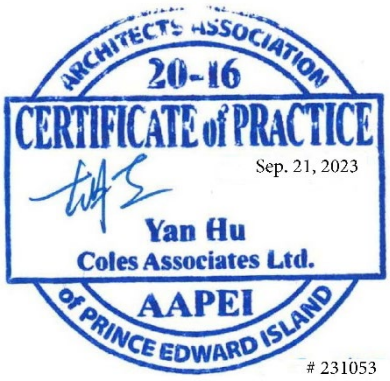
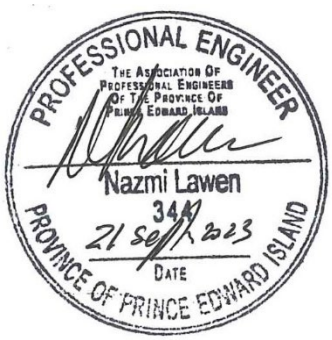
COLES ARCHITECTURE ENGINEERING PROJECT MANAGEMENT

201-85 Fitzroy Street
Charlottetown, PE C1A 1R6
(902) 368-2300
www.colesassociates.com

SPECIFICATIONS

KINKORA COMMUNITY HALL EXPANSION
45 ANDERSON ROAD KINKORA, PE





Consultant:

Coles Associates Ltd.
Charlottetown, PE

Project #231053 **Issued for Tender – September 21, 2023**

This page intentionally left blank

TABLE OF CONTENTS

1 General

1.1 LIST OF DRAWINGS

.1 DRAWINGS COVER PAGE
- .1 A000 Cover Page

.2 CIVIL DRAWINGS
- .1 C100 Site Plan
- .2 C101 Site Details & Notes

.3 STRUCTURAL DRAWINGS
- .1 S101 Foundation & Ground Level
- .2 S102 Roof Framing
- .3 S103 Notes & Typical Sections
- .4 S104 Sections & Details

.4 ARCHITECTURAL DRAWINGS
- .1 A001 Context Plan & Project Info, Legend, General Notes
- .2 A002 Schedules
- .3 A030 3D Views
- .4 A040 Building Code and Life Safety Notes
- .5 A100 Floor Plan
- .6 A102 Roof Plan
- .7 A140 Floor Finish Plan
- .8 A160 Reflected Ceiling Plan
- .9 A200 Exterior Elevations
- .10 A300 Building Sections
- .11 A350 Wall Sections
- .12 A600 Millwork Plans & Elevations
- .13 A700 Plan Details
- .14 A800 Section Details
- .15 A801 Details

.5 MECHANICAL DRAWINGS
- .1 M100 Plumbing Plans, Details and Schedules
- .2 M200 Heating, Ventilation and Air Conditioning Plans
- .3 M201 Heating, Ventilation and Air Conditioning Details and Schedules

.6 ELECTRICAL DRAWINGS
- .1 E001 Site Plan, Trench Details & Legend
- .2 E100 Main Floor Plan & Enlargements - Power
- .3 E200 Main Floor Plan - Communications, Systems & Lighting
- .4 E300 Details & Schedules
- .5 E301 Communications, Access Control & Fire Alarm Details

END OF SECTION

This page intentionally left blank

1 General

1.1 APPENDIX A

.1 Geotechnical Investigation Report Revision 1.1, Kinkora Community Centre Expansion, Kinkora, PE, prepared by Fundy Engineering, dated May 12, 2023, Project No: 16548.

1.2 APPENDIX B

.1 Material / Finish Schedule
.2 Accessories Schedule

1.3 APPENDIX C

.1 Fire Alarm Verification Report

1.4 APPENDIX D

.1 Luminaire Schedule
.2 Panel Schedules

END OF SECTION

This page intentionally left blank

1 General

1.1 INVITATION - TENDER CALL

.1 The Owner, the Rural Municipality of Kinkora, is issuing this tender as follows:
- .1 Sealed tenders will be received as per TIMING REQUIREMENTS of this section.
- .2 Tenders are to be clearly marked with the name of the project & the Bidder's name.
- .3 Tenders documents will need to be received at location of tender closing, prior to the time of tender closing noted, and on the date specified in the Tender. No submission will be accepted after that time.
- .4 The tender opening will be public.
- .5 Location of the Tender closing is as follows:

  Coles Associates Ltd.
  85 Fitzroy Street, Suite 201
  Charlottetown, PEI
  C1A 1R6
- .6 Refer to Section 01 10 00 - Summary, for full summary of work.

1.2 QUERIES / ADDENDA

.1 Direct all questions during the tender period to:

Coles Associates Ltd.
85 Fitzroy Street, Suite 201
Charlottetown, PEI
C1A 1R6

Attention: Jeremy Bishop, P. Eng.
Phone: 902-368-2300
Email: jmarchand@colesassociates.com

.2 Addenda may be issued during the bidding period. All addenda become part of the Contract Documents. Include costs in the Bid Price.

.3 Verbal answers are only binding when confirmed by written addenda.

.4 Clarifications requested by bidders must be in writing not less than four days before tender close. The reply will be in the form of an addendum, a copy of which will be issued two days prior to tender close.

1.3 TENDERING PROCEDURE

.1 General Contractors:
- .1 Submit their tender for the entire work of this Contract, INCLUDING the work of all subcontracts, directly to the Owner in accordance with the requirements of the Invitation to Tender and this specification.

.2 Subcontractors:
- .1 Submit their tenders directly to the General Contract bidders, for incorporation by the General Contractors into their General Contract tenders.

.3 General Contract bidders shall take particular care to ensure that their tender is submitted on the proper tender form.

1.4 SPECIFICATION EXPLANATION

.1 Whenever the words "as shown," "as noted," "as called for," "indicated," or similar phrases are used, they shall be understood to refer to this specification and/or the accompanying drawings and addenda.

.2 The words "provided", "install" or similar words shall mean the work described shall be completely supplied, and erected or installed by the Contractor, unless otherwise noted.

.3 All materials are to be new unless noted otherwise.

1.5 EXAMINATION OF SITE

.1 All bidders submitting tenders for this work shall first examine the site and all conditions thereon and/or therein, including:
  .1 Existing building conditions visually evident at the time of tender upon which the Work of this Contract will be installed.
  .2 Conditions attached to, abut against or in any other way affected by existing conditions.

.2 All tenders shall take into consideration all such conditions as may affect the work under this Contract.

.3 No extra payment will be made to the Contractor, above the Contract Price, for costs resultant from failure to determine the conditions that affect the Work.

.4 A visit to the project site has been arranged for bidders as noted in the timing requirements of this section.

1.6 EXISTING CONDITIONS

.1 If in the performance of the contract, subsurface or latent conditions at the site are found to be materially different from those indicated by the drawings and specifications, or unknown conditions not usually inherent in work of the character shown and specified, the attention of the Consultant shall be called immediately in writing to such conditions before they are disturbed. Upon such notice or resulting from his own observation of such conditions the Consultant shall promptly make such changes in the drawings and specifications as he finds necessary to conform to the different conditions and any increase or decrease in the cost shall be adjusted as provided under Changes in the Work.

1.7 DOCUMENT INTERPRETATION

.1 The Consultant's interpretation of Contract Documents shall be final.

.2 Should the Bidder find discrepancies in, or omissions from the drawings, specifications or other tender documents, or be in doubt as to their meaning or interpretation, the Bidder should at once notify the Consultant in writing for clarification.

.3 Any instructions or clarifications to Bidders issued during the period of bidding will be in the form of Addenda and are to be included in the tender. Addenda will form part of the Contract Documents.

.4 The Owner, User Groups or Consultant will not be responsible for verbal instructions.

.5 All addenda will be posted to the Province of Prince Edward Island tenders and procurement opportunities website and it is the bidders responsibility to make sure they are in receipt of all addenda. No addenda will be issued by email to bidders.

1.8 PREPARATION AND SUBMISSION OF BIDS

.1 Contractors shall submit their bids on the Tender Form provided, which will be received at the time and place indicated on the Invitation to Tender. Late tenders will not be accepted and will be returned unopened to the bidder.

.2 Bidders shall fill in all information requested on the Tender Form.
  .1 This form must be completely filled out in ink, or be typewritten with the signature in longhand. The completed forms shall be without interlineation, alteration or erasure.
  .2 Failure to fill in the Tender Form, as provided, in its entirety may result in the rejection of the bid; however, bidders are not obligated to provide alternative prices to products listed on the Appendix provided for that specific purpose, as part of the tender form.
  .3 Tender amount shall be stated both in writing and in figures.
  .4 Signatures shall be without alteration or erasure.
  .5 Receipt of addenda for the project shall be acknowledged by filling in the addendum number and date of issue for each addendum on the appropriate line on the Tender Form. These lines shall be initialed by the person signing the tender after they have been filled in.

.3 Each tender submitted will be accepted on the understanding that it covers all the Work called for in the specifications and on the drawings, regardless of any notations by Bidder that certain parts of the required Work are omitted from their proposal.

.4 Each bid must:

.1 Give the full business address of the Bidder and be signed by him with his usual signature.

.2 Bids by partnerships must furnish the full name of all partners and must be signed in the partnership name of one of the members of the partnership or by some authorized representative, followed by the signature and designation of the person signing.

.3 Bids by corporations must be signed with the legal name of the corporation, followed by the name of the Province of incorporation, and by the signature designation of the president, secretary, or other person authorized to bind it in the matter. The name of each person signed shall also be typed or printed below the signature.

.4 A bid by a person who affixes to his signature the word "president," "secretary," or "agent," or other designation, without disclosing his principal, may be held to be the bid of the individual signing on behalf of the corporation.

.5 A bid of any individual or any group of individuals operating as co-partners or the bid of any corporation which may be submitted shall be executed and authorized so that it shall be and it will constitute a legal binding act of the persons, co-partners, or corporate entity making the bid.

.5 Bidders shall include with their tender, in the space designated in Section 00 41 13, Appendix A, the name of each Subcontractor and/or Supplier, as designated, whose price has been included in their tender and who will perform the trade work. Substitution for another Subcontractor in the event that the listed Subcontractor is unable to do the work shall be subject to the approval of the Owner and contingent on evidence satisfactory to the Owner that the original Subcontractor's price was legitimately carried in the Tender, and that the original Subcontractor is now incapable of carrying out the work required under the subcontract, or that he refuses to carry out the work and provides documented reasons for such incapacity or refusal.

.6 The term "Own Forces," as a subcontractor, may be used by a Bidder where the Bidder is equipped to and in fact normally carries out the trade work using employees in the direct employment of the Contractor or a wholly owned subsidiary company. Other designations such as "Own Estimate" are unacceptable and may be cause for rejection of the tender by the Owner.

.7 When a Bidder indicates "Own Forces" as a subcontractor, the Bidder may be required to demonstrate to the Owner that he has the resources, experience and employees necessary, available and qualified to perform the trade work in a manner and quality satisfactory to fulfill the obligations of the Contract Documents and that the trade work is a normal and continual part of his business operation.

.8 A Bidder, whose tender is accepted, that included "Own Forces" for a subcontract will if requested, provide the Owner with payroll records verifying that the employees carrying out the "Own Forces" subcontract work are direct employees of the Contractor or of a wholly owned subsidiary company of the Contractor.

.9 Each bidder shall be prepared, if so requested by the Owner, prior to the award of the Contract to present evidence of his experience, qualifications and financial ability to carry out the terms of the Contract.

.10 The Owner will evaluate Tenders submitted for this project. The criteria to be considered by the Owner in awarding the Contract will include a combination of:

.1 Bid price;

.2 Scheduling;

.3 Compliance;

.4 Expertise;

.5 Qualifications of the Contractor and named Subcontractors / Suppliers and

.6 Any other such conditions as may be determined by the Owner to be in the best interests of the Owner. A decision on the acceptance of a Tender will be made by the

Owner based on the results of the Owner's evaluation.

