 100 m^2 (1000 ft^2) 360º with adaptable corridor coverage up to 9.75 m (32 ft) when mounted at 3 m (10 ft) above finished floor

.2 Ceiling mount sensors – Passive Infrared only

.1 Minimum IR coverage 100 m^2 (1000 ft^2) 360º when mounted at 3 m (10 ft) above finished floor.

.3 Wall mount sensors

.1 Dual technology

.2 Rotatable knuckle mount for aiming (with lock in place)

.3 Mounting plate for octagonal or square wall box

.4 Minimum IR range of 13.5 m (45 ft) at 90º coverage when mounted 3 m (10 ft) above finished floor

.4 Fixture mount sensors

.1 Refer to lighting fixture schedule for specific details.

.2 Daylighting Control Sensors:

.1 Supply daylighting control via photosensors to light fixtures within floor areas substantially illuminated by daylight either through toplight or sidelight windows. The primary and secondary sidelighted or toplighted zones are indicated on the drawings.

.2 In addition to the occupancy based lighting control within this space, the light fixtures in these areas are required to dim or switched off if exterior sunlight levels increase beyond a programmed threshold.

.3 Continuous-type dimming to be used in normally occupied spaces.

.4 Supply photosensor capable of multi-zone switching or dimming with a minimum of 3 sensing levels and connect to room controller/relay.

.5 Combination photosensor/occupancy sensors are not recommended and may be used only where placement of device will not degrade performance of either function.

.3 Line Voltage Wall Controls:

.1 In finished spaces, supply commercial grade rocker-type switches to match the voltage and amperage level of the circuit supplying the fixtures. Supply 3-way or 4-way switches when shown on the drawings. Provide white nylon cover plates.

.2 Where loads are connected to emergency power, switches shall be red in colour, otherwise colour shall be white.

.3 Supply cover plate suitable for the number of gangs shown on the drawings.

.4 Low Voltage Wall Controls:

.1 Dimming wall switch

.1 Supply dimming wall switch consists of one of the following options. The same type shall be used in all areas of the scope of work, and the switch type will not change from area to area.

.1 a multi-button switch with each ON and OFF activation surface greater than 325 mm^2 (0.5 in^2) and separate raise/lower slider or buttons,

.2 a single or multi-button switch with ON/OFF toggle surface greater than 650 mm^2 (1 in^2) and separate raise/lower slider or buttons,

.3 a single dual-zone switch with separate ON and OFF activation zones with a surface greater than 1300 mm^2 (2 in^2), or

.4 a two-button switch with each ON and OFF activation surface greater than 650 mm^2 (1 in^2).

.2 For switches without separate raise/lower slider or pushbuttons, supply the ON/OFF buttons to raise or lower dimming level with a push and hold:

.1 Pushing the top of the switch will turn lighting on. Push and hold of the top of the switch will gradually raise the dimming level of the lighting.

.2 Pushing the bottom of the switch will turn lighting off. Push and hold of the bottom of the switch will gradually lower the dimming level of the lighting.

.3 Supply white cover plate suitable for the number of gangs shown on the drawings.

.2 Non-dimming wall switch

.1 Supply non-dimming wall switch consists of one of the following options. The switch shall match as closely to the dimming version above.

.1 a single dual-zone switch with separate ON and OFF activation zones with a surface greater than 1300 mm^2 (2 in^2), or

.2 a two-button switch with each ON and OFF activation surface greater than 650 mm^2 (1 in^2).

.2 Supply white cover plate suitable for the number of gangs shown on the drawings.

.3 LIGHTING”.

.3 Multi-button/Scene Switch

.1 Supply low voltage momentary pushbutton switches in multi-button (up to 8 in single gang) configuration. Wall switches shall include the following features:

.1 Supply buttons that are large enough to be engraved. Engrave first set of buttons on each switch.

.2 Include bi-level LEDs to indicate dimming levels.

.3 When room lighting is off, illuminate ON button.

.4 All activation buttons to be 160 mm^2 (0.25 in^2) or larger.

.2 Default button text, unless noted on the drawing, shall be as follows.

.1 ON

.2 OFF

.3 Raise

.4 Lower

.5 Meeting

.6 Present

.7 Confer

.8 Cleaning

.3 Layout of buttons shall have logical arrangement. All configurations are subject to review in shop drawings.

.1 ON shall be on top of switch and OFF shall be at the bottom of switch.

.2 Place “raise” always higher than “lower” and are adjacent.

.3 ON/Raise-on-hold combination button and OFF/lower-on-hold combination button can be used if programming will allow multiple function.

.4 Icons may be used in place of text when appropriate and approved.

.5 Emergency Lighting Control:

.1 Where emergency lighting is required and is installed in a space where lighting control is desired, supply an emergency lighting control unit compliant with UL 924 or CSA C22.2 No. 141. Rooms shown with an emergency battery unit meeting code requirements do not require an emergency lighting control unit.

.2 The emergency lighting control unit allows control of emergency lighting fixtures in tandem with normal lighting in an area while ensuring that emergency lighting will turn on immediately to full brightness upon loss of normal power supplying the control device. Emergency lighting operation is independent for each controlled area and does not require a overall power failure for proper operation.

.3 Supply the device with an integral momentary test switch. Pressing and holding this switch instantly forces the unit into emergency mode and turns on emergency lighting. Releasing the test switch immediately returns the unit to normal operation.

.4 The unit has dedicated leads and 24 V DC source for connection to remote test switch, fire alarm system, or other external system capable of providing a normally closed dry contact closure. Breaking contact between the terminals to force and hold the emergency lighting on until the terminals are again closed. An integral LED indicator indicates the unit’s current remote activation status.

.6 Wireless Control:

.1 The basis of design is a fully wired lighting control system. Wireless controls are acceptable for use if the following criteria are met:

.1 Operation of all local control functions is independent of IP network connectivity. Do not require connection to the building network or the internet to operate. All dimming preferences and last known switch or dimming level to not be dependant on network connections.

.2 Use batteries in the system that are non-proprietary and last a minimum of 5 years. Supply part numbers and replacement instructions for all batteries.

.3 On restoration of power to controlled fixtures, return lighting level to brightness level set before power loss within 5 seconds. If fixture was off prior to loss of power, fixture remains off after power restoration.

.4 All wireless installation components to have an installed base of more than 500 successful sites.

2.4 ACCESSORIES

.1 Spare Components:

.1 Supply and turn over to the owner, after six month service visit, 10 % spare (rounded up) wiring devices, sensors, buttons, control stations, relay modules and relays to allow minor future expansion and ongoing maintenance of lighting control system. Installer may use spare components to adjust owner’s requirements during final testing, one month, and six month visits. These spare components are not a replacement for defective components covered under warranty.

3 EXECUTION

3.1 INSTALLATION

.1 The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors, layout is based on coverages in the design basis. Install additional sensors and power supplies/relays as required to provide coverage in the respective control group.

.2 Locate and aim sensors within each space as required for complete and proper volumetric coverage within the range of coverage(s) of controlled areas per the manufacturer's recommendations. Place sensors to have 90% or greater coverage of the controlled zone to accommodate all occupancy habits of single or multiple occupants at any location within the space.

.1 Place occupancy sensors to eliminate activation (or minimize activation, in the case of multiple entries) from outside the space with doors open.

.2 Place photosensors close to sidelights and within toplight vertical sections, with lens not subject to direct exposure to sunlight at all times of the year.

.3 Allow sensors in same control zone to work in conjunction with one another through wired or wireless connections. In rooms with movable dividers, incorporate sensors on dividers that subdivide control zones when dividers are closed and consolidate control zones when dividers are open.

.4 For lighting on emergency circuits in corridors, open areas, or other paths of egress install modules that bring lighting to full output on loss of normal power, fire alarm, or programmed event. At conclusion of event, return lighting brightness to level set before event or normal time-of-day programming.

.5 Non-switch type wall mounted sensors to be mounted at 3 m (10 ft) or 300 mm (12 in) below ceiling, unless otherwise noted.

.6 Proper judgment must be exercised in executing the installation so as to ensure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structural components.

.7 For occupancy sensors with ultrasonic sensors, mount the unit on a vibration free surface and install a minimum of 610 mm (24 in) away from supply ducts and wall mounted discharge ducts.

.8 When installing occupancy sensors in areas where the area is too large to cover with sensors shown on drawings or the space has obstructions that do not meet the minimum coverage requirements, then multiple sensors shall cover space to ensure that the proper coverage is achieved without additional cost to the owner.

.9 When an area is served by lighting of multiple fixture types or daylighting zones, a separate dimming or relay zone shall be provided for each fixture type and daylighting zone.

.10 When serving areas with high ceilings or exterior areas, sensors should be placed at manufacturer's recommended height for coverage and spacing.

.11 Interconnect modules, controls, and sensors via plenum-rated (FT-6) low-voltage network wiring, when routed in plenum, or via wireless connections. Free-air cabling to be neatly supported every 1.5 m (5 ft) to avoid cable laying on ceiling tile. Where cabling route is in exposed space conceal control cabling after any suspension, and suspension cable colour to match power cable colour.

.12 Connect all power/relay modules and relay panels either wired or wirelessly to a networked central control unit either directly or through a series of sub-controllers.

.13 Connect Lighting Control Unit (LCU) to uninterruptible power either via UPS circuit or with integrated battery backup to provide up to 30 minutes run time.

.14 Systems Integration:

.1 Connect the following to the lighting control system:

.1 Fire alarm system alarm status

.2 Loss of normal power signal

3.2 SITE QUALITY CONTROL

.1 Site Tests and Inspections:

.1 Conduct field inspection and testing as specified in Section 26 05 00.

.2 Field Testing:

.1 Upon completion of the installation, the system shall be completely tested by field technician who will verify all adjustments and sensor placement to ensure a trouble-free lighting control system and compliance with ASHRAE 90.1 functional testing standards.

.2 Each device shall be numbered, labeled and recorded. Tests shall be conducted to ensure that entering the space shall ensure that lighting shall be activated as per requirements and the vacating a space will cause the lighting to turn off within 30 minutes.

.3 After one month and six months of customer use, the installer and/or manufacturer shall return to the site and make any required adjustments to location, control, sensitivity and timing as required by the users based on their feedback. Provide suitable feedback forms to owner's representative two weeks prior to visit. Schedule visits with owner's representative.

.3 Functional Testing:

.1 Perform functional testing in accordance with ASHRAE 90.1 functional testing requirements. Provide final lighting control narrative and room-by-room control requirements.

.2 The individual(s) responsible for the functional testing are not directly involved in either the design or construction of the project and show documentation certifying that the installed lighting controls meet or exceed all documented performance criteria.

.3 At a minimum perform the following procedures:

.1 Confirm the placement, sensitivity and time out adjustments for occupancy sensors yield acceptable performance, lights turn off only after space is vacated and do not turn on unless space is occupied.

.2 Confirm that time switches and programmable schedule controls are programmed to turn the lights off.

.3 Confirm that photosensor controls reduce electric light levels based on the amount of usable daylight in the space as specified.

.4 Lighting control system to be complete, operational and have fully passed functional testing completed within 7 calendar days of full occupancy.