.11 Bidders may, at their own discretion, submit Alternatives to items identified as "Acceptable Material".
- .1 All proposed Alternatives shall be listed in Appendix "B", ALTERNATIVE PRICES and be identified by name and model number where applicable and each Alternative shall have an associated tender price change "INCREASED BY" $_____ or "DECREASED BY" $_____ or "N/A," as compared with the "Acceptable Material" item carried in the tender amount.
- .2 Alternate prices will include ALL related costs associated with charges from Accepted Material. No additional costs will be accepted for failure of the Contractor to identify the full impact of using alternate systems.
- .3 Alternate prices will NOT be used in determining the tender price or as the basis for awarding the tender.

.12 Bidders are to complete any other appendices forming part of the Tender Form as directed under Section 00 41 13 - Bid Form.

.13 Tender Forms and accompanying documents shall be enclosed in a sealed envelope marked "TENDER" and bearing the following identification.
- .1 Name of project.
- .2 Name of Contractor submitting tender.

.14 Envelope to be addressed to the recipient of tenders indicated in the Invitation to Tender and delivered by hand, registered mail or courier.

.15 Submit one (1) only signed copy of Tender Form.

.16 Accompanying the Tender Form shall be:
- .1 One (1) copy of Bid Guarantee, together with Surety's Letter of Consent, as specified.
- .2 One (1) copy of a preliminary schedule demonstrating the full scope of work to be completed within the identified time for the completion of the contract work.
- .3 One (1) copy of a letter from Bidder's insurance provider identifying a list of any claims made against the Bidder within the last five (5) years.

.17 Tender forms and securities must bear original signatures.

.18 Where the bid amount is shown in both written words and number and the two are in conflict, written words will take precedence.

1.9 CONTRACT SECURITY

.1 Upon award of a Contract, the Contractor shall provide the following Contract Security:
- .1 For a General Contract Tender less than One Million Dollars ($1,000,000.00), including Civil, Mechanical, Sprinkler, and Electrical Subcontract values:
  - .1 A Performance Bond and a Labour and Materials Bond, each in the amount of fifty per cent (50%) of the total Contract Amount, or
  - .2 A Security Deposit in the form of a Certified Cheque or Bank Draft, in an amount not less than ten per cent (10%) of the total Contract Amount.
- .2 For a General Contract Tender One Million Dollars ($1,000,000.00) or more, including Civil, Mechanical, Sprinkler and Electrical Subcontract values:
  - .1 A Performance Bond and a Labour and Materials Bond, each in the amount of fifty per cent (50%) of the total Contract Amount.

.2 All Bonds provided by General Contractors, are to be made payable to the Owner.

.3 Bonds shall be from a recognized Surety Company, licensed in Canada and authorized to do business in the Province of Prince Edward Island.

.4 If a Performance Bond is utilized, it shall be maintained in force for a period of not less than twelve (12) months after the issuance of the Total Performance Certificate.

.5 Security Deposits, provided by the General Contractor:
- .1 Must be in the form of a Certified Cheque or Bank Draft drawn on a bank to which the Canadian Bank Act applies, or a Credit Union, payable to the Owner, OR
- .2 Bonds of the Government of Canada, unconditionally guaranteed, as to the principle and interest by the Government of Canada if such Bonds are:
  - .1 Payable to the Bearer, or

.2 Accompanied by a duly executed Instrument of Transfer to the Owner, in the form prescribed by the Domestic Bonds of Canada Regulations, or

.3 Negotiated as to principle or as to principle and interest in the name of the Owner pursuant to the Domestic Bonds of Canada Regulations.

.6 Contract Security shall be provided at the expense of the General Contractor. Cheques or Bank Drafts shall be drawn on an account with recognized Financial Institutions.

.7 Contract Security submitted by Subcontractors to General Contractors, shall be in a form acceptable to the General Contractor.

.8 No interest will be paid to the successful Contractor on any form of Contract Security.

.9 If in accordance with the Contract Security requirements the successful Contractor has used a Certified Cheque or Bank Draft as Contract Security, the Certified Cheque or Bank Draft will be deposited in a safety deposit box in a bank until the date of Substantial Performance for the Contract as defined under Definition 19 of CCDC2-2008. Subject to the Work being acceptable to the Owner and Consultant it will be returned to the Contractor, without interest. The Certified Cheque or Bank Draft used as contract Security used through the construction period will be replaced with a Certified Cheque or Bank Draft in the amount of 20% of the original Contract Security during the Warranty Period. Subject to Warranty issues being addressed during the 1-year Warranty Period to the satisfaction of the Owner and Consultant it will be returned to the Contractor, without interest.

1.10 RECEIPT AND OPENING OF BIDS

.1 Bids will be opened publicly at the time and place stated in the Invitation to Tender. The officer whose duty it is to open them will decide when the specified time has arrived. No responsibility will attach to any officer for the premature opening of a bid not properly addressed and identified.

.2 Emailed, telephoned or facsimile transmitted bids will not be considered.

.3 Any firm which has submitted a tender has the privilege of being present at the bid opening.

1.11 ADJUSTMENT AND WITHDRAWAL OF BIDS

.1 Bids may be withdrawn or adjusted in writing by mail, delivered in person, or facsimile transmission delivered to the party to whom the bids were submitted, provided such withdrawal or adjustment is prior to the time fixed for the opening of the bids. Negligence on the part of the bidder in preparing the bid confers no right for the withdrawal or adjustment of the bid after the expiration of the time within which bids may be submitted.

.1 All withdrawals or adjustments to previously submitted tenders must be faxed to **Coles Associates Ltd. at (902) 566-3768** prior to the time fixed for the opening of bids.

.2 Neither the Owner nor Coles Associates Ltd. accepts responsibility for the Contractors inability to submit faxed modifications within the allotted time for such circumstances, including but not limited to power and equipment failures, transmission failures, paper outages, busy fax line, etc.

.3 Adjustments must be signed by the same person who signed the original bid.

1.12 AWARD OF CONTRACT

.1 The Contract, if awarded, will be awarded as promptly after the opening of bids as is possible, and at the discretion of the Owner. The award date will not extend beyond the period indicated on the Tender Form following the scheduled time of tender closing, without first obtaining permission of the three (3) low bidders, or low bidder only, at the discretion of the Owner.

.2 The Form of Agreement, (Contract) which the successful Bidder will be required to enter into with the Owner, may be seen on application to the Consultant. The drawings, specifications and any addenda issued during the tender period, will be suitably marked for identification at the time the Form of Agreement is signed by both parties, shall be considered as being included in the Contract, together with the completed Tender form and are hereinafter referred to as the "Contract Documents." All of these documents shall be read together and

construed as one document. Following execution of the Contract, the Contractor shall receive from the Owner one (1) complete signed set of Contract Documents.

.3 Final award of Contract shall be subject to approval of all agencies having direct interest in the project.

.4 Where identical bids are received, the low bidder will be selected on the basis of a coin toss by the Owner in the presence of the identical bidders.

1.13 REJECTION OF BIDS

.1 The Owner reserves the right to reject any and all bids.

.2 The lowest or any bid will not necessarily be accepted.

.3 Bids submitted which indicate "own forces" for subcontract work, that in the opinion of the Owner cannot be successfully completed by the Contractor's employees will not be accepted.

.4 Bids not submitted on the required form will be rejected.

.5 Bids which are incomplete or qualified will be rejected.

.6 All Bidders acknowledge that they shall have no claim against, or entitlement to damages from the Owner or Consultant by reason of the Owner's rejection of their individual bids or all bids.

1.14 SUBCONTRACT WORK

.1 Contractor is to ensure that all Subcontractors understand the full extent of their responsibilities in order to complete the entire work of the project. Subcontract work may appear in various Sections of Specifications and on various Drawings.

.2 Contractors and their Subcontractors are advised to become familiar with all specifications and drawings.

1.15 CONDITIONS OF WORK AND EMPLOYMENT IN PEI

.1 All Construction Companies and Contractors and subcontractors submitting tenders for this work, or a portion thereof, are advised, in their own interest, to contact the Construction Association of Prince Edward Island, the accredited association for commercial and industrial sectors of the construction industry, to inquire and determine the terms and conditions of work and employment in the Province of Prince Edward Island.

1.16 LABOUR

.1 No prospective employee in the Province of Prince Edward Island shall, with relation to his employment or eligibility for employment, be discriminated against or favored by reason of sex, racial origin, religious views, or political affiliations.

.2 Contractors, to the extent possible, are encouraged to maximize the employment of the local labour force for the Work of this Contract.

1.17 HARMONIZED SALES TAX REQUIREMENTS

.1 The Owner for this project must account for the Harmonized Sales Tax (HST).

.2 All tenders submitted for the work of this Contract shall be calculated on the basis that the Owner is not exempt from HST. The bid will exclude HST but will show it as a separate line item.

1.18 ACCEPTABLE PRODUCTS

.1 The Bidder shall carry in his tender the base bid product(s) identified in the specifications as "Acceptable Material", or Approved Equals as they are identified throughout the tender period.

.2 The Bidder is also encouraged to carry the products of other manufacturers, that are not considered equals, as "Alternatives Prices," listing them by name on the Appendix provided for that specific purpose, as part of the Tender Form, together with the price difference compared to the specified products, when such Appendix is identified under Section 00 41 13 - Bid Form.

1.19 APPROVED EQUALS

.1 Submission for an Approved Equal is to contain literature and descriptive information with full specification data. Where the requested item is contained on a printed document with other items, it is to be clearly identified.

.2 The Consultant will not search catalogs, e-mails or websites or contact suppliers to obtain the necessary information for proper evaluation.

.3 Submission by Bidders for evaluation of products requested to be considered as equal must be submitted to Consultant no less than five working days prior to closing of tenders. No consideration will be given to approving equals after the close of tenders, except when the specified product is found to have been discontinued by the manufacturer.

.4 The consideration of a product(s) for Approved Equal status and the acceptance of individual products as approved equals is entirely at the discretion of the Consultant.

.5 When products are given Approved Equal status these products may, at the discretion of bidders, be carried in their tender price, provided that ALL costs related to changes to the contract work required to incorporate the Approved Equal product are included in the tender price.

.6 The acceptance of a product by the Consultant as an "Approved Equal," even where not specifically indicated on the Approved Equals listing in the Addendum, is to be understood as being contingent upon the provision of the particular series, model and/or type, complete with all options to meet the specified requirements of the Acceptable Material product.

.7 Products given approved status that are found, during construction period, to not have all specified options available, or to have discontinued production of same, or to have made other design changes since the time of approval, will not be accepted for use on this project, except when financial compensation has been mutually agreed upon between the Contractor and the Owner and deemed acceptable by the Consultant. Compensation will not be paid to the Contractor for products acknowledged by the Consultant to be superior to the specified products.

1.20 ALTERNATIVES

.1 Alternative products, when requested under Section 00 41 13 - Bid Form, must be listed in Appendix "B" provided as part of the Tender Form, and are to be understood as being offered only for the Owner's consideration as substitutes for the specified Acceptable Material products, at the amount of increase or decrease in the tender amount indicated in the Appendix. These products and related prices are not to be included in the tender amount.

.2 Alternative products and their related increase or decrease in the base bid amount are not used as the basis for awarding tenders.

.3 When alternative products are listed in Appendix "B", ALL costs related to changes to the contract work required to incorporate the alternative product into the work are to be included in the amount stated in Appendix "B".

.4 Alternative products may or may not be accepted at the discretion of the Owner at the price difference quoted, without any other monetary consideration. If requested, bidders shall promptly supply full details of any or all Alternatives listed. Specific written direction from the Consultant must be given to the Contractor to substitute an alternative product.

.5 Alternative prices shall include all fees, taxes and markups.

1.21 UNIT PRICES

.1 Unit Prices, when requested under Section 00 41 13 - Bid Form, must be listed in Appendix "C", as part of the Tender Form and are to be understood as being offered only for the Owner's consideration; to be accepted or not accepted, at the Owner's discretion in a timely manner during the Work of the Contract, ONLY as a method of adjustment to the Contract Work for changes in the Work, should the Owner opt for the Unit Price Method.

.2 Unit prices shall include all fees, taxes and markups.

1.22 SEPARATE PRICES

.1 Separate Prices, when requested under Section 00 41 13 - Bid Form, must be listed in Appendix "D", as part of the Tender Form and are to be understood as being offered only for the Owner's consideration; to be accepted or, not accepted, in whole or in part, at the Owner's discretion. If used the Separate Prices may be incorporated into the Contract Work either at the time of Award of Contract or in a timely manner during the Work of the Contract, at the Owner's discretion.

.2 Separate Prices shall include all fees, taxes (excluding HST) and markups.

1.23 GUARANTEES

.1 The Contractor will be required to guarantee the work of this Contract in accordance with the requirements of GC12.3 of the Agreement.

.2 Not withstanding the above, the bidder's attention is directed to the fact that certain individual items on this project may be required to be guaranteed by the manufacturer for periods in excess of twelve months. These specific requirements are to be found in various Sections of the specifications for this project.

1.24 PAYMENT OF WORKERS

.1 The Contractor shall, in addition to any fringe benefits, pay the workers employed by the Contractor on the work at wage rates, not less than those established by the Minimum Wage Order, issued under authority of the Labour Act, which is in effect. The Contractor shall pay workers employed on the work at intervals of not less than twice per month.

.2 The Contractor shall require each Subcontractor, or person doing any part of the work, to covenant with the Owner that workers are employed at the wage rates and in the manner required by this provision.

.3 Where any person employed by the Contractor or any Subcontractor, or other person engaged on the Work of this Contract, is paid less than the amount required to be paid under the provisions of this Contract, the Owner may deduct from any monies payable to the Contractor, under this or any other Contract, and pay to such person, a sum sufficient to bring the person's wages up to the amount required to be paid under this Contract.

.4 No claim for extra payment from the Contractor will be considered by the Owner concerning any change in the Minimum Wage Order which may occur during prosecution of the Contract.

1.25 TIMING REQUIREMENTS

.1 This project will require the achievement of the following project milestones:

.1	Tender Call	21 SEP 2023
.2	Pre-Tender Site Meeting	26 SEP 2023 @ 2:00 pm
.3	Tender Close	05 OCT 2023 @ 2:00 pm Refer to item TENDER CALL of this section for the address.
.4	Substantial Completion	40 weeks following Award.

END OF SECTION

This page intentionally left blank

1 General

1.1 TENDER

.1 SUBMITTED BY:

_____(Name)

_____(Address)

_____(Contact)

DATE: _____

FOR: PROJECT NAME: **KINKORA COMMUNITY HALL EXPANSION**

LOCATION: **45 ANDERSON ROAD KINKORA, PE**

TO: PROJECT OWNER: **RURAL MUNICIPALITY OF KINKORA**

Having examined ALL the drawings and specifications for this project, as well as any addenda issued, as prepared by Coles Associates Ltd. and/or their consultants; WE HEREBY OFFER to furnish all materials, plant and labour necessary for the full and proper completion of the Contract work for:

PROJECT NAME: **KINKORA COMMUNITY HALL EXPANSION**

LOCATION: **45 ANDERSON ROAD KINKORA, PE**

INCLUDING all prime cost allowances and Government sales or other taxes in force at this date, EXCLUDING Harmonized Sales Tax (HST) but not any other additional or deductible allowances or taxes which may be applicable subsequent to this date, and which shall be payable by or to the Owner, in accordance with the above mentioned Documents, for the bid amount of:

_____(Dollars)
($)

in lawful money of Canada.

In submitting this Tender we recognize the necessity to complete the information requested by any appendices, as well as, the right of the Owner to reject all Tenders or to accept any Tender at the price submitted, on the condition that revised Tenders will not be called for if minor changes are made.

In the event of this Tender being accepted within 60 days of the time stated for the closing of Tenders, and our failing or declining to enter into a Contract, then our Bid Guarantee, submitted with our Tender shall be forfeited to the Owner in lieu of any damages which the Owner may suffer by reason of our failure or refusal to enter into such Contract.

In the event of our Tender not being accepted with 60 days of the time stated for the closing of Tenders, our Bid Guarantee, submitted with our Tender will be returned to us forthwith, unless a satisfactory arrangement is made with us covering its retention for a further stated period.

If we are notified of the acceptance of this Tender within the above specified time, we will:

.1 Enter into a formal Contract Agreement with the Owner.
.2 Furnish the Performance Bond and Labour and Materials Payment Bonds, or other form of Contract Security, when specifically permitted, as Contract Security in accordance with the requirements of the specifications.
.3 Furnish a cost breakdown of the Contract sum, the total aggregating the amount of our Tender, in accordance with the requirements of the specifications.
.4 Furnish a certified copy of all insurance policies.
.5 Complete the entire work on or before the dates stated.
.6 Provide and update as required a Construction Schedule which clearly shows the state of progress required to complete the work on the date specified.
.7 Enter into subcontract agreements where applicable.

1.2 ACKNOWLEDGEMENT OF RECEIPT OF ADDENDA

.1 Addendum No. _____ Issued: _____ _____ initial

Addendum No. _____ Issued: _____ _____ initial

Addendum No. _____ Issued: _____ _____ initial

Addendum No. _____ Issued: _____ _____ initial

Addendum No. _____ Issued: _____ _____ initial

1.3 FORM OF TENDER APPENDICES

.1 Appendix 'A' must be completed by bidders.
.2 Appendix 'B' (only the items indicated) may be completed by bidders, any other items are at the bidder's discretion.
.3 Appendix 'C' must be completed by bidders.
.4 Appendix 'D' must be completed by bidders.
.5 Appendix 'E' must be completed by bidders.

1.4 DOCUMENTS ACCOMPANYING BID FORM

.1 As per Section 00 21 13 - Instructions to Bidders:

One (1) copy of Bid Guarantee, together with Surety's letter of consent. _____initial
One (1) copy of preliminary schedule. _____initial
One (1) copy of letter from Bidders Insurance Provider identifying list of claims made against Bidder within last five (5) years. _____initial

1.5 PROJECT MANAGER & SUPERINTENDENT

.1 Name of Project Manager _____.

.2 Years of Experience with Contractor _____.

.3 Name of Superintendent _____.

.4 Years of Experience with Contractor _____.

1.6 CONFLICT OF INTEREST

1.7 CONTRACTOR'S SIGNATURE

.1 Signed sealed and submitted for and on behalf of:

_____
(Company Name)

_____

_____
(Address)

_____ _____
(Authorized Signature) (Witness)

_____ _____
(Name and Title) (Name and Title)

_____
(Date)

1.8 APPENDIX 'A'

.1 Herewith are identified the Subcontractors we propose to use on this project.
Carrying Sub-Contractor options next to identified work, is not acceptable. The words TBD, own estimate, allowance and no bids received are also not acceptable and will be cause for rejection. All blanks shall be filled in with Subcontractor name or with the words Own Forces.

Site Demolition: _____

Excavation Work: _____

Asphalt Paving Work: _____

Concrete Sidewalks / Aprons: _____

Landscaping _____

Building Concrete Work: _____

Masonry: _____

Wood Roof Trusses: _____

Wood Framing: _____

Roofing: _____

Gypsum Wall Board: _____

Millwork / Cabinetwork: _____

Siding: _____

HM Doors and Frames: _____

Wood Doors: _____

Aluminum Curtain Wall: _____

Windows: _____

Glazing: _____

Door Hardware: _____

Flooring: _____

Firestopping: _____

Painting: _____

Mechanical: _____

Controls: _____

Electrical: _____

COMPANY: _____

AUTHORIZED SIGNATURE: _____

1.9 APPENDIX 'B'

.1 ALTERNATIVE PRICES

We herewith submit for consideration by the Owner the following systems or products as Alternatives to the Base Bid items indicated below and identify the increase or decrease, as applicable, in our tender price, for each item should it be selected by the Owner for installation in lieu of the Base Bid item. The change in tender price includes for all necessary modifications to the base bid systems.

Alternative prices shall include all fees and markups, and are to EXCLUDE Harmonized Sales Tax (HST).

SECTION ITEM BASE BID ALTERNATIVE:	TENDER PRICE INCREASED BY:	TENDER PRICE DECREASED BY:
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____

COMPANY: _____

AUTHORIZED SIGNATURE: _____

1.10 APPENDIX 'C'

.1 UNIT PRICE COMPONENT

We submit herewith our Unit Prices for the additions or deletions to the work listed below. The Unit Prices listed apply to performing the Units of Work, in accordance with the requirements of the appropriate specifications herein, only during the time scheduled for such work in the project work schedule.

Unit prices shall include all fees & markups and are to EXCLUDE Harmonized Sales Tax (HST).

UNIT OF WORK	ONE (1) UNIT PRICE ONLY FOR EITHER ADDITION OR DELETION
.1 _____	$ _____
.2 _____	$ _____
.3 _____	$ _____
.4 _____	$ _____

COMPANY: _____

AUTHORIZED SIGNATURE: _____

1.11 APPENDIX 'D'

.1 SEPARATE PRICES

We submit herewith our Separate Price for the addition of the work listed below and amounts are NOT included in our Stipulated Price. In accordance with the requirements of the appropriate specifications herein, only during the time scheduled for such work in the project work schedule.

Separate prices shall include all fees & markups and are to EXCLUDE Harmonized Sales Tax (HST).

UNIT OF WORK	ONE (1) UNIT PRICE ONLY FOR EITHER ADDITION OR DELETION
.1 _____	$ _____
.2 _____	$ _____
.3 _____	$ _____
.4 _____	$ _____

COMPANY: _____

AUTHORIZED SIGNATURE: _____

1.12 APPENDIX 'E'

.1 CASH ALLOWANCES

The undersigned hereby acknowledges that the sum of:

TWO THOUSAND FIVE HUNDRED DOLLARS, $2,500.00
(EXCLUDING Harmonized Sales Tax (HST))

is included in the total tender amount as Cash Allowances, to perform the following work: This money to be expended in accordance with the requirements of CCDC2 2008 General Condition GC4.1 - Cash Allowances, only on consultant's written instructions.

WORK:

.1 Contractor to include for a $2,500.00 dollar cash allowance to cover utility costs including all labour, material and plant associated with the new incoming communications service of the new addition at the Kinkora Community Hall. This allowance is to be adjusted to the actual utility service cost and be supported by invoices from the utility. No Contractor mark-ups will be accepted on this item.

Contractors are advised to carry sufficient overhead and administration cost to administer and coordinate this work.

In the event that the Owner decides not to proceed with any or all of this work, we agree to credit the Contract with the unused portion of the full amount of these Cash Allowances, as applicable.

COMPANY: _____

AUTHORIZED SIGNATURE: _____

END OF SECTION

This page intentionally left blank

1 General

1.1 FORM OF AGREEMENT

.1 The Form of Agreement between Contractor and Owner shall be Canadian Construction Documents Committee CCDC2-2008, "Stipulated Price Contract", including the Definitions and General Conditions therein dated 2008 including items GC1.1 inclusive to GC12.3, and the modifications to items GC1.1 to GC12.3 incorporated into Section 00 73 00 - Supplementary Conditions of this Specification.

.2 Document CCDC2-2008 may be examined at the Construction Association office in Charlottetown, PEI.

END OF SECTION

This page intentionally left blank

1 General

1.1 GENERAL

.1 The Definitions and General Conditions governing the Work shall be those specified in the following amendments and supplements to those provisions, and shall apply to all Sections of this Specification.

.2 Where any Article or portion of Article conflicts with the Laws of the Province concerned, such Article or portion of the Article is hereby stricken.

.3 The following amendments shall apply to the Definitions of CCDC2 Stipulated Price Contract 2008.

1.2 DEFINITIONS

.1 Paragraph 4 Consultant, add the following:
- .1 The Consultant shall be the Owner's Prime Consultant, Coles Associates Ltd., 85 Fitzroy Street, Charlottetown, PEI.

.2 Paragraph 12 Owner, add the following:
- .1 The Owner shall be the Rural Municipality of Kinkora.

.3 Paragraph 19 Subcontractor, add the following:
- .1 All dealings with the Subcontractor shall be through the medium of the Contractor, who will be responsible for the proper coordination and execution of the Sub-contractor's work.