.4 Life Safety Testing:

.1 Ensure lighting control system operates as intended to meet specifications, codes, and standards. Testing to be conducted with IP network connections disabled.

.1 On loss of normal power, lighting on emergency power in paths of egress illuminate to full brightness.

.2 On an alarm or alert signal from the fire alarm panel, lighting on emergency power in paths of egress illuminate to full brightness.

.3 On conclusion of these events, all lighting is restored to the set brightness level at the initiation of the event within 5 seconds. If fixture was off prior to event, fixture remains off after event.

.2 Manufacturer Services:

.1 Have manufacturer's technical representative inspect the Work at suitable intervals during application, and at conclusion of the Work of this Section, to ensure the Work is correctly installed. Submit manufacturer's inspection reports and verifications that the Work of this Section is correctly installed.

3.3 CLOSEOUT ACTIVITIES

.1 Demonstration and Training:

.1 Include the on-site demonstration and training necessary to familiarize the owner's personnel with the operation, use, adjustment, and problem-solving diagnosis of the lighting control system.

.2 Include manufacturer 12-month (from building occupancy) toll-free telephone support for technical questions concerning troubleshooting, re-programming, and technical issues.

.3 Demonstration and training to consist of one half-day on-site session organized by manufacturer at approximately one month after owner occupancy. Contact owner representative within 3 weeks after occupancy to schedule appropriate time and review of trainer generated agenda. Turn over all electronic and hardcopy of all slides and handouts used in training presentation to the owner.

.4 Hands-on demonstration of on-site components to include:

.1 Lighting Control Unit locations and interfaces

.2 Scene controls in applicable spaces

.3 Overall manual controls for trim level

.4 Any associated mobile or web applications

END OF SECTION

1 GENERAL

1.1 SUMMARY

.1 Provide indoor distribution dry type transformers of the size and type as shown on the drawings and specified herein.

1.2 SUBMITTALS

.1 Provide detailed shop drawings showing equipment sizes, dimensions, nameplate data and all other pertinent details required to complete the installation and connections.

1.3 QUALITY ASSURANCE

.1 Dry type transformers shall be manufactured and tested in accordance with the latest issue of CSA Standard C-9 for the applicable rating.

.2 Dry type transformers sound level shall comply with the latest issue of NEMA Standard TR1.

.3 Dry-type transformers minimum efficiency values shall comply with CAN/CSA-C802.2-12.

.4 Power transformers maximum losses shall comply with CAN/CSA-C802.3-01 (R2012).

2 PRODUCTS

2.1 DRY TYPE TRANSFORMERS

.1 Indoor distribution transformers shall be two winding (not autotransformers), 60 cycle, high efficiency ANN dry type. Transformers shall be 3 phase two winding type designed for 600 V Delta primary and 120/208V Wye secondary system voltages unless otherwise indicated on the drawings. Transformer capacity ratings shall be as indicated on the drawings.

.2 Transformers shall be complete with four 2 1/2% full capacity taps, two FCAN and two FCBN, and internal core/coil vibration mounts. Transformer enclosures shall be ventilated EEMAC 1 type and be finished with light grey enamel. Provide sprinklerproof hoods for transformers installed in sprinklered areas and external neoprene vibration isolators.

.3 Transformer primary and secondary windings shall be aluminum or copper.

.4 Transformer insulation shall be rated 220ºC (150ºC full load operating temperature rise).

3 EXECUTION

3.1 INSTALLATION

.1 All floor mounted transformers shall be mounted on concrete housekeeping pads with external neoprene vibration pads or equivalent.

.2 Transformers shall have flexible conduit connections or equivalent on both the high and low voltage feeders.

.3 Wall mounted transformers shall be mounted on a structural angle iron frame suitably attached to the masonry walls, steel structure, etc., and be set on external neoprene vibration isolators or equivalent.

.4 Dry type transformers up to and including 45 KVA shall be wall mounted. Transformers over 45 KVA are to be floor mounted. Exceptions to the above shall be as noted on the drawings.

.5 Adjust primary voltage tap to achieve desired secondary system voltage as instructed on site by Project Manager. Provide grounding terminals and primary and secondary lugs to suit indicated feeder conductors.

END OF SECTION

1 GENERAL

1.1 SUMMARY

.1 The Electrical Contractor will provide all distribution equipment required for the complete installation. The Section "Low Voltage Distribution Equipment" will generally refer to such items as switchboards, disconnect switches, breakers, splitters, starters, etc.

.2 Refer to Section 26 05 33 “Raceway and Boxes for Electrical Systems”, 26 05 19 "Wire and Cable" and 26 05 53 "Identification for Electrical Systems" for the additional requirements of materials necessary to complete the work of this Section.

.3 Refer to the "Power Distribution Schematic Diagram" and "Wiring for Mechanical Equipment Schedule" as shown on the drawings, for details of equipment and components to be provided.

.4 Related sections:

.1 Section 26 05 00 Common Work Results for Electrical

.2 Section 26 05 33 Raceway and Boxes for Electrical Systems

.3 Section 26 05 19 Wire and Cable

.4 Section 26 05 53 Identification for Electrical Systems

.5 Section 26 29 23 Variable Frequency Drives

.6 Section 26 43 00 Surge Protection Devices

1.2 REFERENCES

.1 Reference Codes and Standards: Versions of the following standards current as of the date of issue of the project, apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction.

.1 Ontario Electrical Safety Code

1.3 SUBMITTALS

.1 All distribution equipment for this project will have shop drawings submitted for review (i.e. panelboards, switchboards, circuit breakers, etc.). Include product characteristics, performance criteria, physical size, finish and limitations.

.2 Maintenance and operating instructions, parts lists, etc., will be provided for switchboards, air circuit breakers, meters, ground fault detectors, or any special function equipment.

.3 Include meter outline dimensions, panel drilling dimensions and installation cut-out template.

1.4 QUALITY ASSURANCE

.1 All equipment will be CSA approved and be finished in ANSI/ASA-61 light grey enamel paint.

.2 All equipment will be manufactured in accordance with the applicable sections of CSA Specification C22.2.

1.5 DELIVERY, STORAGE AND HANDLING

.1 A suitable on-site storage arrangement must be provided to keep the equipment protected from the elements and other trades. If there is any sign of damage, rusting or corrosion on the equipment, the affected parts will be replaced at no charge.

2 PRODUCTS

2.1 CIRCUIT BREAKER PANELBOARDS

.1 Panels will be of the type, with voltage and current rating as indicated on the drawings. The panels will be sized to contain the specified branch breakers with space for future units as indicated.

.2 The bus bars will be aluminum or copper and a continuous copper ground bus will be provided complete with cable terminals

.3 Panels will be complete with common key locking doors, and no label, stamp, or nameplate on the exterior of the panel trim or door. Provide a directory card and suitable holder mounted on the back of the panel door. Panel enclosure rating will suit application requirement.

.4 Flush mounted panelboards will have doors and trims finished in ANSI/ASA-61 light grey enamel paint. Surface mounted panelboards will have tubs, doors and trims finished in ANSI/ASA-61 light grey enamel paint.

.5 Unless otherwise indicated, circuit breakers will be moulded case type, with required frame size for trip settings as shown on the Drawings. Breakers mounted in panels will be bolt-on type.

.6 Unless otherwise noted all breakers will be rated minimum 14kA symmetrical interrupting capacity at 600 volts, 3-phase or 10kA symmetrical interrupting capacity at 208 volts, 3-phase as appropriate and not less than the short circuit capacity as shown on single line diagram drawings.

.7 Switching breakers will be UL SWD rated for switching duty.

.8 The circuit breaker servicing Life Safety Loads such fire alarm control panel will be paint red and lockable.

.9 Provide sprinkler resistant hoods and doors for panelboards installed in sprinklered areas.

2.2 DISCONNECT SWITCHES

.1 Disconnect switches will be heavy duty type with visible blades in the off position, quick- make quick-break operating mechanism, lock-off provision, door/handle interlock with override and will be horsepower and electric heat rated. Switch fuse holders will have reinforced clips. Fuses will be easily removable when the switch is in the off position. All switches will have ample gutter space for top or bottom wiring and be provided with enclosures to suit the specific application.

2.3 MOTOR STARTERS

.1 Manual motor starters for single phase fractional horsepower motors will be equipped with heavy duty toggle mechanism, thermal overload unit, and red neon pilot light. The motor starter will be rated to match the motor requirements and be flush mounted with stainless steel coverplate in finished areas.

.2 Individual combination type motor starters will be complete with fused disconnect switch protection suitable for use with HRC-1-J fuses.

.3 Each magnetic starter will include a 3-phase manual reset overload unit. Motor overload units will be single phase sensitive adjustable thermal type. Provide one normally open and one normally closed extra auxiliary contact in each starter for possible future use.

.4 All two speed starters will be of the type to suit the motor being supplied. Two speed starters will have two sets of overload relays, one for each power supply connection.

.5 All starters will be IEC or NEMA types but must be rated at minimum 15 Ampere continuous current. Starter enclosures will be provided to suit application requirements.

.6 Refer to the wiring for mechanical equipment schedule for indication of the various individual control components to be included with the starters.

.7 Starters controlling power circuits of more than 120 volts will be provided with an integral control circuit transformer with fused secondary. All control wiring and devices will function on a 120 volt control circuit unless otherwise noted.

2.4 CONTACTORS

.1 Supply and install AC contactors complete with hand-off-auto selector switch and pilot light indicating "on" condition for control of loads as shown. Use latching type contactors and appropriate momentary contact type control devices for all non-motor loads unless otherwise specified.

.2 Provide auxiliary contacts, control relays, control transformers, and terminals as required for interlocking and control of equipment as shown. Contactor enclosures will be provided to suit application requirements.

2.5 RELAYS

.1 Supply and install AC relays with required coil and contact rating and pilot light for control of lighting and miscellaneous loads as shown. Provide auxiliary components, control transformers, terminals, control devices, etc., required for proper control and connection.

2.6 FUSES

.1 Fuses will be HRC-1 Class L (over 600 Ampere) or Class J (under 600 Ampere) as appropriate; time delay type unless otherwise indicated. Fuse rating will be as noted for feeders or as required for proper motor protection, if not indicated. Provide as spares, 3 of each type and rating of fuses installed and turn over to Owner at time of building occupancy.

3 EXECUTION

3.1 INSTALLATION

.1 Protect installed products and components from damage during construction. Repair damage to adjacent materials caused by equipment installation

.2 Install equipment in accordance with manufacturer's instructions or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

.3 All equipment installed in this scope will meet clearance requirements of OESC. Any equipment installed that does not meet this requirement will be reviewed with the Consultant.

.4 Mount surface mounted panelboards on surfaces that can support the weight of the equipment. Refer to manufacturer's instructions for fastening devices specific to surface material. For areas where the surface cannot support the weight of the panelboard, install non-combustible, non-porous materials or structural supports to adequately fasten the panelboard at location shown.

.5 Mounting heights of wall mounted panels will generally be 2000 mm (6'-6") to the top of the panel trim.

.6 Provide preprogrammed contacts for fire alarm shutdown as noted on the drawings. Fire alarm shutdown operation to override all local and remote control. Program display to read "Under Control of Fire Alarm".

.7 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions and the General Requirements of Division 01 and Section 26 05 00 Common Work Results for Electrical.

1.2 SUMMARY

.1 Section includes: Provide Wiring Devices, including but not limited to the following:

.1 Receptacles

.2 Coverplates

.3 Floor Boxes

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 26 05 33 - Raceways and Boxes for Electrical Systems

.2 Section 26 09 23 - Lighting Controls

.3 Section 27 05 28 - Pathways for Communications Systems

1.3 REFERENCES

.1 Abbreviations and Acronyms:

.1 AFCI: Arc Fault Circuit Interrupter

.2 GFI/GFCI: Ground Fault Circuit Interrupter

.3 UPS: Uninterruptible Power Supply

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with Section 26 05 00 Common Work Results for Electrical.

.2 Product Data:

.1 Submit manufacturer's Product data sheets for Products proposed for use in the Work of this Section. Include printed technical data, installation instructions and general recommendations for all materials and components. Include certification indicating compliance of materials with project requirements

.1 Special devices not listed in the Schedule of Wiring Devices.

.2 Floor boxes.

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Hubbell

.2 Legrand - Pass & Seymour

.3 Eaton - Arrow Hart

.4 Bryant

.5 Leviton

.2 Comparable Products from manufacturers not listed herein will be accepted provided they meet requirements of this Specification.

.2 Requests for substitutions shall be made in conformance with Section 26 05 00 Common Work Results for Electrical.

.3 Products listed here are based on products and part numbers manufactured by Hubbell and indicate a level of quality and technical specification and is not an endorsement of the manufacturer.

2.2 MATERIALS

.1 All wiring devices and will be white in colour unless noted otherwise. Device part numbers shown represent required component series and are not meant to be exact part number or identify colour. The following special colours will be used:

.1 Red – Standby, Emergency or Essential Power

.2 Orange – UPS Power

.3 Green – Controlled Circuit

.4 Blue – Surge Suppression

.5 Black – Special receptacle not in CSA 5-15R or 5-20R configurations

.6 If an outlet exhibits more than one of the above properties, then a clear permanently-mounted label will be placed above the device stating all the other functions or properties of this wiring device.

.2 Schedule of Wiring Devices

.1 Standard Devices

Description	**CSA/NEMA Configuration**	**Hubbell Part Number**
15 Ampere, 120 Volt, Toggle Type Switch, Heavy Duty (Series includes Single pole, double pole, 3-way, 4-way, locking, pilot light, etc.)	n/a	1200 Series
20 Ampere, 120 Volt, Toggle Type Switch, Heavy Duty (Series includes Single pole, double pole, 3-way, 4-way, locking, pilot light, etc.)	n/a	1220 Series
15 Ampere, 347 Volt, Toggle Type Switch, Heavy Duty (Series includes Single pole, 3-way, and 4-way)	n/a	18200 Series
20 Ampere, 347 Volt, Toggle Type Switch, Heavy Duty (Series includes Single pole and 3-way)	n/a	18220 Series
15 Ampere, 120 Volt, Duplex Receptacle (Series includes standard, tamper resistant, isolated ground, weather resistant, corrosion resistant, etc.)	5-15R	5262 Series
20 Ampere, 120 Volt, T-Slot, Duplex Receptacle (Series includes standard, tamper resistant, isolated ground, weather resistant, corrosion resistant, etc.)	5-20R	5362 Series
15 Ampere, 120 Volt, GFCI Duplex Receptacle	5-15R	GFRST15
20 Ampere, 120 Volt, T-Slot, GFCI Duplex Receptacle	5-20R	GFRST20
15 Ampere, 120 Volt, GFCI Weather Resistant Duplex Receptacle	5-15R	GFWRST15
20 Ampere, 120 Volt, T-Slot, GFCI Weather Resistant Duplex Receptacle	5-20R	GFWRST20
30 Ampere, 120/250 Volt, Dryer Receptacle, Black	14-30R	HBL9430A
50 Ampere, 120/250 Volt, Range Receptacle, Black	14-50R	HBL9450A

Description	CSA/NEMA Configuration	Hubbell Part Number
20 Ampere, 120 Volt, Locking Single Receptacle, Black	L5-20R	2310
20 Ampere, 250 Volt, Locking Single Receptacle, Black	L6-20R	2320

.2 Standard Devices for use in light duty environments:

Description	CSA/NEMA Configuration	Hubbell Part Number
15 Ampere, 120 Volt, Decorator Duplex Receptacle	5-15R	DR15
20 Ampere, 120 Volt, T-Slot, Decorator Duplex Receptacle	5-20R	DR20
15 Ampere, 120 Volt, Decorator Duplex Receptacle, Controlled, Green (Series includes controlled, half controlled, and tamper resistant)	5-15R	DR15C Series
20 Ampere, 120 Volt, T-Slot, Decorator Duplex Receptacle, Controlled, Green (Series includes controlled, half controlled, and tamper resistant)	5-20R	DR20C Series
15 Ampere, 120 Volt, Surge Protection Duplex Receptacle, Blue	5-15R	HBL5260SA
20 Ampere, 120 Volt, T-Slot, Surge Protection Duplex Receptacle, Blue	5-20R	HBL5360SA
15 Ampere, 120 Volt, Duplex Receptacle with 5 Ampere, 5 Volt combination USB Type A and Type C charging ports.	5-15R	USB15AC5
5 Ampere, 5 Volt, 4-port USB Type A charging ports.	n/a	USB4

.3 Coverplates

.1 Coverplates for wall mounted wiring devices in general finished areas will be high impact smooth nylon coloured to match device. Where ganged devices have different colours, coverplate colour shall be white.

.2 Coverplates for wall mounted wiring devices in masonry wall and meeting pods will be smooth 302 stainless steel type.

.3 Flush floor receptacles will be provided complete with a carpet flange to match floor box colour where applicable.

.4 In unfinished areas or surface mounted devices, coverplates will be galvanized type with rounded corners and back boxes will be cast type.

.5 Provide gasketed 'While-in-Use' or Extra Duty polycarbonate cover Hubbell RW58300 for all devices exposed to weather or water splashing. Cover will have ability to install padlock to restrict access and removal of installed plugs.

.6 Provide proper ganged coverplates and backboxes for all grouped outlets. Provide internal barriers between receptacles from different panels, and between receptacles and extra low voltage outlets.

3 EXECUTION

3.1 INSTALLATION

.1 All switches controlling a connected load in excess of 10 amperes will be 20 ampere rated type.

.2 Mounting heights of the wiring devices will be as follows unless subject to special installation conditions, or otherwise indicated on floor plans or dimensioned interior elevations (Mounting heights refer to the centre of the outlet box):

.1 Light Switches and Control Devices 1100 mm (43").

.2 Wall Outlets and Receptacles 460 mm (18") or 150 mm (6") above countertop or back splash as applicable.

.3 In barrier-free spaces and suites, mount light switches and control devices at 1050 mm (41.5") above finished floor.

.3 Coverplates will be installed flush and level.

.4 Install wiring devices after wall construction and painting is complete.

.5 All wiring devices shown as being relocated on drawings will be replaced with new device and coverplate and will be connected to the existing circuit.

.6 Install all wall switches with the OFF position down. All CSA 5-15R and 5-20R configuration receptacles will be installed so the ground is in the bottom position.

.7 Where electrical outlets and wall mounted heating units occur at the same height and location, the outlets will be mounted below or beside the heater, unless noted otherwise.

.8 Work top mounted outlets will be above floor monument type securely fastened to work surface using a threaded connection to conduit system. Provide all required fittings, inserts and accessories required for approved mounting and connection.

.9 Outlets installed in millwork will be standard wall mounted versions, flush mounted into face of the appropriate vertical surface. Refer to millwork elevations and sections for further details.

.10 Receptacles not on isolated ground will have a green bond wire bonded to the device grounding terminal, the back box it is located in, and bonded to the branch circuit panelboard ground bus.

3.2 SITE QUALITY CONTROL

.1 Site Tests and Inspections:

.1 When installation is complete, test operation of all devices. All defective devices shall be replaced and all defective wiring shall be repaired.

.1 Switches should be operated to ensure load is switching as expected.

.2 For CSA 5-15R and 5-20R configuration receptacles should be tested with handheld plug-in receptacle tester for open circuits, and reversed wiring. GFCI test shall be completed on all GFCI receptacles and circuits.

.3 For receptacles of other configurations, a multimeter shall be used to preform similar tests.

.2 Non-Conforming Work:

.1 Defective materials or quality of work, whenever found, at any time prior to acceptance of the work, shall be rejected regardless of previous inspection. Inspection will not relieve responsibility but is a precaution against oversight or errors.

.2 Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to the satisfaction of the Consultant at no additional cost to the Owner.

END OF SECTION

1 GENERAL

1.1 SUMMARY

.1 The lighting fixtures shall be provided complete with lamps, ballasts, drivers, lenses, etc., and they shall be compatible with the various building elements that affect the installation and operation of the units.

1.2 SUBMITTALS

.1 Shop drawings for luminaires indicating lighting performance details, fixture construction details, air control and ductwork connection details, etc., and pictures of each type of lighting fixture shall be submitted for review.

.2 Shop drawings shall be submitted for LED drivers, ballasts, and bulbs for all fixtures to be installed. These shall be submitted separately from the lighting fixtures being installed and should indicate each fixture the product is installed.

.3 Fixtures shall not be released prior to review of the shop drawings. Cancellation charges will not be paid for changes to fixtures made before the fixture cuts have been reviewed.

1.3 QUALITY ASSURANCE

.1 All lighting fixtures and components must be CSA approved, ULC approved, or approved by Special Inspection from the Electrical Safety Authority.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Light fixtures must be shipped in individual containers. The fixtures must be stored in a dry area protected from the elements and physical damage.

1.5 WARRANTY

.1 Incandescent lamps shall be warrantied for three months from date of final acceptance, LED lamps and drivers for minimum 5 years, all other lamps and ballasts for a minimum 1year warranty period.

2 PRODUCTS

2.1 LED LIGHT FIXTURES

.1 LED monochrome lighting fixture shall have lighting that shall a minimum CRI of 85 for regularly occupied spaces, a minimum CRI of 70 for exterior, and a minimum of 75 for all other spaces. All lighting shall have IESNA LM-79 and LM-80 testing reports and life calculations based on TM-21. Exterior and interior area lighting shall have a minimum efficacy of 80 lumens per watt.

.2 LED drivers shall have minimum lifespan equal or better than the lifespan of the projected L70 lifespan of the LED lamps it serves. Drivers shall be integrated into the fixture if serving only that fixture or remote if the driver serves more than one fixture. All drivers shall be dimmable using 0-10V dimming technology unless noted otherwise. LED drivers shall have high power factor.

.3 All LED lighting and drivers used in exterior or unheated applications shall provide start-up and operation in temperatures from -30 °C to +50 °C.

2.2 LENSES

.1 All flat plastic lenses shall be a minimum 3.2 mm (1/8") thick acrylic type with no mid-span sag.