.4 New Paragraph 27 Engineer:
- .1 This shall mean the designated engineering representative(s) of the Consultant.

1.3 ARTICLE GC1.1 CONTRACT DOCUMENTS

.1 Paragraph 1.1.8 - Delete as written and substitute:
1.1.8 The Contractor shall receive PDF digital copies of the drawings and specifications at no cost from the Owner.

.2 Paragraph 1.1.11 - Add new Paragraph as follows:
1.1.11 The Contract Documents are prepared solely for use by the party with whom the Consultant has entered into a Contract and there are no representations of any kind made by the Consultant to any party with whom the Consultant has not entered into a Contract.

.3 Paragraph 1.1.12 - Add new Paragraph as follows:
1.1.12 Electronic documents are and shall remain the Consultant's property. Copies of electronic documents may be made available for the preparations of shop drawings at the Consultant's sole discretion and for a fee.

1.4 ARTICLE GC3.1 CONTROL OF THE WORK

.1 Paragraph 3.1.1 - add new Sub-Clause 3.1.1.1 as follows:
- .1 The Contractor shall co-ordinate his own work and the work of all Subcontractors so as to facilitate and expedite the progress of the work.

.2 Paragraph 3.1.1 Add new Sub-Clause 3.1.1.2 as follows:
- .1 It is the responsibility of the Contractor to immediately notify the Consultant of any signs of distress or any other indications of actual or potential damage to the contract work, without regard to his awareness of any errors, inconsistencies or omissions in the Contract Documents.

.3 Add new Paragraph 3.1.3 as follows:
- .1 Before ordering any materials or doing any Work, Contractor shall verify all compensation has been allowed on account of differences between actual site dimensions and the measurements indicated on the drawings. Any difference, which may be found, shall be submitted to the Consultant for consideration before proceeding with the work.

.4 Add new Paragraph 3.1.4 as follows:

.1 The Contractor will be responsible for effecting the removal from the site of any trade, firm, group or person who is delaying the Work, or whose Work is unsatisfactory. The Contractor will arrange for other competent trades people to complete the Work at no expense to the Owner.

1.5 ARTICLE GC3.6 SUPERVISOR

.1 Add new Paragraph 3.6.3 as follows:
- .1 The Consultant may require the Contractor to inform him, in writing, of the name and experience of the supervisory personnel he intends to use on the project.

1.6 ARTICLE GC3.8 LABOUR AND PRODUCTS

.1 Add new Paragraph 3.8.4 as follows:
- .1 All manufactured articles, materials and equipment shall be installed, applied, connected, erected, used, cleaned, conditioned and commissioned as directed by the manufacturer unless specified to the contrary.

1.7 ARTICLE GC3.9 DOCUMENTS AT THE SITE

.1 Add new Paragraph 3.9.2 as follows:
- .1 Maintain at job site, one copy each document as follows:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Reviewed Shop Drawings.
  - .5 List of Outstanding Shop Drawings.
  - .6 Notice of Change.
  - .7 Change Orders.
  - .8 Other Modifications to Contract.
  - .9 Field Test Reports.
  - .10 Approved Work Schedule.
  - .11 Health and Safety Plan and Other Safety Related Documents.
  - .12 Other documents as specified.

1.8 ARTICLE GC4.2 CONTINGENCY ALLOWANCE

.1 Article GC4.2 - Delete this article.

1.9 ARTICLE GC5.2 APPLICATIONS FOR PROGRESS PAYMENT

.1 Paragraph 5.2.2 - add two new Sentences as follows:
- .1 Payment shall be less any holdback release, which may have been made in accordance with the specific terms of this Agreement as dictated by GC 5.6. Any such holdback release by the Owner to the Contractor shall be a payment to the Contractor in trust for the specific Subcontractor in respect of whose work the release is made.
- .2 Payments shall be less 15% Mechanics' Lien Holdback amount claimed against each progress claim.

.2 Add new paragraph 5.2.6 as follows:
- .1 Authorized Change Orders shall be listed on the application for payment indicating the amount claimed against each to date of claim.

.3 Paragraph 5.2.7 - Add new sentences as follows:
- .1 Payment for materials will be considered only if such materials are properly stored on site in a secure enclosure acceptable to the Consultant. Security of materials so stored is the responsibility of the Contractor.

.4 Add new Paragraph 5.2.8 as follows:
- .1 With the second and all subsequent applications for payment the Contractor shall include a statutory declaration form CCDC 9B, or other similar form acceptable to the Consultant, declaring that all labour and materials entering into the work, including

Subcontractors, covered by the previous application, have been paid. With application for release of lien holdback, the Contractor shall include a statutory declaration form CCDC 9A, or other similar form acceptable to the Consultant.

.2 With the second and all subsequent applications for payment the Contractor shall include a Letter of Clearance from the PEI Workers Compensation Board.

1.10 ARTICLE GC5.3 PROGRESS PAYMENT

.1 Paragraph 5.3.1 - Add new Sentence as follows:

.1 When any claim for payment during the course of construction includes for completed or partially completed Work, which in the opinion of the Consultant is defective or otherwise unacceptable, a sum of monies determined by the Consultant to be ten (10) times the value of the defective or unacceptable Work, or ten (10) times the value of the Work required to correct the defect or an amount solely at the Consultants discretion, will be withheld from the claim.

.2 Paragraph 5.3.1 - Add 3 new Sentences as follows:

.1 Deficiency monies may be held back at any time during the course of the project for Work deemed incomplete or unacceptable.

.2 It remains the Contractor's responsibility to undertake his own deficiency reviews and ensure the entire Work conforms to the Contract including quality, completeness and commissioning.

.3 Two final deficiency reviews will be conducted by the Consultant. The first review with the Owner and Contractor will identify any minor items which may remain outstanding, and the second review will confirm that these items have been completed. All other deficiency reviews where deficiencies are incomplete or not ready for requested inspections, will be charged at cost to the Contractor. The invoice for the additional reviews will be submitted to the Owner with a corresponding amount deducted from the Contractor's progress payment.

1.11 ARTICLE GC5.5 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF THE WORK

.1 Paragraph 5.5.1, Add new Sub-Clause .3 as follows:

.1 5.5.1.3 Submit with application for payment letter of clearance from The Workers Compensation Board to the Owner stating that the Contractor is in good standing with the Board.

1.12 ARTICLE GC5.7 FINAL PAYMENT

.1 Paragraph 5.7.2 - Add new Sentence as follows:

.1 Any delay in delivering the required Project Record Drawings (As-Builts) as described in Section 01 78 00 - Closeout Submittals will have the effect of delaying the final payment to the Contractor until the Consultant has received them complete and in good condition.

1.13 ARTICLE GC6.2 CHANGE ORDER

.1 Delete Paragraph 6.2.1 and replace with a new paragraph as follows:

.1 When a change in Work is proposed or required, the Consultant will provide the Contractor with a written description of the proposed change in the Work. The Contractor shall promptly present, in forms acceptable to the Consultant, a detailed breakdown of the costs associated with the change, if any; and the adjustment in the Contract Time, if any. The breakdown shall include:

.1 Actual (not list) costs of material, as well as Subtrade and Supplier costs.

.2 Labour costs, including fringe benefits and wage levies.

.3 Equipment rental (excluding hand and small power tool).

.2 Change Orders calling for normal changes or additions to the Work will be priced in detail giving actual material trade prices (not list prices) and actual labour costs and wage levies (including Employment Insurance, Worker's Compensation, Holiday Pay) and actual

equipment rental.

.3 Each Change Order will be considered as a whole to complete the work, inclusive of all Sub-Contract and/or General Contract work.

.4 To these prices, the Contractor will add:

.1 For Work involving the General Contractor and a Subcontractor, the Subcontractor adds 15% to his cost, submits this price to the General Contractor who adds 5%; to this amount the General Contractor adds the cost of his own Work plus 15% of the cost of his own Work only. The General Contractor does NOT add a further 5% to the cost of his own Work.

.2 Deletions to Contract: A mark-up by either Sub-Contractor or General Contractor shall not be charged or credited on credit Change Orders.

.3 Supervision related to Change Orders shall be considered as included in the allowable mark-up, and shall not be added as additional charges for a Change order.

.5 Note: Costs related to management, supervision, estimating, scheduling, bonding, insurance, as built drawings, copying, courier, safety, cleaning, site overhead, site vehicle, hand and small power tools etc. are covered by the mark up indicated and shall not be included on Change Orders.

1.14 ARTICLE GC6.3 CHANGE DIRECTIVE

.1 Delete Paragraphs 6.3.6.1, 6.3.6.2 and 6.3.6.3 and replace with the following.

.2 The Owner or the Consultant, without invalidating the contract, may make changes by altering, adding to, or deducting from the work, the contract sum being adjusted accordingly. All such work shall be executed under the conditions of the Contract.

.3 Where work is required to proceed immediately, work may proceed under a Change Directive. The Contractor will be instructed to proceed on a time and materials basis and maintain accurate accounting records for the cost of the change.

.4 Change Directives calling for changes to the Work will be priced in detail giving actual material trade prices (not list prices) and actual labour costs and wage levies (including Employment Insurance, Worker's Compensation, Holiday Pay) and actual equipment rental.

.5 Each Change Directive will be considered as a whole to complete the work, inclusive of all Sub-Contract and/or General Contract work.

.6 To these prices, the Contractor will add:

.1 For Work involving the General Contractor and a Subcontractor, the Subcontractor adds 15% to his cost, submits this price to the General Contractor who adds 5%; to this amount the General Contractor adds the cost of his own Work plus 15% of the cost of his own Work only. The General Contractor does NOT add a further 5% to the cost of his own Work.

.2 Deletions to Contract: A mark-up by either Sub-Contractor or General Contractor shall not be charged or credited on credit Change Orders

.3 Supervision related to Change Orders shall be considered as included in the allowable mark-up, and shall not be included in the labour changes for a Change order.

1.15 ARTICLE GC9.1 PROTECTION OF WORK AND PROPERTY

.1 Add new Paragraph 9.1.5 as follows:

.1 The Contractor shall be responsible for implementing all necessary security measures required to protect the areas of Work under his control and shall be responsible for damage which may arise from the failure of, or the failure to implement such security measures.

1.16 ARTICLE GC10.1 TAXES AND DUTIES

.1 Paragraph G.C. 10.1.1 - Revise as follows:

.1 Delete the words ..."at the time of closing except for Value Added Taxes"...and replace with the words ..."at the time of closing including Value Added Taxes"...

1.17 ARTICLE GC11.1 INSURANCE

.1 Paragraph 11.1.1.4: Delete and replace with following:
Builders Risk, in the names of the Contractor, the Owner, the Sub-Contractors and the Consultant. As applicable. The policy shall commence from the date of the commencement of Work until the earliest of:
- .1 10 calendar days after the date of substantial Performance of the Work;
- .2 On the commencement of use or occupancy of any part or section of the Work unless the use or occupancy is for construction purposes, or for the installation, testing and commissioning of equipment forming a part of the Work;
- .3 When left unattended for more than 30 consecutive calendar days or when construction activity has ceased for more than 30 consecutive calendar days.
- .4 The Contractor shall provide evidence of Course of Construction Property Insurance, that is all risk, replacement cost blanket limit, with an agreed amount endorsement and includes boiler and machinery coverage as noted in 11.1.1.5 and 11.1.1.6. Said coverage will include completed operations coverage for 24 months after completion to the full value of the building or structure as required by the Owner. Coverage for "X,C, U exposures shall be included along with loss of use.

.2 Paragraph 11.1.2:
- .1 Delete "if required" on the second line. (A certified true copy as described, MUST be promptly provided within 3 days of contract award). Add the following at the end of the sentence. "All insurance is primary and will not require the sharing of any loss with any Owner Insurance Program."

.3 Add new Paragraph 11.1.9 Indemnity/Hold Harmless:
- .1 The Contractor shall be liable for all injuries to persons and for damage to property caused by his operations, and those of his sub-contractors, and his and their employees, engaged on all operations in connection with the contract both on and off the site, and he shall indemnify and save harmless the Owner from all suits, claims, expenses, costs, demands, losses and damages to which the Owner may be put to reason of injury including death, to persons, and damages to property of the Owner and others, resulting from negligence, carelessness and any other cause whatsoever in the performance of the work.
- .2 The Contractor shall, until the date of issue of the final Certificate of Approval of the work by the Consultant, indemnify and save harmless the Owner, and protect his own interests against:
  - .1 Theft, burglary or robbery of, and loss or damage to, all materials and equipment brought to the site for use in the work, whether or not such material and equipment are incorporated in the work at the time that any such theft, burglary, robbery, loss or damage occurs.
  - .2 Theft or burglary of, and loss or damage to, any of his own plant and equipment being used on the project and/or stored on the site.

.4 Add new Paragraph 11.1.10:
- .1 The Contractor shall, without limiting its obligations or liabilities herein and at its own expense, provide and maintain the following insurances with Insurers and in forms and amounts acceptable to the Owner, Commercial General Liability Insurance in an amount not less than five million dollars ($5,000,000) inclusive per occurrence against bodily injury including death, and property damages. The Owner is to be added as an insured under this policy. Such insurance shall include but not limited to:
  - .1 Products and Completed Operations Liability;
  - .2 Owners and Contractors Protective Liability;
  - .3 Cross Blanket Written Contractual Liability;
  - .4 Personal Injury Liability;
  - .5 Cross Liability;
  - .6 Broad Form Property Damage;
  - .7 Employees as Additional Insured's;

.8 Operations and Premises Liability.

.9 The Contractor shall not commence work under this contract until he has obtained all of the liability insurance specified and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his sub-contract until all similar insurance required of the sub-contractors has been obtained. Approval of the insurance by the Owner shall not relieve or decrease the liability of the Contractor hereunder nor shall such approval imply the contractor has fulfilled all the terms and conditions of this Contract. Upon expiration of any policies during the period of this Contract, new Certificates of Insurance showing renewal shall be forwarded. In the event, that the Contractor carried a blanket-type policy, an endorsement by the insurance company is required confirming coverage of this specified project and indicating the extent of coverage.

.5 Add new Paragraph 11.1.11: In all insurance policies required under this agreement:

.1 There shall be an endorsement stating that the insurer will provide 30 days' notice to the Owner of cancellation or material change in coverage;

.2 The insurer shall acknowledge that the policy is primary and any other insurance policies that may be in effect or any other sources of recovery shall not contribute in any way to any judgments, awards, payments, or costs or expenses of any kind whatsoever made as a result of actual or alleged claims. The Ultimate Recipient shall provide the Owner with current certificates of insurance, in a form and content reasonably acceptable to the Province, evidencing the required insurance policies hereunder within 10 days of the Effective Date and on each renewal of the insurance policies thereafter. Umbrella insurance may be used to achieve the required insured limits above.

1.18 ARTICLE GC12.3 WARRANTY

.1 Add new Paragraph 12.3.7 as follows:

.1 When a part of the work is occupied by the Owner, directly or for the use intended prior to Substantial Performance, the warranty for the Work directly related to the construction and normal operation of that part of the Work, shall start on the date of occupancy.

.2 Add new paragraph 12.3.8 as follows:

.1 The Contractor shall ensure that his subcontractors are bound to the requirements of GC12.3 insofar as their work is concerned.

END OF SECTION

1 General

1.1 SCOPE OF WORK

.1 The Contractor is to provide each item, and properly execute all work as specified herein, indicated by drawings, addenda, or change orders issued with respect to this project.

.2 The Contractor shall coordinate, administer, and supervise all work, material acquisition and labour.

.3 Contractor shall coordinate with Owner and facilitate installation of Owner provided equipment.

.4 The scope of work will include the following:

.1 Select interior and exterior demolition including site work.

.2 New single storey building with interior / exterior finishes and systems connected to the existing building.

.3 All in accordance with the requirements of the specifications and drawings listed on their respective Index of Specifications and Drawings.

1.2 COORDINATION

.1 All Trades on site are responsible to co-operate and co-ordinate with each other.

.2 Coordination prior to installation of all building components is mandatory.

.3 Where work must be modified or reinstalled to be properly coordinated, the cost to do so will be paid by the Trades involved. The Owner will not pay for uncoordinated work nor will the Owner pay to resolve uncoordinated work.

.4 If resolution cannot be achieved among the involved Trades, the Construction Manager and Consultant will assess Trade involvement and assign costs accordingly.

1.3 DAMAGE

.1 Where damage is done to work in progress or existing areas of the building and is unclaimed by a Trade, the cost to repair the damage will be assessed by the Consultant and assigned on a pro-rated tender cost basis to all Trades on site at the time the damage occurred.

.2 The Owner will not participate in paying for such damage.

1.4 DEDUCTIONS FOR UNCORRECTED WORK

.1 If, in the opinion of the Consultant, it is not expedient to correct defective work or work not done in accordance with the Contract documents, the Owner may deduct from the Contract price the difference in value between the work as done and that called for by the Contract, the amount of which shall be determined in the final instance by the Consultant.

1.5 CORRECTION AFTER COMPLETION

.1 Subject to any special provisions in the Contract documents, the Contractor shall remedy any defects due to faulty materials or workmanship appearing within a period of one year from the date of substantial completion of the work and shall pay for any damage to other work resulting there from which appears within such period and neither the final certificate nor payment there under shall relieve the Contractor from responsibility hereunder. The Owner shall give notice of observed defects promptly. Questions arising under this Article may be decided as provided in Article 43.

1.6 EMERGENCIES

.1 The Consultant has authority in an emergency to stop the progress of the work whenever in his or her opinion, such stoppage may be necessary to ensure the safety of life, or of the structure, or neighbouring property. This includes authority to make such changes and to order, access and award the cost of such work extra to the Contract or otherwise as may in his or her opinion be necessary.

1.7 WORK SEQUENCE

.1 Construct Work to accommodate Owner's continued use of existing premises during construction.

.2 Coordinate Progress Schedule referred to in Section 01 32 16 - Construction Progress Schedule and coordinate with Owner Occupancy during construction.

.3 Construct Work to provide for continuous public usage. Do not close off public usage of facilities.

.4 Maintain fire access/control.

1.8 EXECUTION

.1 Execute work with least possible interference or disturbance to building operations, public and normal use of premises.

1.9 MITIGATION OF IMPACT ON EXISTING BUILDING

.1 This Contractor will recognize that the existing facility must remain fully functional with minimal disruption during the course of the Work, and that the existing facility, its operation, and its occupants may be very sensitive to dirt, dust, air-borne particulate, smoke, fumes, etc. generated as a result of the Work. Any disruption in services must be brought to the attention of the Consultant and receive prior approval before commencement.

.2 This Contractor is responsible to ensure that the existing building is kept free from any contamination that may result from any of the Work.

.3 The life safety and security systems in the existing building are required to remain functional during construction. This Contractor is responsible to ensure that such systems are not inadvertently activated or deactivated during construction.

.4 The Contractor is financially responsible for all measures required to minimize the potential for any contamination that could occur. Such measures include, but are not limited to, temporarily masking sensors in non-occupied areas, providing fans, working off hours (nights), performing work outside, sealing off localized work areas, etc. All such measures to be confirmed and approved by the Consultant prior to undertaking.

.5 The scheduling of all Work, which has the potential to cause contamination to the existing building, is to be approved by the Owner.

.6 This Contractor is responsible to immediately mitigate any discomfort, disruption, damage or condition, to the existing occupants, operations, space or building systems as deemed necessary by the Consultant.

1.10 DOCUMENTS

.1 The Contract Documents are complementary and what is called for by any one shall be as binding as if called for by all.

.2 Descriptions of materials or work which have well known technical or trade meanings shall be held to refer to such recognized standards.

.3 Should the specifications conflict with the drawings, the specifications shall govern.

.4 In the case of discrepancies between drawings, those of larger scale, or if the scale are the same, those of later date shall govern.

.5 All drawings and specifications shall be interpreted in conformity with the agreement.

1.11 PROTECTION OF WORK AND PROPERTY

.1 The Contractor shall maintain continuously adequate protection of all their work from damage and shall take reasonable precautions to protect the Owner's property from all injury arising in connection with this Contract. The Contractor shall make good any damage or injury to their work and shall make good any damage or injury to the property of the Owner resulting from the lack of reasonable protective precautions. The Contractor shall not be responsible, however, for any damage or injury to their work and to the property of the Owner which may be directly due to errors in the Contract documents or caused by the Owner, their agents, or employees, or from any work or risk which the Owner has agreed to insure, provided the

Contractor has taken reasonable protective precautions. The Contractor shall adequately protect adjacent property as required by law and the Contract documents.

1.12 COMMUNICATION

.1 All submissions and inquiries shall be directed to the Consultant for review.
.2 All direction will be transmitted to the Contractor by the Consultant.

1.13 CODES AND REGULATIONS

.1 Perform work in accordance with National Building Code of Canada (NBC) 2015 and any other code of provincial or local application, provided that in any case of conflict or discrepancy the more stringent requirements shall apply.
.2 Meet or exceed requirements of contract documents and specified standards.
.3 References to standards, including manufacturer's direction for installation shall be the latest edition.
.4 All materials, components and equipment as well as construction methods shall comply with the NBC (2015) and all other applicable Provincial codes or regulations.
.5 The latest edition of the Canadian Electrical Code shall govern all electrical work, whether pre-wired and/or assembled remote from the site or not.
.6 All equipment supplied or installed shall be CSA approved for the intended use.
.7 The latest edition of the PEI Occupational Health and Safety Act and Regulations shall govern safe construction practices.
.8 Provide a copy of all certificates of acceptance issued by Provincial or local authorities.

1.14 CONTRACTOR'S USE OF SITE

.1 Do not unreasonably encumber site with materials or equipment.
.2 Move stored products or equipment, which interfere with operations of Consultant or other Contractors.
.3 Obtain and pay for use of additional off site storage or work areas needed for operations.
.4 The work related to modifying the site roadways must be carried out so that one half of the roadway is open to vehicle traffic at all times.

1.15 SITE INSPECTOR

.1 No work is to be covered without having received approval from the Consultant. The Consultant will have the authority to cause any part of the work to cease, should, in his or her opinion, there be cause to do so.
.2 This work shall be examined by the Consultant and approval granted to resume when a satisfactory solution has been found out.
.3 The Owner does not have authority to authorize changes to work. He or she shall confer with the Consultant who, if necessary will authorize any change.
.4 The fact that the Owner or Consultant does not reject any work shall not remove the responsibility for completing all work as specified from the Contractor.

1.16 SETTING OUT OF WORK

.1 Assume full responsibility for and execute complete layout of work to locations, lines and elevations.
.2 Provide all equipment, materials and devices needed to lay out and construct work.
.3 Supply such devices as straight edges and templates required to facilitate Consultant's inspection of work.

1.17 CONCEALMENT

.1 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.18 LOCATION OF EQUIPMENT AND FIXTURES

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

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

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

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

1.19 CUTTING, FITTING AND PATCHING

.1 Execute cutting, core drilling, fitting and patching, required to install and make new work under this contract fit properly.

.1 Includes all cutting and patching in building for connection of new mechanical and electrical services to service lines.

.2 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.

1.20 BLOCKING AND BACKING

.1 Provide all blocking, backing, hangers, etc. used for support of all built-in work.

1.21 EXISTING SERVICES

.1 Before commencing work, establish the location and extent of service lines and notify Consultant of findings if in conflict with information or intent shown.

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

.3 Contractor shall pay for any or all repairs to existing services that have been damaged due to the Contractor's negligence in the course of his work.

.4 Notify Consultant and utilities of intended interruption of services and obtain permission.

.5 Where Work involves breaking into or connecting to existing services, give Consultant two weeks notice for necessary interruption. Minimize duration of interruptions. Carry out Work at times as directed by governing authorities or Owner with minimum disturbance.

.6 Provide temporary services when directed by Consultant to maintain critical building and tenant systems.