.2 All metal parabolic louvres shall be fabricated from low iridescent, semi-specular aluminum sheet with cell size, depth and quantity as indicated on fixture schedule. All parabolic louvres shall be shipped assembled in fixtures to prevent damage and be enclosed in a clear plastic wrap all around to prevent dust or dirt contamination. Plastic wrap shall not be removed until space is fully cleaned and approval to do so is granted by the Consultant.

.3 All special lenses shall be as specified in fixture schedule.

2.3 SOURCE QUALITY CONTROL

.1 Lighting fixtures shall be provided with all auxiliary components and mounting hardware required for installation in the building as intended. Verify all catalog numbers with descriptions given including mounting, lamp type and quantity.

3 EXECUTION

3.1 INSTALLATION

.1 Ensure that both recessed and surface mounted light fixtures mounted as part of a suspended ceiling system are adequately supported. Fixtures shall not be suspended directly from the ceiling system supporting grid, but must be supported directly from the building structure.

.2 Surface mounted fixtures on T-Bar ceilings may be supported using a minimum of two "Caddy" IDS clips from the ceiling suspension grid and which are also separately connected to the building structure.

.3 Co-ordinate the requirements of the ceiling system supports with the Ceiling Contractor prior to fixture installation. Fixture safety chains or wires shall also be provided as required by regulatory agencies. The method of attaching suspension wires and safety chains or wires to fixtures and building elements, shall be discussed with and approved by the Consultant prior to installation. Where the structural system is to have a fireproofing material applied, attach all structural system fasteners in advance of the fireproofing.

.4 Pendant mounted fixtures shall have a deep canopy cover to fully cover the supporting outlet box and render it inconspicuous. Provide a self-aligning type cover and support for fixtures mounted to sloped surfaces.

.5 Electrical wiring or components shall not be attached to the ceiling system suspension wires.

.6 For exact details of fixture installation in valances, bulkheads, millwork, etc., refer to the Architectural Drawings.

.7 All electrical fixtures are to be delivered to the site with the specified finish. Where required colour or finish is not available from the fixture manufacturer, the Contractor shall obtain such from an approved paint shop.

3.2 FIELD QUALITY CONTROL

.1 Check all lighting fixtures prior to their installation to ensure that they are the specified and approved fixtures for the project. Check the fixture catalogue number, frame and mounting arrangement, lens type, reflector type, lamp socket position, lamp type, fixture operating voltage, etc.

.2 The locations of fixtures are shown generally on the electrical drawings. For accurate locations refer to the architectural reflected ceiling plans (indoor) or landscape drawings (outdoor).

3.3 CLEANING

.1 Clean all lenses and interior of all fixtures.

END OF SECTION

1 GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Comply with General Conditions of the Contract, Supplementary Conditions and requirements of Division 01. This section will also comply with 26 05 00 Common Work Results for Electrical.

1.2 SUMMARY

.1 Provide Exit Lighting as shown on the drawings and in the lighting fixture schedule. Exit Lighting will be fed from an AC voltage dedicated circuit connected to emergency source.

.2 Related Sections:

.1 Section 26 05 19 Wire and Cable

.1 Section 26 05 33 Raceway and Boxes for Electrical Systems

1.3 REFERENCES

.1 Reference Codes and Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction.

.1 CAN/CSA C860 Performance of internally lighted exit signs.

.2 Ontario Building Code

.3 Ontario Electric Safety Code

1.4 SUBMITTALS

.1 Complete sets of shop drawings will be submitted indicating the following:

.1 System components, specifications, and dimensions.

.2 For Closeout submittals provide the following:

.1 Emergency lighting runtime test report

2 PRODUCT

2.1 APPROVED MANUFACTURERS

.1 Listed below are manufacturers that will provide complete emergency and exit lighting systems. Equivalent emergency and exit lighting systems by other manufacturers and/or engine manufacturer may be accepted subject to review by the consultant. Emergency and Exit Lighting by the following manufacturers will be considered for use on this project:

.1 Aimlite

.2 Beghelli

.3 Emergi-lite

.4 Lumacell

.5 Stanpro>

2.2 EXIT LIGHTING

.1 Housing: cold rolled steel minimum 1.0 mm (1/25 in) thick, die-cast or anodized extruded aluminum frame, white finish c/w universal mounting system.

.2 Face and back plates: extruded aluminum alloy white colour.

.3 Graphic: Green “running man” pictogram.



.4 Lamps: LED type, 120 V AC, maximum 5 watts consumption.

.5 Designed for minimum 50,000 hours of continuous operation without re-lamping.

.6 Exit lighting arrows: exit lighting will be capable of no arrows or configuration with arrows facing left, right, up, down, upper right, upper left, lower right, or lower left. “Running man” pictogram will also be capable of facing either right or left. Refer to drawings for orientation required for each exit lighting unit.

.7 Photoluminescent Exit signage is not permitted.

3 EXECUTION

3.1 EXIT LIGHTING

.1 Ensure that exit lighting AC circuit breaker is locked in on position

.2 Install exit lighting as indicated, in accordance with building code requirement.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, Division 01 – General Requirements, and Section 26 05 00 – Common Work Results for Electrical.

1.2 SUMMARY

.1 Section includes: Provide pathways for communications and other extra low voltage systems, including but not limited to the following:

.1 Internal building horizontal pathways, service provider pathways, and exterior pathways.

.2 Outlet boxes, cover plates, conduits, cable trays, pull boxes, sleeves, backboards, telecom rooms, shafts, fish wires, innerduct, cable hooks, firestopping, cable managers, service fittings, and direct buried ducts.

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 Section 07 84 00 - Firestopping

.2 Division 21 - Fire Suppression

.3 Division 22 - Plumbing

.4 Division 23 - Heating, Ventilating, and Air Conditioning (HVAC)

.5 Section 26 05 19 - Wire and Cable

.6 Section 26 05 33 - Raceway and Boxes for Electrical Systems

.7 Section 26 27 26 - Wiring Devices

1.3 REFERENCES

.1 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 American National Standards Institute (ANSI)/ Telecommunications Industry Association (TIA):

.1 ANSI/TIA 569 – Telecommunications Pathways and Spaces

.2 ANSI/TIA 606 – Administration Standard for Telecommunications Infrastructure

.2 Ontario Building Code

.3 Ontario Electrical Safety Code

1.4 SUBMITTALS

.1 Submittals under this Section shall be in accordance with Section 26 05 00.

.2 Product Data:

.1 Submit manufacturer's Product data sheets for Products proposed for use in the Work of this Section. Include printed technical data, installation instructions and general recommendations for all materials and components. Include certification indicating compliance of materials with project requirements

.1 Fire Rated Pathways

2 PRODUCTS

2.1 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Fire-rated Pathways:

.1 STI EZ-Path

.2 Hilti Firestop Speed Sleeve

.2 Requests for substitutions shall be made in conformance with Section 26 05 00.

2.2 MATERIALS

.1 Internal Distribution:

.1 Interior conduit to be EMT unless specifically noted or required to be otherwise.

.2 Exterior conduit to be PVC unless specifically noted or required to be otherwise.

.3 Conduit not indicated as to size to be 25 mm (1 in) minimum.

.4 LB fittings are not allowed under any conditions.

.2 Outlets:

.1 Wall outlets consist of standard deep single gang outlet boxes unless otherwise indicated. Provide blank coverplates for all un-used outlets.

.2 Coverplates complete with appropriate jacks are provided by extra low voltage systems providers.

.3 Fire-Rated Cable Pathways:

.1 Fire-Rated Pathway device modules are comprised of steel pathway with self-adjusting intumescent foam pads allowing 0% to 100% cable fill without removal of intumescent material.

.2 Quantity and size of pathway are based on the fill area listed on the drawings or minimum sizes listed below. Provide uniform sized of devices where more than one device is required at same location.

.3 Unless noted on the drawings, the minimum clear space sizes are:

.1 160 cm^2 (25 in^2) for telecommunications rooms

.2 for cable tray penetrations, provide minimum size equal to cross-sectional area of cable tray

.3 80 cm^2 (12.5 in^2) in corridors without cable trays

.4 8 cm^2 (1.25 in^2) for room penetrations

3 EXECUTION

3.1 INSTALLATION

.1 Install empty raceway system, including distribution system, fish wire, outlet boxes, floor boxes, pull boxes, cover plates, conduit, sleeves, cable tray, service poles, miscellaneous and positioning material to constitute complete system.

.2 Run parallel to building lines all horizontal and vertical pathways. Do not route diagonally for extended distances.

.3 Since cabling for communications is subject to many add/moves/changes in future, install pathways in locations that are readily accessible in future and route below ductwork and piping in ceiling spaces. Coordinate installation of pathways with Division 21, Division 22, and Division 23 to minimize interference and maximize accessibility to pathways.

.4 Horizontal data cables from telecommunications rooms patch panels have limitation of cable length of 90 m (297 ft). Optimize pathways to minimize cable length.

.5 Protect installed products and components from damage during construction.

.6 Repair damage to adjacent materials caused by pathways for communications systems installation

.7 Bury underground service ducts a minimum of 900 mm (36 in) below finished grade.

.8 Restrict installation of conduits as follows:

.1 60 m (200 ft) maximum no bends

.2 45 m (150 ft) maximum with equivalent of one 90º bend

.3 30 m (100 ft) maximum with equivalent of two 90º bends

.4 20 m (65 ft) maximum with equivalent of three 90º bends

.5 No more than three 90º bends are allowed in any section of conduit run

.9 Install all conduits with large radius bends. Minimum bending radii is 10 times the diameter.

.10 Mounting heights of the communications outlets unless otherwise noted are as follows:

.1 Standard wall outlet 460 mm (16 in) or 150 mm (6 in) above countertop or splash back

.2 Wall mounted telephones outlets 1100 mm (43 in) to centre of backbox

.3 When mounting adjacent to other devices at same location, communications outlet box to match installation height of adjacent outlet box used for wiring device

.11 Refer to the systems conduit diagrams for details of distribution and outlet conduit, cabinet and backboard requirements and to floor plans for component and outlet locations.

.12 Contact Owner's systems service providers as appropriate to verify all incoming conduit sizes, prior to proceeding with installations. Modify provisions accordingly to suit their specific requirements. Co-operate with appropriate installation personnel during construction and give sufficient notice of construction progress to allow scheduling of their installations. Systems installation companies/contractors generally supply and install distribution cable, terminals, equipment and connectors to complete systems installations. Co-ordinate and arrange for all work to suit construction phasing as appropriate.

.13 Install nylon pull cords in all empty conduits and tag and identify both ends appropriately. Maintain a pull cord in all conduit systems used only to partial capacity.

.14 Firestopping

.1 Install at all fire separations Fire-Rated Pathway device modules to allow future cables to be installed through fire separation. Prepare and install device module as per manufacturer’s instructions.

.2 Use Fire-Rated Pathway device module only for extra low voltage systems cabling and do not use for line voltage applications.

END OF SECTION

1 GENERAL

1.1 INSTRUCTIONS

.1 Comply with the General Conditions of the Contract, the Supplementary Conditions, Division 01 – General Requirements, and Section 26 05 00 – Common Work Results for Electrical.