.7 Provide alternative routes for personnel and vehicular traffic.

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

.9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by Authorities Having Jurisdiction.

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

.11 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.22 ACCESS AND SECURITY

.1 Access and security on the entire job site will be the responsibility of the Contractor.

1.23 ADDITIONAL DRAWINGS

.1 The Consultant may furnish as necessary for the execution of the work, additional instructions, by means of drawings or otherwise. All such additional instructions shall be consistent with the contract documents. In giving such additional instructions the Consultant shall have authority to make minor changes in the work, consistent with the Contract.

1.24 RELICS AND ANTIQUITIES

.1 Relics and antiquities and items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tablets, and similar objects found during the

work, shall remain property of the Owner. Protect such articles and request directives from Consultant.

.2 Give immediate notice to Consultant if evidence of archaeological finds are encountered during construction, and await Consultant's written instructions before proceeding with work in this area.

END OF SECTION

This page intentionally left blank

1 General

1.1 ACCESS AND EGRESS

.1 Design, construct and maintain temporary access to and egress from work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Consultant to facilitate work as stated.
.2 Maintain existing services to building and provide for personnel and vehicle access.
.3 Where security is reduced by work provide temporary means to maintain security.
.4 Contractor will provide sanitary facilities for use by Contractor s personnel. Keep facilities clean.
.5 Closures: protect work temporarily until permanent enclosures are completed.

1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to public, building operations, occupants, and normal use of premises. Arrange with Consultant to facilitate execution of work.

1.4 EXISTING SERVICES

.1 Notify, Consultant and utility companies of intended interruption of services and obtain required permission.
.2 Where Work involves breaking into or connecting to existing services, give Consultant two weeks of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
.3 Provide for personnel, pedestrian and vehicular traffic.
.4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.5 SPECIAL REQUIREMENTS

.1 Carry out noise generating Work Monday to Friday and Weekends from 07:00 to 17:00 hours.
.2 Submit schedule in accordance with Section 01 32 16 - Construction Progress Schedule.
.3 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
.4 Keep within limits of work and avenues of ingress and egress.
.5 Ingress and egress of Contractor vehicles at site is limited to
.6 Deliver materials outside of peak traffic hours, coordinate times with Owner.

1.6 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not permitted on property.

END OF SECTION

This page intentionally left blank

1 General

1.1 REFERENCES

.1 Owner/Contractor Agreement.
.2 Canadian Construction Documents Committee (CCDC).
  .1 CCDC 2-2008, Stipulated Price Contract.
.3 Section 00 73 00 - Supplementary Conditions.

1.2 APPLICATIONS FOR PROGRESS PAYMENT

.1 Make applications for payment on account as provided in Agreement as Work progresses.
.2 Date applications for payment last day of agreed monthly payment period and ensure amount claimed is for value, proportionate to amount of Contract, of Work performed and Products delivered to Place of Work at that date.
.3 Submit to Consultant, at least 14 days before first application for payment, Schedule of Values for parts of Work, aggregating total amount of Contract Price, so as to facilitate evaluation of applications for payment.

1.3 SCHEDULE OF VALUES

.1 Make schedule of values out in such form and supported by such evidence as Consultant may reasonably direct and when accepted by Consultant, be used as basis for applications for payment.
.2 Include statement based on schedule of values with each application for payment.
.3 Support claims for products delivered to Place of Work but not yet incorporated into Work by such evidence as Consultant may reasonably require to establish value and delivery of products.
.4 Provide, minimum 14 days before submitting first application for payment, a Schedule of Values, aggregating the Total Contract Price. After approval by the Consultant the Schedule of Values will be used as a basis for the application for progress payments.
.5 Contractor shall submit with the Schedule of Values, an itemized list of all trades and applicable labour rates for each, which will be used as a basis for labour rates in changes to contract Work.
.6 The schedule of values is to indicate separate line items each for mechanical commissioning, electrical commissioning, mechanical operation & maintenance manuals and electrical operations ' maintenance manuals.

1.4 PREPARING SCHEDULE OF UNIT PRICE TABLE ITEMS

.1 Submit separate Schedule of Unit Price items of Work requested in Bid form.
.2 Make form of submittal parallel to Schedule of Values, with each line item identified same as line item in Schedule of Values. Include in unit prices only:
  .1 Cost of material.
  .2 Delivery and unloading at site.
  .3 Sales taxes.
  .4 Installation, overhead and profit.
.3 Ensure unit prices multiplied by quantities given equal material cost of that item in Schedule of Values.

1.5 PROGRESS PAYMENT

.1 Consultant will issue to Owner, no later than ten days after receipt of an application for payment, certificate for payment in amount applied for or in such other amount as Consultant determines to be properly due. If Consultant amends application, Consultant will give notification in writing giving reasons for amendment.

1.6 SUBSTANTIAL PERFORMANCE OF WORK

.1 Refer to Section 00 73 00 - Supplementary Conditions.

.2 Prepare and submit to Consultant comprehensive list of items to be completed or corrected and apply for a review by Consultant to establish Substantial Performance of Work or substantial performance of designated portion of Work when Work is substantially performed if permitted by lien legislation applicable to Place of Work designated portion thereof which Owner agrees to accept separately is substantially performed. Failure to include an item on list does not alter responsibility to complete Contract.

.3 No later than ten days after receipt of list and application, Consultant will review Work to verify validity of application, and no later than seven days after completing review, will notify Contractor if Work or designated portion of Work is substantially performed.

.4 Consultant shall state date of Substantial Performance of Work or designated portion of Work in certificate.

.5 Immediately following issuance of certificate of Substantial Performance of Work, in consultation with Consultant, establish reasonable date for finishing Work.

1.7 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF WORK

.1 After issuance of certificate of Substantial Performance of Work:

.1 Submit an application for payment of holdback amount.

.2 Submit sworn statement that all accounts for labour, subcontracts, products, construction machinery and equipment, and other indebtedness which may have been incurred in Substantial Performance of Work and for which Owner might in any way be held responsible have been paid in full, except for amounts properly retained as holdback or as identified amount in dispute.

.2 After receipt of application for payment and sworn statement, Consultant will issue certificate for payment of holdback amount.

.3 Where holdback amount has not been placed in a separate holdback account, Owner shall, ten days prior to expiry of holdback period stipulated in lien legislation applicable to Place of Work, place holdback amount in bank account in joint names of Owner and Contractor.

.4 Amount authorized by certificate for payment of holdback amount is due and payable on day following expiration of holdback period stipulated in lien legislation applicable to Place of Work. Owner may retain out of holdback amount any sums required by law to satisfy any liens against Work or, if permitted by lien legislation applicable to Place of Work, other third party monetary claims against Contractor which are enforceable against Owner.

1.8 FINAL PAYMENT

.1 Submit an application for final payment when Work is completed.

.2 Consultant will, no later than ten days after receipt of an application for final payment, review Work to verify validity of application. Consultant will give notification that application is valid or give reasons why it is not valid, no later than seven days after reviewing Work.

.3 Consultant will issue final certificate for payment when application for final payment is found valid.

END OF SECTION

1 General

1.1 APPOINTMENT AND PAYMENT

.1 The Contractor will arrange and pay for the services of an independent Consultant to carry out the following tests:
- .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
- .2 Inspection and testing performed exclusively for Contractor's convenience.
- .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
- .4 Tests specified to be carried out by Contractor under the supervision of Consultant.
- .5 Additional tests specified in Article 1.3.7 below.
- .6 Where tests or inspections reveal work not in accordance with contract requirements, Contractor shall pay costs for additional tests or inspections as Consultant may require to verify acceptability of corrected work.

1.2 CONTRACTOR'S RESPONSIBILITIES - GENERAL

.1 Provide labour, equipment and facilities to:
- .1 Provide access to Work for inspection and testing.
- .2 Facilitate inspections and tests.
- .3 Make good Work disturbed by inspection and test.
- .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

.2 Notify Consultant sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

.3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Consultant.

.5 Provide Consultant with two sets of fully documented test reports, submitted immediately following the testing operations.

1.3 CONTRACTOR'S RESPONSIBILITIES - INSPECTION & TESTING REQUIREMENTS

.1 Testing of all soil material types at source, including collection of sample material by testing firm, to verify compliance with material specifications.

.2 Follow up testing of all soil material types delivered to site.

.3 Monitoring placement and verifying compaction densities.

.4 Monitoring of upgrading work.

.5 Verifying the new compaction densities.

.6 Concrete:
- .1 Slump tests.
- .2 Compressive strength tests.

.7 Asphalt Paving:
- .1 Review of asphalt mix design submitted by Contractor.
- .2 Monitoring placement and compaction of seal course.
- .3 Testing of asphalt for compliance with material specifications from asphalt core samples taken by testing firm.

.8 All Flooring
- .1 Moisture vapour transmission levels.
  - .1 Moisture tests.
  - .2 PH levels tests.

.9 Testing work may occur under various Sections of the Specification.

1.4 FINAL REPORT

.1 Submit to the Owner at completion of job, two bound hard copies and one electronic copy of inspection report. This report to include:
  .1 All copies of test results, indexed to correspond with testing requirements of this Section.

.2 Written report from the testing firm carrying out the work of this Contract stating that the work as itemized under Par. 4 of this Section has been performed in strict accordance with the requirements of the Contract documents.

.3 The report will be signed and sealed by a Professional Engineer registered to practice in the Province of Prince Edward Island and practicing in the field of materials testing.

END OF SECTION

1 General

1.1 GENERAL

.1 Schedule and administer project meetings throughout the progress of the work.
.2 Prepare agenda for meetings.
.3 Distribute written notice of each meeting four (4) days in advance of meeting date to Consultant.
.4 Provide physical space and make arrangements for meetings.
.5 Preside at meetings.
.6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
.7 Reproduce and distribute copies of minutes within three (3) days after meetings and transmit to meeting participants.
.8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

.1 Within fifteen (15) days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
.2 Consultant, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
.3 Establish time and location of meeting and notify parties concerned minimum five (5) days before meeting.
.4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
.5 Agenda to include:
    .1 Appointment of official representative of participants in the Work.
    .2 Schedule of Work: in accordance with Section 01 32 16 - Construction Progress Schedule.
    .3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
    .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
    .5 Delivery schedule of specified equipment in accordance with Section
    .6 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
    .7 Owner provided products.
    .8 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
    .9 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
    .10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
    .11 Monthly progress claims, administrative procedures, photographs, hold backs.
    .12 Appointment of inspection and testing agencies or firms.
    .13 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work and not less than bi-weekly.
.2 Contractor, major Subcontractors involved in Work, Consultant, Owner are to be in attendance.
.3 Notify parties concerned minimum five (5) days before meeting.
.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within
.5 Agenda to include the following:
    .1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.
.3 Field observations, problems, conflicts.
.4 Problems which impede construction schedule.
.5 Review of off-site fabrication delivery schedules.
.6 Corrective measures and procedures to regain projected schedule.
.7 Revision to construction schedule.
.8 Progress schedule, during succeeding work period.
.9 Review submittal schedules: expedite as required.
.10 Maintenance of quality standards.
.11 Review proposed changes for affect on construction schedule and on completion date.
.12 Other business.

END OF SECTION

1 General

1.1 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. Generally Bar Chart should be derived from commercially available computerized project management system.

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

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

.5 Duration: Number of work periods (not including holidays or other nonworking periods) required to complete 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: 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.

.9 Project Planning, Monitoring and Control System: Overall system operated by Consultant to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

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

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

.3 Limit activity durations to maximum of approximately ten working days, to allow for progress reporting.

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Ten (10) working days after award of contract and prior to commencement of Work, submit to Consultant the following work management documents:

- .1 Work Schedule as specified herein. Work Schedule to include a critical path methodology.
- .2 Shop Drawing Submittal Schedule specified in Section 01 33 00 - Submittal Procedures.
- .3 Health and Safety Plan specified in Section 01 35 29 - Health, Safety, and Emergency Response Procedures.

1.4 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 five working days.