1.2 SUMMARY

.1 Section includes: Provide complete structured cabling systems, including but not limited to the following:

.1 Telecommunications cabling

.2 Outlet jacks and plugs

.3 Patch panels and termination blocks

.4 Consolidation points and zone cabling

.5 Racks and cabinets

.6 Grounding busbars and bonding

.7 Labelling

.8 Firestopping

.9 Testing and certification.

.2 Related sections: The following is included for reference only and shall not be presumed complete:

.1 26 05 19 Wire and Cable

.2 27 05 28 Pathways for Communications Systems

1.3 REFERENCES

.1 Abbreviations and Acronyms:

.1 “MPTL” is defined as Modular Plug Terminated Link.

.2 “U” is defined as a rack unit of measure for rack mounted equipment and is equivalent to 44.45 mm (1.75 in) as defined in EIA-310. This term is preceded by an integer without a space indicating the multiplier of the rack unit height (for example 3U is equivalent to 133.35 mm (5.25 in) or three rack units).

.3 “WAP” is defined as Wireless Access Point.

.2 Definitions:

.1 “Category 6A" or “Cat 6A” is defined as a 4-pair unshielded twisted pair cable with cable performance defined to 500 MHz to meet or exceed the ANSI/TIA-568.2 Category 6A Specifications. This term applies to cable and connecting hardware for component, link and channel performance.

.2 "PoE" is defined as Power over Ethernet and delivers data communications and power up to 100 W to meet or exceed requirements of IEEE-802.3af (15 W), IEEE-802.3at (30W), and IEEE-802.3bt (60 W and 100 W).

.3 Reference Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction

.1 American National Standards Institute (ANSI)/ Institute for Electrical and Electronics Engineering (IEEE):

.1 ANSI/IEEE 802.3 Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications.

.2 ANSI/IEEE 802.3z Gigabit Ethernet Specifications over Fibre Optic Cabling

.3 ANSI/IEEE 802.3ab Gigabit Ethernet Specifications over UTP Cabling

.4 ANSI/IEEE 802.3ae Media Access Control Parameters, Physical Layers and Management Parameters for 10 Gb/s Operation

.5 ANSI/IEEE 802.3af Data Terminal Equipment (DTE) Power via Media Dependent Interface (MDI)

.6 ANSI/IEEE 802.3at Data Terminal Equipment (DTE) Power via Media Dependent Interface (MDI) Enhancements

.7 ANSI/IEEE 802.3bt DTE Power via MDI over 4-Pair

.2 American National Standards Institute (ANSI)/ Telecommunications Industry Association (TIA):

.1 ANSI/TIA 568.0 – Generic Telecommunication Cabling for Customer Premises

.2 ANSI/TIA 568.1 – Commercial Building Telecommunications Infrastructure Standard

.3 ANSI/TIA 568.2 – Balanced Twisted-Pair Telecommunications Cabling and Components

.4 ANSI/TIA 568.3 – Optical Fiber Cabling and Components

.5 ANSI/TIA 568.4 – Broadband Coaxial Cabling and Components

.6 ANSI/TIA 569 – Commercial Building Standard for Telecommunications Pathways and Spaces

.7 ANSI/TIA 570 – Residential Telecommunications Wiring Standard

.8 ANSI/TIA 606 – Administration Standard for the Telecommunications Infrastructure

.9 ANSI/TIA 607 – Commercial Building Grounding/Bonding Requirements

.10 ANSI/TIA 758 – Customer-Owned Outside Plant Telecommunications Infrastructure Standard

.11 ANSI/TIA 862 – Structured Cabling Infrastructure Standard for Intelligent Building Systems

.12 ANSI/TIA 942 – Telecommunications Infrastructure Standard for Data Centers

.13 ANSI/TIA-1152 – Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling

.3 Building Industry Consulting Service International (BICSI):

.1 ANSI/NECA/BICSI 607 – Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings

.2 BICSI – Telecommunications Distribution Methods Manual

.3 BICSI – Cabling Installation Manual.

.4 Electrical Industry Association (EIA):

.1 EIA-310 – Cabinets, Racks, Panels, and Associated Equipment

.5 International Standards Organization (ISO):

.1 IEC/ISO 11801 – Generic Cabling for Customer Premises

.6 Ontario Building Code

.7 Ontario Electrical Safety Code

.8 Cabling system manufacturers' design and installation guidelines

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 All work shall be coordinated and scheduled with Contractor or Construction Manager, and coordinate with other trades prior to commencing work.

.2 When installing material in a space where ceiling tiles and access floor tile have already been installed or are existing, this section to:

.1 remove and replace all associated tiles,

.2 perform tile cutouts for work directly related to contractor supplied material, and

.3 replace any tiles damaged at no additional cost to the owner. Tiles shall match existing.

.3 Coordinate with owner's service provider technicians, network integrator, and owner's forces for active equipment installation and associated cabling and services to that equipment.

.2 Scheduling:

.1 Weekend and/or evening scheduling may be required for completion of the project within the specified schedule. Include such scheduling requirements, refer to Division 01 for further scheduling requirements, in all bid pricing.

.2 Installation of system furniture workstation outlets will be done after hours immediately prior to owner's move-in. Coordinate installation with system furniture installer and ensure that all outlets are fully terminated and tested prior to owner's move-in. Ensure that sufficient labour is available and include all associated overtime costs in bid pricing.

.3 Schedule work within telecommunications rooms to be completed early to allow owner to complete installation and testing of active equipment. Allow at least two weeks prior to owner occupancy for this work to be completed. Horizontal cable testing and labelling may be preformed after this deadline.

1.5 SUBMITTALS

.1 Submittals under this Section shall be in accordance with Section 01 33 00 – Submittals and Section 26 05 00 – Common Work Results for Electrical.

.2 Product Data:

.1 Submit manufacturer's Product data sheets for Products proposed for use in the Work of this Section. Include printed technical data, installation instructions and general recommendations for all materials and components. Include certification indicating compliance of materials with project requirements

.1 Cable and Component Cutsheets

.2 Cords

.3 Labeller and labels

.4 Testing equipment to be used

.3 Certificates:

.1 Provide manufacturer’s certificate indicating application assurance and application warranty for provided cabling and components for minimum of 15 years.

.4 Test and Evaluation Reports:

.1 Provide electronic copy of summary and full test results in sorted and searchable PDF format. Summary to be sorted by cable label and show a single line for each cable with the minimum information of: field label, channel loss, length, and pass/fail. Provide complete test results in a single combined non-secured, searchable PDF sorted by cable label. If graphical test results are available from tester, provide legible PDF of results and native formatting for information with free viewing software for current version of Microsoft Windows.

1.6 CLOSEOUT SUBMITTALS

.1 Submittals under this Section shall be in conformance with Section 26 05 00.

.2 Operation and Maintenance Manuals:

.1 Including the following:

.1 Product data sheets

.2 Structured Cabling Testing Report

.3 Firestopping Report

.3 Warranty Documents:

.1 Shall be in conformance with Section 26 05 00.

.2 Provide manufacturer's certificate indicating application assurance and application warranty for provided cabling and components for minimum of 15 years.

.4 Record Documents:

.1 As-built Drawings including but not limited to the following:

.1 Outlet final locations

.2 Cable labelling for horizontal and backbone

.5 Software:

.1 All software required to view test results in native format in PC format.

1.7 QUALITY ASSURANCE

.1 Qualifications:

.1 Manufacturer's:

.1 Manufacturer shall have a minimum of 5 years' experience having successfully supplied products required for the Work of this Section for other projects of similar size and complexity.

.2 Installer's:

.1 Installer shall have a minimum of 5 years' continuous Canadian experience successfully completing projects similar in size and complexity as the Work of this Section. Submit proof of experience upon Consultant's request.

.2 Provide all system installations by a cabling system manufacturer certified installer with qualified and accredited technicians experienced with the specific work detailed in this Section. All subcontractors hired under this Section must also meet these criteria.

1.8 WARRANTY

.1 Manufacturer Warranty:

.1 Provide a minimum 15-year manufacturers' product warranty against defects in materials and workmanship from the date of substantial completion.

2 PRODUCTS

2.1 OWNER FURNISHED PRODUCTS

.1 Owner's Network Equipment:

.1 Core and network switches not connected directly to PoE Lighting.

.2 Routers, Firewalls, Storage Area Networks, and Servers

.3 Wireless Access Points (WAP)

.4 Fibre optic patch cords to the above equipment

.2 Service Provider Equipment:

.1 Gateways, Routers, Firewalls, Amplifiers, and Splitters

.2 Building entrance surge protection for above equipment

.3 Associated patch cord and cross-connects with above equipment.

2.2 MANUFACTURERS

.1 The products of the following manufacturers are acceptable subject to conformance with the requirements of the Drawings, Schedules and Specification:

.1 Acceptable Manufacturers:

.1 Panduit

.2 Subsitutions will not be accepted.

.3 Single source responsibility: Obtain each type of product in this Section from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

2.3 MATERIALS

.1 Category Copper Cable:

.1 All cabling and components to be ANSI/TIA-568.2 standard Category 6A or better.

.2 Four twisted-pair copper cables, connectors, and patching:

.1 Unshielded twisted pair

.2 Cable fire rating: FT-4 (CMR)

.3 Ceiling terminations use male MPTL (modular plug terminated link) connector for the following applications:

.1 Wireless Access Points (WAP)

.3 Line Cords:

.1 Line cords are used within a floor area to connect between a horizontal outlet and equipment.

.2 4-pair unshielded twisted pair, 24 AWG, copper modular with male 8-pin modular connector at each end.

.3 Lengths of line cords to be as follows: 50% at 3 m (10 ft), 30% at 7m (23 ft), and 20% at 10 m (33 ft).

.4 Quantity of cords to equal number of horizontal outlets.

.5 Cords to be factory terminated and tested.

.6 Line cords passing free-air through ceiling space to be FT6 (CMP) fire rated.

.7 Cord to match manufacturer of horizontal cable and Category rating.

.2 Wireless Access Points (WAP):

.1 Install cable for wireless access points in the work area as indicated on the drawings.

.2 Install cables from the work area outlets to nearest communication room.

.3 Each wireless access point outlet must consist of two (2) drops.

.4 Leave 7.6m of cable slack to allow for relocation during the systems commissioning.

.5 WAP must be mounted below drop ceilings (if they exist) or below obstructions such as lighting/HVAC if ceiling space is open

.6 No other equipment installed for the building can operate on frequencies used by wireless networks (2.4Ghz, 5Ghz, 6Ghz).

.3 Horizontal Outlets:

.1 Each workstation must have two (2) horizontal data/VoIP drops unless otherwise noted.

.2 For standalone wall faceplates, supply up to 6-port per gang white faceplates to mount jacks.

.3 For combined power/telecom wall faceplates, supply white 3-port decorator style insert plates for mounting horizontal jacks within combined faceplate.

.4 For combined power/telecom multi-gang floor boxes, supply white 3-port decorator style insert plates for mounting horizontal jacks within floor box faceplate.

.5 For wall telephone locations, supply 1-port stainless steel telephone faceplates with dual mounting posts. Port to be suitable for 8-pin jack.

.6 For furniture mounted jacks, supply mounting faceplate suitable for furniture manufacturers openings. Only if there is no suitable faceplate, supply surface mount enclosure for housing jacks.

.7 Mount all ports with manufacturer’s supplied jack. Supply blank port covers for all unused ports within faceplates.

.4 Labelling:

.1 Labelling to meet ANSI/TIA-606 standards and owner’s nomenclature requirements. Include entire tag on labels. All final labels to be white, vinyl, machine printed using a legible sans serif font. All ink to be black, non-smudging, water resistant, and fade resistant.

.2 For cabinet/rack minimum 36-point

.3 For patch panel minimum 24-point

.4 For cables wrap around self-laminating cable labels with a minimum 10-point

.5 Each horizontal jack minimum 8-point

.5 Finishes:

.1 Colours used shall match that of the system being supplied. These colours apply to cable, jacks, and cords.

.1 Horizontal Data – Blue

.2 Horizontal Voice – White

.3 Wireless Access Points – Orange

.4 Bonding/Grounding – Green

3 EXECUTION

3.1 INSTALLERS

.1 The staff selected for the installation of the structured cabling system must conform to the following:

.1 The communication cabling contractor must have a BICSI RCDD on staff and assigned to the project

.2 Only qualified technicians must terminate all cables (at both ends) and test.

.3 Staff must comply with the following:

.1 Site safety and fire regulations

.2 Occupational Health and Safety Act

.3 Ontario Electrical Safety Code

.4 Ontario Building Code

.5 Governing local municipal regulations

.4 Staff must make any changes or alternations required by an authorized inspector of the authority having jurisdiction.

3.2 EXAMINATION

.1 Verification of Conditions:

.1 Examine all work of other Sections upon which the Work of this Section depends.

.2 Report in writing to the Consultant/Project Manager any defects of surfaces or work prepared by other Sections which affect the quality or dimensions of the Work of this Section.

.3 Do not proceed with Work of this Section until all unsatisfactory conditions have been rectified and site conditions are ready to receive work.

.4 Commencement of work implies acceptance of existing conditions and work by others.

3.3 PREPARATION

.1 Protection of In-Place Conditions:

.1 Effectively protect the owner's facilities, equipment and materials from dust, dirt and damage during construction. Remove any protection at the completion of each shift unless the protection endangers work in progress or personal safety. Removal and replacement of ceiling or floor tiles to be the responsibly of this section. Replace all cable damaged from lack of effective protection during construction period with no additional cost to the owner. All areas should be cleaned of debris generated by this work at the completion of each shift.

.2 Preparation:

.1 Prior to pathway rough-in, coordinate the installation of all telecommunications infrastructure routing with Section 27 05 28 to resolve all interferences and cabling infrastructure requirements. Provided that final outlet locations are within the total shown and the average cable length to the telecommunications room does not change more than 3 m (10 ft) per cable, no additional costs to be paid for location changes.

.3 Demolition / Removal:

.1 Exercise extreme caution when working at or near any live connections to ensure that no interruption to active users occurs. Repair all interruptions immediately at full cost to this section.

.2 Completely remove and dispose of all existing cabling, terminations, faceplates, patch panels within the space to source unless indicated on the drawings or labeled for future use.

3.4 INSTALLATION

.1 Install all cabling, components, and equipment detailed in this section unless noted otherwise.

.2 Install cabling and components according to applicable standards and cabling system manufacturer's specifications, including cable stress, bending radius, maximum length, separation from other services, etc. All backbone and horizontal cabling to be continuous. No splicing is permitted except as noted.

.3 For cabling run in free-air or plenum spaces, install J-Hooks as per Section 27 05 28. Support all hooks from ceiling structure and not from other equipment or supports for that equipment. Do not lay cabling or any other components on the ceiling tile or equipment withing ceiling.

.4 Terminate all copper category cabling in T568A configuration, unless existing installation is already terminated in T568B configuration.

.5 Within ceiling space above horizontal jack or connector location install a minimum of 1000 mm (39 in) of looped spare cable for future jack relocation. Support independently all looped spare cabling using J-Hooks as per Section 27 05 28. Do not lay looped spare cabling in cable tray or on any other components on the ceiling tile.

.6 Neatly dress and comb all cabling to the backboard, tray, and racks.

.7 Fill in all unused ports, inserts, and coverplates with manufacturer's blank.

.8 Labelling:

.1 Install labelling at following locations:

.1 Cabinet/Rack

.2 Patch Panel

.3 Cable at each terminus

.4 Each horizontal jack

.9 Bundling:

.1 When travelling along the same route in free-air or cable tray, neatly bundle more than two like cables together to maintain cable organization. Limit each bundle to 48 cables to limit cable overheating and performance issues. Do not mix cable types within same bundle.

.2 The use of plastic cable ties may be used for cable bundling outside of telecommunications spaces. Wide band Velcro-based ties to be used to allow cables to be easily added to or removed from bundles. Never cinch ties so tight that the cable jackets deform or bend beyond cable manufacturer's recommended limits.

.10 Telecommunications Grounding and Bonding:

.1 Follow regulations for grounding and bonding of communications equipment as per Electrical Code, ANSI/TIA-607, and ANSI/NECA/BICSI-607.

.2 Install 6 AWG copper with green jacket from telecommunications busbar to all racks, cabinets, exposed steel structural columns, electrical panels ground bus to circuit supplying equipment in telecom room, cable trays, and access floor.

.3 All cable tray shall have copper 6 AWG bonding wire for the entire length with connection made at each section. If tray splits, each leg shall also be bonded in similar manner. Bond all communications cable tray to telecommunications room busbar.

.4 Use 2-hole crimp type connectors for all bonding and grounding connections to busbars.

.11 Interface with Other Work:

.1 Firestopping:

.1 Firestop all penetrations through the integrity of fire-rated architectural structures and assemblies, such as walls, ceilings and floors to maintain the structure's fire rating. Provide firestop within conduits or open spaces of cable trays. Conform all firestop penetrations to a specific ULC system number. All firestopping systems used for telecommunications cabling to use reusable materials (putty, pillows, etc.) unless directed by the engineer.

.2 Install firestopping material regardless if other non-firestopped penetrations through the fire separation are visible. If existing opening through fire separation is used, firestop entire opening and all other associated penetrations through that opening. If other trades use this opening as part of the scope of work of the project, then the cost of firestopping to shared among all trades using opening. If the opening is existing and used for structured cabling in this scope and is not firestopped, this Section to firestop the entire opening.

.3 Provide at each firestop penetration a fluorescent colored label indicating the following information: unique identification number, contractor name, date installed, ULC system number, cable type installed, and cable quantity. Provide a firestopping report with cable test results summarizing all firestop label information with photo of final installation.

3.5 SITE QUALITY CONTROL

.1 Site Tests and Inspections:

.1 Performance test using the most current available test methods and equipment installations. Provide all meters, tools and associated equipment and the services of technicians as required to carry out all testing.

.2 On completion of the installation of the system, provide tests to show that these specifications have been met both physically and functionally. All defects need to be rectified before final acceptance of the system. All test results to use field labelling and not default tester numbering.

.3 Provide electronic copy of summary and full test results in sorted and searchable PDF format. Summary to be sorted by cable label and show a single line for each cable with the minimum information of: field label, channel loss, length, and pass/fail. Provide complete test results in a single combined non-secured, searchable PDF sorted by cable label. If graphical test results are available from tester, provide legible PDF of results and native formatting for information with free viewing software for current version of Microsoft Windows.

.4 For testing that fails, complete re-termination or replacement of entire cable run. After re-installation, re-test all failed cabling. Submitted test report to show only passed tests.

.5 Test all installed copper cabling to show that the installed cabling meets performance parameters of the manufacturer, ANSI/TIA-568.2, and ANSI/TIA-1152 for the Category of cable installed.

.2 Non-Conforming Work:

.1 Defective materials or quality of work, whenever found, at any time prior to acceptance of the work, shall be rejected regardless of previous inspection. Inspection will not relieve responsibility, but is a precaution against oversight or errors.

.2 Remove and replace defective materials and work of other trades affected by this replacement, at no additional cost to the Owner.

.3 Manufacturer Services:

.1 Have manufacturer's technical representative inspect the Work at suitable intervals during application, and at conclusion of the Work of this Section, to ensure the Work is correctly installed. Submit manufacturer's inspection reports and verifications that the Work of this Section is correctly installed.

END OF SECTION

1 GENERAL

1.1 GENERAL INSTRUCTIONS

.1 Comply with General Conditions of the Contract, Supplementary Conditions and requirements of Division 01. This section will also comply with 26 05 00 Common Work Results for Electrical.

1.2 SUMMARY

.1 Provide alterations to the existing fire detection and alarm system to suit the specific building requirements as indicated in this scope of work.

.2 The existing fire alarm control panel, fire alarm devices, and existing components are to be reused and expanded to suit this scope of work. The system alterations will consist of new and relocated initiating devices, signalling devices, supervisory circuits, and components as specified herein.

.3 At the completion of the scope of work, the modified fire alarm system will be a fully functional system and will be compliant with all local, provincial, and federal codes and standards.

.4 Modify the existing fire alarm graphics to suit changes.

.5 Connect devices to existing fire alarm system with wire and conduit as required by code, standards, and equipment manufacturer. Provide any components, expansion cabinets, re-programing, and make any modifications necessary to the fire alarm control panel.

.6 Related Sections:

.1 Division 21 Fire Suppression

.2 Division 23 Heating, Ventilating, and Air Conditioning (HVAC)

.3 Division 25 Integrated Automation

.4 Section 26 05 19 Wire and Cable

.5 Section 26 05 33 Raceway and Boxes for Electrical Systems

.6 Section 26 05 53 Identification of Electrical Systems

1.3 REFERENCES

.1 Reference Codes and Standards: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section. Where regulatory requirements use older version of a standard, comply with the version year adopted by the Authority Having Jurisdiction.

.1 CAN/ULC S524 Installation of Fire Alarm Systems

.2 CAN/ULC S536 Inspection and Testing of Fire Alarm Systems

.3 CAN/ULC S537 Verification of Fire Alarm Systems

.4 CAN/ULC S561 Installation & Services for Fire Signal receiving Centre Equipment

.5 ANSI S1.40 Specifications for Acoustical Calibrators

.6 Technical Standards & Safety Authority (TSSA)

.7 Ontario Fire Code (OFC)

.8 Ontario Building Code (OBC)

.9 Ontario Electrical Safety Code (OESC)

1.4 QUALITY ASSURANCE

.1 In the case of any discrepancy between these specifications, the project drawings, and any applicable local codes, the installed Fire Alarm / Life Safety System will comply with the most stringent requirement.

1.5 SUBMITTALS

.1 Submittals under this Section will be in accordance with General Conditions, Section 01 33 00 – Submittals, and Section 26 05 00 - Common Work Results for Electrical.

.2 Submit the following as part of the Shop Drawings:

.1 System component numbers and dimensions.

.2 Wiring schematics indicating expanded and/or new loops.