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

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

1.5 PROJECT SCHEDULE

.1 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:

- .1 Award.
- .2 Shop Drawings, Samples.
- .3 Permits.
- .4 Mobilization.
- .5 Excavation.
- .6 Backfill.
- .7 Building footings.
- .8 Slab on grade.
- .9 Structural Steel.
- .10 Exterior cladding and roofing.
- .11 Interior Architecture (Walls, Floors and Ceiling).
- .12 Millwork.
- .13 Plumbing.
- .14 Lighting.
- .15 Electrical.
- .16 Piping.
- .17 Controls.
- .18 Heating, Ventilating, and Air Conditioning.
- .19 Fire Systems.
- .20 Testing and Commissioning.
- .21 Supplied equipment long delivery items.
- .22 Owner supplied equipment required dates.
- .23 Substantial Completion.
- .24 Deficiency Completion.
- .25 Total Completion.

1.6 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule every month, reflecting activity changes and completions, as well as activities in progress. Provide two days before construction meeting for the project duration.

.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.

.3 Provide a two week look ahead schedule noting detailed tasks to be completed. Update on a weekly basis and circulate via email every Friday.

1.7 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site / construction meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

.2 Weather related delays with their remedial measures are to be identified and are the contractors responsibility.

END OF SECTION

1 General

1.1 GENERAL

.1 All submittals are to be delivered within 30 days of award of Contract.

.2 Make specified submittals to the Consultant at commencement of Contract, before beginning work on site (and no later than ten days after award). Include:

- .1 Contract Security
- .2 Proof of Insurance
- .3 Workers' Compensation clearance letter
- .4 Cost Breakdown
- .5 Permits as required
- .6 Construction schedule
- .7 Corporate Safety Plan
- .8 Site specific safety plan
- .9 Shop drawing schedule

.3 During Construction provide:

- .1 Updated construction schedule
- .2 Shop drawings as required
- .3 Inspection and test reports
- .4 Request for Information
- .5 Submission required for payment purposes

.4 At completion of Work provide

- .1 Submission at completion of work as specified in Project Close Out, Commissioning, and Operations and Maintenance Data Sections.

1.2 ADMINISTRATIVE

.1 Refer to GC 3.10 Shop Drawings

.2 Submit to Consultant submittals listed for review. Submit ten working days after award of contract 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.

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

.4 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.5 Where items or information is not produced in SI Metric units converted values are acceptable.

.6 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.

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

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

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

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

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

1.3 SUBMITTAL SCHEDULES:

.1 Within ten days following award of contract, prepare and submit a summary of all submittals required by the Trade Package.

.2 Submittal schedule shall be formatted as follows:

SECTION NUMBER	ITEM / EQUIP	SHOP DWG DELIVERY DATE	ORDER DATE	ITEM DELIVERY DATE

.3 The initial submission shall include completion of the first three columns of the above table example. Once approved shop drawings are received by the Contractor, the balance of the summary shall be updated and submitted accordingly.

1.4 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 coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.3 Allow ten days for Consultant's review of each submission.

.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 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.

.7 After Consultant's review, distribute copies.

.8 Submit digital copy of all shop drawings, product data sheets, reports, MSDS sheets and other traditional paper submissions.

.9 Submit electronic copies 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.

.10 Submit electronic copies 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.

.11 Submit electronic copies 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.

.12 Submit electronic copies of manufacturers 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.

.13 Submit electronic copies 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.

.14 Submit two hard copies of Operation and Maintenance Data for requirements requested in specification Sections, plus one electronic copy and as requested by Consultant.

.15 Delete information not applicable to project.

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

.17 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, transparency 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.

1.5 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 color, 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 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

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

END OF SECTION

This page intentionally left blank

1 General

1.1 REFERENCES

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  .1 Material Safety Data Sheets (MSDS).
.3 Province of Prince Edward Island
  .1 Occupational Health and Safety Act, R.S.P.E.I. 1988.
.4 CSA C22.1-2021 - Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.
.5 CSA C22.3 No. 1-M87 (R2001) - Overhead Systems.
.6 CSA C22.3 No. 7-94 (R2000) - Underground Systems.
.7 CSA - S269.1 - 1975 Falsework for Construction Purposes.
.8 CAN/CSA - S269.2 - M87 Access Scaffolding for Construction Purposes.
.9 COSH, Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.
.10 Fire Protection Standards issued by Fire Protection Services of Human Resources Development Canada as follows:
  .1 FCC No. 301 - June 1982 Standard for Construction Operations.
  .2 FCC No. 302 - June 1982 Standard for Welding and Cutting.
  .3 FCC standards, may be viewed at the Regional Fire Protection Services' office (previously known as the Fire Commissioner of Canada) located at 99 Wyse Road, 8th Floor, Dartmouth, NS, Tel: (902) 426-6053.

1.2 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit site-specific Health and Safety Plan: Within seven days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
  .1 Part 1: List of individual health risks and safety hazards identified by hazard assessments.
  .2 Part 2: List specific measures to control or mitigate each hazard and risk identified in part one of Plan. State engineering controls, personal protective equipment and safe work practices to be used for work having identified hazard(s) or risk(s).
  .3 Part 3: Emergency and Communications Measures as follows:
    .1 Emergency Procedures: standard operating procedures, evacuation measures and emergency response implemented on site during an accident or incident. State step by step procedures, applicable to each identified hazard.
    .2 Emergency Communications: list names and telephone numbers of officials, to be contacted if incident, accident or emergency situation occurs, including:
      .1 General Contractor and all Subcontractors.
      .2 Provincial Departments and resources from local emergency organizations, based on type of hazard, incident or accident which might occur and as stipulated in applicable laws and regulations.
.3 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Consultant.
.4 Submit copies of incident and accident reports.
.5 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures.
.6 Consultant will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within five days after receipt of plan. Revise plan as appropriate and resubmit plan to Consultant within two days after receipt of comments from Consultant.
.7 Consultant's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health

and Safety.

.8 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

.9 Maintain Worker's Compensation Coverage for duration of contract. Submit Letter of Good Standing to Consultant.

1.3 DEFINITIONS

.1 Electrical Facility: means any system, equipment, device, apparatus, wiring, conductor, assembly or part thereof that is used for the generation, transformation, transmission, distribution, storage, control, measurement or utilization of electrical energy, and that has an amperage and voltage that is dangerous to persons.

.2 Guarantee of Isolation: means a guarantee by a competent person in control or in charge that a particular facility or equipment is isolated.

.3 De-energize: in the electrical sense, that a piece of equipment is isolated and grounded, e.g. if the equipment is not grounded, it cannot be considered de-energized (DEAD).

.4 Guarded: means that an equipment or facility is covered, shielded, fenced, enclosed, inaccessible by location, or otherwise protected in a manner that, to the extent that is reasonably practicable, will prevent or reduce danger to any person who might touch or go near such item.

.5 Isolate: means that an electrical facility, mechanical equipment or machinery is separated or disconnected from every source of electrical, mechanical, hydraulic, pneumatic or other kind of energy that is capable of making it dangerous.

.6 Live/alive: means that an electrical facility produces, contains, stores or is electrically connected to a source of alternating or direct current of an amperage and voltage that is dangerous or contains any hydraulic, pneumatic or other kind of energy that is capable of making the facility dangerous to persons.

1.4 PERMITS

.1 Obtain permits, licenses and compliance certificates, at appropriate times and frequency as stipulated by authorities having jurisdiction.

.2 Post all permits on site. Submit copies to Consultant.

1.5 FILING OF NOTICE

.1 File Notice of Project and other Notices with Provincial authorities prior to commencement of Work.

1.6 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Consultant.

1.7 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Consultant.

.2 Provide Consultant with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Consultant may stop Work if non-compliance of health and safety regulations is not corrected.

1.8 MEETINGS

.1 Preconstruction Conference:

.1 The safety officer shall attend and chair the preconstruction conference and prepare a comprehensive agenda for the conference.

.2 Meeting On Work Procedures:

.1 Meet with Contracting Officer to discuss work procedures and safety precautions. Ensure the participation of the Contractor's superintendent, the quality control, officer and representatives of each subcontractor or trade performing work at the site.

.3 Weekly Safety Meetings:
- .1 Hold weekly at the project site. Prepare minutes showing contract title, signatures of attendees, a list of topics discussed and meeting minutes.

.4 Work Phase Meetings:
- .1 The appropriate activity hazard analysis shall be reviewed and attendance documented by the Contractor at the preparatory, initial, and follow-up phases of quality control inspection.

.5 Prior to commencement of work hold Health and Safety meeting. Have Contractor's Site Superintendent in attendance.

.6 Provide site safety orientation session to all workers, all workers new to the site and other authorized persons prior to granting them access to work site. Brief persons on site conditions and on the minimum site safety rules in force at site. Maintain records of orientation on site.

.7 Conduct site specific occupational health and safety meetings for the duration of the work as follows:
- .1 Formal meetings on a minimum monthly basis.
- .2 Informal tool box meetings on a regular basis from a predetermined schedule.

.8 Keep workers informed of anticipated hazards, on safety practices and procedures to be followed and of other pertinent safety information related to:
- .1 Progress of Work;
- .2 New sub-trades arriving on site and;
- .3 Changes in site and project conditions.

.9 Record and post minutes of meetings. Make copies available to Consultant upon request.

1.9 SITE SAFETY OFFICER (SSO)

.1 Employ and assign to Work, competent and authorized representative as Site Safety Officer (SSO). The SSO must:
- .1 Have minimum 2 years site-related working experience specific to activities associated with Construction.
- .2 Have working knowledge of occupational safety and health regulations.
- .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
- .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

.2 The selection of the SSO will be subject to the approval of the Consultant, and changes shall be made as requested by the Consultant.

.3 The SSO shall be responsible for ensuring that all provisions of the Health and Safety Plan and relevant legislation are implemented.

.4 The SSO shall ensure that all monitoring and testing, as specified and at the direction of the Consultant, are conducted.

.5 The SSO shall maintain records of all readings that are taken by the Contractor report and any abnormal or dangerous situation to the Consultant and the Municipality, after having implemented emergency measures, as required, work shall not continue or proceed until the situation has been rectified.

.6 The Safety Officer shall be at the work site at all times whenever work or testing is being performed, shall conduct daily safety inspections.

.7 The SSO shall be authorized to act on behalf of the Contractor on all matters related to Health and Safety.

.8 Qualifications of Site Safety Officer:
- .1 Ability to manage the on-site Contractor safety program through appropriate management controls.

.2 Ability to identify hazards and have the capability to expend resources necessary to abate the hazards.
.3 Must have worked on similar types of projects that are equal to or exceed the scope of the project assigned with the same responsibilities.
.4 Shall, as a minimum, have attended a recognized training qualification program including at least 40 hours of classroom instruction.

.9 Qualifications of Qualified Person, Confined Space Entry:
.1 The qualified person shall be capable (by educations and specialized training) of anticipating, recognizing, and evaluating employee exposure to hazardous substances or other unsafe conditions in a confined space. This person shall be capable of specifying necessary control and protective action to ensure worker safety.

1.10 RECORD KEEPING

.1 ALL activities associated with Health and Safety shall be recorded daily in a bound notebook. Include as a minimum: activity date, time, location of occurrence, mitigation action taken and results. Records shall be assessed by the Consultant.