1.6 RELATED WORK

.1 Coordinate work in this Section with all related Sections. Work and/or equipment provided in other Sections and related to the fire detection and alarm system will include, but not be limited to:

.1 Sprinkler waterflow and supervisory switches will be furnished and installed as detailed in Division 21 Fire Suppression but wired and connected under this section. Modification of existing sprinkler devices to accommodate monitoring by the new fire alarm system will be the responsibility of this Section.

.2 Duct smoke detectors will be furnished, wired and connected under this Section. Division 23 Heating, Ventilating, and Air Conditioning (HVAC) will furnish necessary duct opening to install the duct smoke detectors.

.3 Air handling and smoke exhaust system fan control circuits and status contacts to be provided by the HVAC control equipment as part of Division 25 Integrated Automation and connected to Fire Alarm System by this Section.

1.7 SYSTEM OPERATION

.1 All fire alarm stations, thermal detectors, products of combustion detectors, notification appliances, sprinkler system flow switches, and sprinkler/standpipe tamper switches will be fully supervised.

.2 All integrated life safety system equipment will be arranged and programmed to provide an integrated system for the early detection of fire, the notification of building occupants, the automatic summoning of the local fire department, the override of the HVAC system operation, and the activation of other auxiliary systems to inhibit the spread of smoke and fire, and to facilitate the safe evacuation of building occupants. In all operating modes, the processing of fire alarms will have the highest priority.

.3 The system will contain all required components for alarm receiving circuits and signal circuits as shown on the drawings. The system will be so arranged that the operation of any manual station or automatic thermal or smoke detector or sprinkler flow switch will activate system signalling sequence. All system circuits, wiring and devices will be fully supervised for faults. A circuit fault such as an open or ground or actuation of a valve tamper switch will sound the trouble signal but will not cause a false alarm.

1.8 SYSTEM PROVISIONS

.1 The system will display both alarm and trouble indications from each fire alarm detection zone. The activities of the system will be complete with custom labels, indicating the exact location of the activity, and will be displayed on the fire alarm control panel and remote annunciator panels.

.2 As a result of alarm conditions received the fire alarm control panel will automatically operate specified control points such as transmitting a signal to the fire signal receiving centre to summon the fire department, or stopping recirculating fan systems, etc.

2 PRODUCTS

2.1 GENERAL

.1 Provide all modifications and additions to the existing installations to incorporate the new control equipment and other work and comply with the latest codes and regulations. Consult the manufacturer to verify the existing system provisions and include all necessary modifications to comply with the system requirements as described.

.2 Replace all existing system wiring as required to comply with new system specified requirements. Upgrade existing wiring arrangements to suit zoning changes, the addition of initiating and signal devices in existing areas, etc. Existing conduit and raceways may be used for new wiring where appropriate.

.3 All equipment and components will be the manufacturer's current model. The materials, appliances, equipment and devices will be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling fire alarm system. The authorized representative of the manufacturer of the major equipment, such as control panels, will be responsible for the satisfactory installation of the complete system. Provide, from the acceptable manufacturer's current product lines, equipment and components, which comply, with the requirements of these specifications.

.4 The system will utilize node-to-node, direct wired, multi-priority peer-to-peer network operations. The system will utilize electronically addressed, smoke detectors, heat detectors and input/output modules as described in this specification.

.5 All integrated life safety system equipment will be arranged and programmed to provide an integrated system for the early detection of fire, the notification of building occupants, the automatic summoning of the local fire department, the override of the HVAC system operation, and the activation of other auxiliary systems to inhibit the spread of smoke and fire, and to facilitate the safe evacuation of building occupants. In all operating modes, the processing of fire alarms will have the highest priority.

2.2 CONTROL PANEL

.1 The existing Fire Alarm Control Panel (FACP) is an Edwards EST3 control panel with a remote annunciator panel.

.2 Consult the manufacturer to verify existing system provisions and the compatibility of the new control equipment with existing system and provide all necessary modifications to existing wiring or control panel accordingly.

2.3 SYSTEM CONFIGURATION

.1 Each addressable analog loop will be circuited so device loading is not to exceed 80 % of loop capacity in order to allow for the addition of future devices.

.2 Provide alarm receiving modules as required in the control panel for all alarm receiving circuits. Modules will include an individual amber trouble lamp for each alarm receiving circuit to indicate the source of any faults.

.3 The alarm receiving circuits will have Class "A" operation. A single break or grouped fault in the wiring to any initiating device will cause a trouble signal but will not affect detection of an alarm from any initiating device while this fault exists.

.4 Provide supervisory receiving modules as required in the control panel for all supervisory circuits. Modules will include individual alarm and trouble lamps for each supervisory circuit to indicate circuit condition.

.5 The supervisory circuits will have Class "B" operation. A single break or ground fault in the wiring to any initiating device will provide a trouble signal. A supervisory circuit alarm condition will activate trouble sequence only.

.6 Provide audible signal circuit modules as required in control panel for all signal circuits.

.7 Provide auxiliary control relay modules as required in control panel for all auxiliary control circuits. Modules will include individual trouble lamps for each circuit and supervised on-off-auto control switch for manual circuit operation override.

.8 The signal and auxiliary control circuits will have Class "B" operation. A single break or ground fault in the wiring to any audible signal or control device will produce a trouble signal.

.9 Provide remote control relays connected to supervised ancillary circuits for control of fans, dampers, door releases, etc. Relay contact ratings will be DPDT and rated for 10 amperes at 115 V AC. A single relay may be energized from a voltage source of 24 V DC, 24 V AC, 115 V AC, or 230 V AC. A red LED will indicate the relay is energized. A metal enclosure will be provided.

2.4 SYSTEM DEVICES

.1 All new and existing/re-used system devices will be fully compatible with existing control equipment and match in operation and performance characteristics of the existing system. All signal devices and manual stations will be identical in appearance and function. All accessories will be supplied by the fire alarm manufacturer.

.2 Supply system devices where indicated on the drawings and described below.

Manual Stations types to be operable using one hand, without requiring tight grasping, pinching with fingers or twisting of the wrist, and with a force of not more than 22.2 N and include:

(1) Manual Station, Single Stage, single-action lever, extruded aluminum with NO/NC contacts.
(2) Manual Station, Single Stage, single-action lever, extruded aluminum with two sets NO/NC contacts (for use with magnetic locks).

.2 Manual stations will include these accessories where required:

(1) Where surface mounted, use a vendor-approved surface wall box.
(2) In public spaces, a vendor-approved polycarbonate lift-type shield and frame that fits easily over manual station. The shield will have integrated battery-operated high dB sounder on cover lift.
(3) Use manufacturer-approved manual station lowering kit to adjust height of existing manual stations.

.3 Automatic thermal detectors types include:

(1) Fixed and Rate of Rise Heat Detector. 57 ºC (135 ºF), separate mounting base.
(2) Fixed and Rate of Rise Heat Detector. 90 ºC (194 ºF), with addressable module.
(3) Fixed Temperature Heat Detector. 57 ºC (135 ºF), separate mounting base.
(4) Fixed Temperature Heat Detector. 90 ºC (194 ºF), with addressable module.
(5) Fixed and Rate of Rise Heat Detector. 57 ºC (135 ºF), suitable for Class 1, Division 1, Group D (explosion proof) application with an address module.
(6) Fixed and Rate of Rise Heat Detector. 57 ºC (135 ºF), Suitable for moisture proof application with an address module.
(7) Fixed Temperature Heat Detector. 57 ºC (135 ºF), suitable for moisture proof application with an address module.

.4 Where indicated to provide a fire detector, provide suitable thermal detector listed above.

.5 Automatic smoke detectors types include:

(1) Photoelectric Area Type with separate mounting base
(2) Photoelectric Type Duct Smoke Detector with housing, Form-C shut down relay and LED remote indicator and sampling tubes to suit duct dimensions and key-operated remote test station. Provide wall mount remote indicator minimum 300 mm (1 ft) below ceiling at detector location.
(3) Photoelectric Smoke and Fixed Temperature Type- intelligent multi-sensor detector. The smoke detector will be modular and allow for replacement of the photoelectric chamber
(4) Ionization, Photoelectric and Heat Type - multi-sensor detector with a separate mounting base.

.6 Addressable Carbon Monoxide (CO) Detector - with audible sounder base. The CO detection element will indicate a trouble condition at the FACP signaling end of life and the CO element of the detector will be field replaceable. It will be programmed at the main control panel as a supervisory indication and transmit a separate supervisory signal to the central station.

.7 The intelligent Analog detectors will be suitable for mounting on any detector-mounting base.

(1) Standard Detector Mounting Bases - The base will be capable of supporting one Remote Alarm LED Indicator. Provide remote LED alarm indicators where shown on the plans.
(2) Relay Detector Mounting Bases – The base will be provided for area smoke detectors as indicated on plans to provide a remote alarm indication or perform auxiliary functions as applicable. Relay bases to be 4 wire version with end of line relay. Power source for relay activation to be run separately from detection circuit to allow multiple unit operation. The relay will be a bi-stable type and selectable for normally open or normally closed operation. The position of the contact will be supervised

(3) Isolator Detector Mounting Bases – The base's respective detector processor will control the operation of the isolator base. Following a short circuit condition, each isolator/detector will be capable of performing an internal self-test procedure to re-establish normal operation.
(4) Audible Bases - For synchronized output of the 3-3-3 pulse for room smoke detector annunciation. The audible bases will be used to provide audible signals to suites and dorm rooms. The power for the audible bases will be provided by the FACP or Booster power supplies and will be supervised with a riser supervisory module. The sounder bases can be controlled by the program so that the sounders can be turned on for general alarm evacuation signaling as well as inter suite alarm annunciation.
(5) Temporal Audible Bases - For synchronized output of the 3-3-3 pulse for room smoke detector annunciation and 4-4-4 temporal pattern to meet CSA and CAN/ULC signal differentiation between smoke and CO detectors. The audible bases will be used to provide audible signals to suites and dorm rooms. The power for the audible bases will be provided by the FACP or Booster power supplies and will be supervised with a riser supervisory module. The sounder bases can be controlled by the program and a temporal code driver module and a dual input signal module to switch between smoke and CO detection signals as required so that the sounders can be turned on for general alarm evacuation signaling as well as inter suite alarm annunciation

.8 Input modules will have a minimum of 2 diagnostic LEDs mounted behind a finished cover plate. A green LED will flash to confirm communication with the loop controller. A red LED will flash to display alarm status.

(1) Single Input Module - (Waterflow Detectors, Tamper Switches etc.) The Single Input Module will provide one (1) supervised Class B input circuit capable of a minimum of 4 personalities, each with a distinct operation. The single input module will support the following circuit types: Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.), Normally-Open Alarm Delayed Latching (Waterflow Switches), Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.), Normally-Open Active Latching (Supervisory, Tamper Switches).
(2) Dual Input Module - The Dual Input Module will provide two (2) supervised Class B input circuits each capable of a minimum of 4 personalities, each with a distinct operation. The dual input module will support the following circuit types: Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.), Normally-Open Alarm Delayed Latching (Waterflow Switches), Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.), Normally-Open Active Latching (Supervisory, Tamper Switches).
(3) Single Input Signal Module - The Single Input (Single Riser Select) Signal Module will provide one (1) supervised Class B output circuit capable of a minimum of 2 personalities, each with a distinct operation. When selected as a telephone power selector, the module will be capable of generating its own "ring tone". The single input signal module will support the following operations: Audible/Visible Signal Power Selector (Polarized 24 V DC @ 2 A).
(4) Control Relay Module - The Control Relay Module will provide one form "R" dry relay contact rated at 2 A @ 24 V DC to control external appliances or equipment shutdown. The control relay will be rated for pilot duty and releasing systems. The position of the relay contact will be confirmed by the system firmware.

.9 End of Line Resistors complete with a white plastic single gang cover plate appropriately marked and must be CSA or CAN/ULC approved.

.3 Provide appropriate wire guard installed over detector for detector protection where shown on drawings.

.4 Notification appliances will be as follows:

.1 Horns: with a field selectable peak output of L_A = 97 dB at 10 feet at high output and L_A = 92 dB at low output. Horn to have a red finish. Horn output to be set at L_A = 97 dB unless noted otherwise. When surface mounted use surface wall box with a colour to match device.

.2 Strobes: synchronized strobe with a field selectable output of 15, 30, 75 or 110 cd; complete with red finish. To be selected for 15 cd unless noted otherwise noted on plans. When surface mounted use surface wall box with a colour to match device. Strobes in sleeping rooms will have minimum output of 177 cd.

.3 Combination Horn-Strobes: with a field selectable peak output of L_A = 97 dB at 10 feet at high output and L_A = 92 dB at low output. Unit to be complete with a synchronized strobe with a field selectable output of 15, 30, 75 or 110 cd. Horn/strobe to have a red finish. Horn output to be set at L_A = 97 dB and strobe to be selected for 15 cd unless noted otherwise. When surface mounted use surface wall box with a colour to match device. Strobes in sleeping rooms will have minimum output of 177 cd.

.4 Surface wall mount high efficiency Horn type speaker complete with metal housing/enclosure and 70 V line matching transformer with 1 to 7 ½ W taps. Initially set tap to 2 W, then individually adjust to suit specific requirements.

.5 Trim Plates: Provide trim plates for two-gang or 100 mm (4 in) square boxes.

3 EXECUTION

3.1 GENERAL

.1 The entire system will be installed in accordance with the latest edition of CAN/ULC-S524 and the approved manufacturer's manuals and wiring diagrams. Furnish all labour, conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for a complete, functional life safety fire alarm system. Provide all necessary power supply, interconnecting and remote signal wire in dedicated conduit throughout and installed in accordance with the manufacturer's wiring diagrams and the requirements of the Building Code, Electrical Code, and Inspection Authorities. All penetration of floor slabs and fire separations will be fire stopped in accordance with all local fire codes.

.2 Take alternate measures in co-ordination with the Owner during any temporary interruption or reduction of fire alarm detection or signalling to ensure the safety of the building occupants. These measures shall be approved by the local fire department and be conveyed to them in writing in accordance with the requirements of the Fire Code.

3.2 WORK WITH EXISTING FIRE ALARM PANEL

.1 Consult the manufacturer to verify the existing system provisions, the compatibility of the new control equipment with existing system and provide all necessary modifications to existing wiring or control panel accordingly, to accommodate the system alterations and comply with the system requirements.

.2 Remove all special modifications upon completion of system wiring and device upgrade. All existing auxiliary control circuits will be reconnected to new control to operate in the specified manner

.3 The manufacturer will supply reasonable amounts of technical information with respect to any changes necessary to accommodate the system alterations.

.4 Modifications to the fire alarm control panel to accommodate the system alterations will be by the manufacturer's technician.

.5 Provide all rewiring and modifications to existing circuit arrangements to comply with the new system circuit zoning, devices and wiring requirements.

.6 It is the intention to install new fire alarm devices and wiring without any interruption of the existing fire alarm system protection to occupied areas of the building in the building. Maintain fire alarm system operation during construction in accordance with Ontario Fire Marshall's *Guidelines for Maintaining Fire Safety During Construction in Existing Buildings*. Any required testing of the fire alarm system during construction must be proceeded by a warning and announcement to the appropriated supervisory personnel. Arrange the time and duration of testing with the Owner to cause minimal disturbance and inconvenience to all concerned.

.7 Take alternate measures in co-ordination with the owner during any temporary interruption or reduction of fire alarm detection or signalling to ensure the safety of the building occupants such as a fire watch. These measures will be approved by the local fire department and be conveyed to them in writing in accordance with the requirements of the Authority Having Jurisdiction (AHJ).

3.3 WIRING

.1 Fire alarm system wiring will be sized and colour coded in accordance with manufacturer's and Electrical Code requirements, (minimum 14 AWG - signal and control circuits, minimum 18 AWG - annunciation, minimum 16 AWG detection and supervisory circuits, minimum 12 AWG power supply).

.2 All fire alarm system wiring will be provided with a separate insulated ground conductor sized in accordance with Electrical Code regulations. All signal and auxiliary wiring will be installed as standard Class 'B' type in a separate conduit system and an alarm receiving wiring will be installed as Class 'A' type in two runs of conduit in accordance with this specification and Electrical Code requirements complete with recessed device boxes for approved component mounting.

.3 Use fire rated mineral insulated cable as noted and/or required to meet Building Code regulations.

.4 Connect auxiliary control circuits to the system to provide proper equipment operation. Provide in-line fuse protection at control panel for all auxiliary control circuits.

.5 Wiring connections will be made as shown on drawings. Final connection to panel will not be applied to the circuit until the representative of the manufacturer has approved the connections to the control equipment.

.6 Wiring requirements for shielding certain conductors from others or routing in a separate raceway will be as recommended by the manufacturer's documentation and included in the bid.

3.4 INSTALLATION

.1 Mounting heights of equipment will be as follows:

Device	Mounting Height
Manual Stations	1100 mm (43 in) to centre of back box New stations installed at existing locations will be re-positioned to new mounting height.
Audible Signals (wall mounted)	2300 mm (90 in) or 300 mm (12 in) below ceiling, to top of device, whichever is lower.
In-suite Audible Signals with Silencing	1050 mm (41 in) to centre of back box
Visual Signals (wall mounted)	2300 mm (90 in) to top of lens.
Panels	2000 mm (80 in) to top of trim.
End of line resistors	1800 mm (6 ft) to centre of device.

.1 New devices installed at existing locations will also be mounted at these mounting heights.

.2 Locate detectors as shown considering spacing and mounting requirements contained in CAN/ULC-S524. Locate detectors away from radiating surfaces or positions affected by ventilation grilles.

.3 End-of-line resistors will be furnished as required for mounting as directed by the manufacturer. These devices are not shown on plans but shall be located in public spaces.

.4 Connect sprinkler system flow and alarm switches, by Division 21 Fire Suppression, to the fire alarm system to indicate an alarm condition on the appropriate zone. Connect standpipe/sprinkler system pressure and tamper switches, by Division 21 Fire Suppression, to the system to indicate a trouble condition on the appropriate zone. Connect fire pump power supply auxiliary monitor contacts to the system to indicate a trouble condition on the appropriate zone.

.5 Connect supervisory device contacts to the system to indicate a trouble condition on the appropriate supervisory zone. Connect auxiliary control circuits to the system to provide proper equipment operation. Provide in-line fuse protection at control panel for all auxiliary control circuits.

.6 Connect auxiliary control circuits to the system to provide proper equipment operation. Provide in-line fuse protection at control panel for all auxiliary control circuits.

3.5 FIELD QUALITY CONTROL

.1 The manufacturer will make a complete inspection of all installed fire alarm equipment including each and every component such as signal devices, initiating devices, annunciation and control equipment, etc. in accordance with CAN/ULC-S537 to ensure the following:

.1 That the system is complete and in accordance with the specifications.

.2 That the system is connected according to ULC requirements.

.3 That the system is installed in accordance with the manufacturer's recommendations.

.4 That the regulations concerning the supervision of components have been adhered to.

.2 Any subsequent changes to conform to the above will be done with technical advice supplied by the manufacturer.

.3 The manufacturer will supply reasonable amounts of technical information with respect to any changes necessary. During the period of inspection by the manufacturer, this Section will make available to the manufacturer, appropriate staff as designated by the manufacturer.

.4 On completion of the inspection, the manufacturer will provide the Consultant with a certificate together with detailed inspection record sheets, confirming that the system is installed in accordance with the above outlined requirements. The manufacturer will also confirm in writing that all authorized building personnel have been instructed as to system operation, maintenance procedures, etc.

.5 All costs involved in this inspection both from the manufacturer and this Section’s work, will be included with the total tender price.

.6 It will be the responsibility of this Section to assure that construction debris does not adversely affect any sensing devices installed as part of this project. Should it be deemed necessary by the Consulting Engineer, End-User, or AHJ, this Section will be responsible for the cleaning of all smoke detectors prior to final acceptance.

3.6 THIRD-PARTY VERIFICATION

.1 Verification shall be carried out in accordance to CAN/ULC-S537 Verification of Fire Alarm Systems. The Third-party verifier shall provide a Verification Certificate and Verification Report to show compliance with CAN/ULC-S537 Verification of Fire Alarm Systems.

.2 Verification must be carried out by an agency (or individual) acceptable to the Authority Having Jurisdiction, who can demonstrate they have the sufficient training or experience, and who is not the installing contractor, fire alarm manufacturer, or involved in the design or installation of the fire alarm system.

.3 All fire alarm system testing and verification will use only safe, non-damaging test methods in accordance with CAN/ULC-S536. Open flame or smoke will not be used for any on-site testing of detection devices for proper operation.

3.7 AUDIBILITY TESTING

.1 All rooms within the scope of work shall be tested with a professional sound level meter that has an accuracy of ± 1.5 dB. Sound level meter used in testing shall be the same for all areas of the building for both with alarm and without. Tester will be calibrated immediately before and after the audibility measurements are taken based on ANSI S1.40, Specifications for Acoustical Calibrators.

.2 Sound level measurements shall be taken in accordance to CAN/ULC-524 Appendix C - Sound Level Measurements with the following additional requirements.

.1 Tester will perform all tests with all doors and windows closed and when unusual noises are not present.

.2 Tester will perform test to get ambient noise level without alarm to measure ambient sound level and perform the test again with the with alarm to measure alarm sound level.

.3 All test results should be tabulated showing the following columns: room number/name, building code minimum sound level, ambient noise level, and alarm noise level

3.8 FIREWATCH

.1 If during the course of construction, the fire alarm system or zones within the building are required to be fully or partially shut down for any period of time, provide a Firewatch for all the affected areas in accordance with the Fire Code during that time period. This Firewatch should be in place for the entire duration of the shutdown.

3.9 SEQUENCE OF OPERATION

.1 All fire safety within the building will follow the requirements set out in the building’s existing Fire Safety Plan.

.2 The overall operation of the existing fire alarm panel will not change. All new or relocated devices added to the system shall function in the same manner as all other existing devices.

END OF SECTION