1.11 SUSPENSION OF ACTIVITIES

.1 Exposure to contaminants shall be controlled so that no worker is exposed to contaminants at a concentration greater than the Time Weighted Average (TWA) concentration for the contaminant, for up to a 10 hour workday, 40 hour work week.
.2 The Contractor will halt activities immediately during unsafe conditions. All costs relating to suspension of work for Contractor's failure to maintain Health and Safety procedures shall be borne by the Contractor.
.3 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

1.12 HEALTH AND SAFETY PLAN

.1 Prior to commencement of the work, submit to the Consultant a detailed Health and Safety Plan for review. The Health and Safety Plan shall comply with the provisions of this section, and shall illustrate the Contractor's knowledge and understanding of health and safety aspects of the work, the Contractor's intention to maintain a high level of safety on-site, and shall include, but not be limited to:
.1 Description of Work.
.2 Description of Site-specific Hazards:
.1 Physical
.2 Chemical
.3 Environmental
.3 Protective Equipment:
.1 Respiratory
.2 Contact
.4 Decontamination Procedures:
.1 Personal protective equipment (PPE)
.2 Equipment
.5 Medical - Monitoring:
.1 Workers medical profile and suitability to work at the site.
.6 Air - Monitoring Procedures:
.1 Action levels
.2 Site monitoring
.3 Perimeter monitoring
.7 Emergency Procedures:
.1 Emergency Equipment
.2 Contingency Plans:
.1 Spill control
.2 Fire

.3 Ventilation
.4 Medical Emergency

.8 General Safety:
.1 Designation of site-safety officer
.1 Safety log
.2 Trenching, digging, excavations
.3 Storage of flammables, compressed gases
.4 Safety inspections

.9 Site Training:
.1 Initial hazard
.2 Daily safety

.2 All workers shall be trained and be familiar with the Health and Safety Plan and the use of personal protective equipment.

.3 Safety Document Submission:
.1 Ensure Safety Document Submission applies to Work of this specific project and site.
.2 Submit two copies of Safety Document at the Pre-Construction Meeting. Do not commence Work nor deliver material on-site prior to submission.
.3 Included in Safety Document submission specific information detailing the methods and procedures to be implemented ensuring adherence to the acts, regulations, codes and policies specified in this section and to:
.1 Ensure the health and safety of persons at or near the Work; including, but not limited to, the Public.
.2 Ensure the measures and procedures of the regulatory agencies specified are carried out.
.3 Ensure every employee, self-employed person and employer performing Work under this contract complies with the regulatory agencies specified.
.4 Where changes to the methods and procedures in the execution of work change submitted safety methods and procedures, modify submitted Safety Documentation and submit modifications, in writing to the Consultant and Minister prior to implementation.
.4 Safety Document Organization:
.1 Organize information in the form of an instructional manual as follows:
.1 Place in binders of commercial quality, 8-1/2" x 11" x 3" maximum ring size.
.2 Cover: Identify binder with typed or printed title "Project Safety Document" and list the title of the project.
.3 Provide tabbed fly leaf for each separate heading, with typed heading on tab.
.4 Where drawings are within the safety document, provide with reinforced punched binder tab. Bind in with text; fold in larger drawings to size text pages.
.5 Arrange content under Safety Document headings specified herein.
.5 Safety Document Headings:
.1 Employee Safety Training:
.1 Place, under this heading, a statement indicating employees working on this specific project have met specified training requirements.
.2 Company Safety Policy
.1 Place, under this heading, information pertaining to the company's policy and commitment to Occupational Health and Safety, including the responsibilities of management, supervisors and works.

1.13 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.
.2 Perform on-going hazard assessments during the progress of Work identifying new or potential health risks and safety hazards not previously known. As a minimum hazard

assessments shall be carried out when:

.1 New subtrade work, new subcontractor(s) or new workers arrive at the site to commence another portion of work.

.2 The scope of work has been changed by Change Order.

.3 Potential hazard or weakness in current health and safety practices are identified by Consultant or by an authorized safety representative.

.3 Each hazard assessment to be made in writing. Keep copies of all assessments on site for duration of Work. Upon request, make available to Consultant for inspection.

.4 Contractor to conduct a hazard assessment in conjunction with the Owner's maintenance staff as part of the planning process including isolating existing equipment where applicable and identification of hidden services where anchoring is required. Hazard Assessments to conform with requirements of Health and Safety Section 01 35 29 - Health, Safety, and Emergency Response Procedures.

1.14 COMPLIANCE REQUIREMENTS

.1 Observe and enforce construction safety measures required by National Building Code, latest edition, National Fire Code, Provincial Building Code Act, Worker's Compensation Act and Municipal Statutes and Authorities.

.2 Comply with Canada Labour Code and Canada Occupational Health and Safety Act.

.3 Latest edition of the Occupational Health & Safety Act Statutes of Prince Edward Island (including any amendments to and regulations).

.4 Fire Prevention Act.

.5 Dangerous Goods Transportation Act.

.6 Industrial Best Practices for Equipment Isolation and Lockout Policy.

.7 In case of conflict or discrepancy the more stringent requirement shall apply.

.8 Maintain clear emergency exit paths.

.9 Ensure that employees working on this specific project have met training requirements as legislated by the Prince Edward Island Occupational Health and Safety Act and its regulations.

.10 Where reference is made to jurisdictional authorities, it shall mean all authorities who have within their constituted powers the right to enforce the laws of the place of the building and workplace.

.11 Provide Consultant with Material Safety Data Sheets (MSDS).

.12 Provide and maintain first aid equipment, supplied and medications appropriate to the work and its location in accordance with the First Aid Regulations. Obtain and implement recommendations from Occupational Health and Safety Division specific to the project work site.

1.15 WHMIS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labeling and provision of material safety data sheets acceptable to Labour Canada and Health and Welfare Canada and Provincial Department of Labour.

.2 Submit WHMIS data sheets to Consultant in accordance with Section 01 33 00 - Submittal Procedures.

.3 Maintain WHMIS information station and ensure designated personnel are trained in its use.

.4 Submit copies of all Tool Box or Safety Meeting notes.

.5 Submit copies of all Worksite Safety Inspections.

1.16 SMOKING, ALCOHOL & RESTRICTED SUBSTANCES

.1 Worksites are inherently dangerous, including travelling to and from the site.

.2 Alcohol, medical and recreational cannabis are restricted substances governed by Federal and Provincial laws as are other forms of illegal drugs.

.3 The smoking of or use of tobacco products, including e-cigarettes, the use of alcohol and restricted substances including cannabis in any form in the building or on the work site is

strictly prohibited.

.4 Where workers have a prescription for medical cannabis, or other prescription drugs that may cause drowsiness, they are to advise their supervisor and discuss with their supervisor safe and appropriate task(s) while under the influence of these prescriptions on the worksite.

.5 Workers who violate this requirement will be removed from the worksite.

1.17 SITE CONTROL AND ACCESS

.1 Control work site and entry points. Grant and allow entry to only workers and other persons so authorized. Immediately stop non-authorized persons from circulating within construction areas and remove from site.

.2 Prior to gaining access to the site, all contractors, subcontractors and suppliers shall file with the General Contractor their proof of Workers Compensation coverage, proof of required Insurance and proof of contract. Upon request, proof of these documents will be provided to the Owner and Consultant.

.3 Delineate and isolate construction areas from other areas of site by use of appropriate means. Erect barricades, fences, hoarding and temporary lighting as required. See Section 01 56 00 - Temporary Barriers and Enclosures for minimum type of barriers acceptable.

.4 Erect signage at entry points and at other strategic locations around site, clearly identifying construction area(s) as being "off limits" to non-authorized persons. Signage must be professionally made.

1.18 PROTECTION

.1 Provide temporary facilities for protection and safe passage of building occupants, public pedestrian and vehicular traffic around and adjacent to work site.

.2 Provide safety barricades, lights and signage on work site as required to provide a safe working environment for workers.

.3 Use personal protection equipment as required by Occupational Health and Safety Act and as required by this site.

.4 Training of workers in the proper use, fitting, inspection and storage of personal protective equipment shall be done prior to use of the equipment.

1.19 UNFORESEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Consultant verbally and in writing.

1.20 TESTING AND MONITORING

.1 Test and monitor for hazardous conditions, as required to demonstrate compliance with provincial regulations.

.2 If multiple locations are being worked simultaneously, provide monitoring at all locations where work is being carried out, including providing additional monitoring instruments.

1.21 ISOLATION OF EXISTING SERVICES

.1 Obtain Consultant's written authorization prior to conducting work on an existing active, energized service or facility required as part of the work and before proceeding with lockout of such services or facility.

.2 To obtain authorization, submit to Consultant following documentation:

.1 Written Request two weeks in advance of work for Isolation of the service or facility and;

.2 Copy of Contractor's Lockout Procedures.

.3 Make a Request for Isolation for each event, unless directed otherwise by Consultant, and as follows:

.1 Fill-out standard forms in current use at the Facility when so directed by Consultant or;

.2 Where no form exist at Facility, make request in writing identifying:
.1 Identification of system or equipment to be isolated, including it's location;
.2 Time duration, indicating Start time & date and Completion time & date when isolation will be in effect.
.3 Voltage of service feed to system or equipment being isolated.
.4 Name of person making the request.
.3 Document to be in typewritten format.

.4 Do not proceed until receipt of written notification from Consultant granting the Isolation Request and authorization to proceed with the isolation of designated equipment or facility. Consultant may designate other individual at the Facility as the person authorized to grant the Isolation Request.

.5 Conduct safe, orderly shut down of equipment or facilities, de-energize and isolate power and other sources of energy and lockout items in accordance with requirement of clause 1.8 below.

.6 Plan and schedule shut down of existing services in consultation with the Consultant and the Facility Manager. Minimize impact and downtime of facility operations.

.7 Determine in advance, as much as possible, in cooperation with the Consultant, the type and frequency of situations which will require a Request for Isolation. Follow Consultant's directives in this regard.

.8 Conduct hazard assessment as part of the planning process of isolating existing equipment and facilities. Hazard Assessments to conform with requirements of Health and Safety Section 01 35 29 - Health, Safety and Emergency Response Procedures.

1.22 LOCKOUTS

.1 Perform lockouts in compliance with:
.1 Canadian Electrical Code
.2 Federal and Provincial Occupational Health and Safety Acts and Regulations as specified in Section 01 35 29 - Health, Safety, and Emergency Response Procedures.
.3 Regulations and code of practice as applicable to mechanical equipment or other machinery being de-energized.
.4 Procedures specified herein.

.2 Isolate and lockout electrical facilities, mechanical equipment and machinery from all potential energy sources prior to starting work on such items.

.3 Develop and implement lockout procedures to be followed on site as an integral part of the Work.

.4 Use energy isolation lockout devices specifically designed and appropriate for type of facility or equipment being locked out.

.5 Use industry standard lockout tags.

.6 Provide appropriate safety grounding and guards as required.

.7 Prepare Lockout Procedures in writing. Describe safe work practices, work functions and sequence of activities to be followed on site to safely isolate all potential energy sources and lockout/tagout facilities and equipment.

.8 Include within procedures a system of worker request and issuance of individual lockout permit by a person, employed by Contractor, designated to be "in-charge" and being responsible for:
.1 Controlling issuance of permits or tags to workers.
.2 Determining permit duration.
.3 Maintaining record of permits and tags issued.
.4 Submitting a Request for Isolation to Consultant when required by Contractors and / or Owners safety plan.
.5 Designating a Safety Watcher, when one is required based on type of work.
.6 Ensuring equipment or facility has been properly isolated, providing a Guarantee of Isolation to worker(s) prior to proceeding with work.

.7 Collecting and safekeeping lockout tags, returned by workers, as a record of the event.

.9 Clearly establish, describe and allocate, within procedures, the responsibilities of:
- .1 Workers.
- .2 Designated person controlling issuance of lockout tags/permits.
- .3 Safety Watcher.
- .4 Subcontractors and General Contractor.

.10 Procedures shall meet the requirements of Provincial and Federal Codes and Regulations.

.11 Generic procedures, if used, must be edited, supplemented with pertinent information and tailored to reflect specific project conditions. Clearly label as being the procedures applicable to this contract.
- .1 Incorporate site specific rules and procedures established by Facility Manager and in force at site. Obtain such procedures through Consultant.

.12 Procedures to be in typewritten format.

.13 Submit copy of Lockout Procedures to Consultant, in accordance with submittal requirements, prior to commencement of work.

1.23 CONFORMANCE

.1 Ensure that lockout procedures, as established for project on site, are stringently followed. Enforce use and compliance by all workers.

.2 Brief all persons working on electrical facilities, mechanical and other equipment fed by an energy source on requirements of this section.

.3 Failure to perform lockouts in accordance with regulatory requirements or follow procedures specified herein may result in the issuance of a Non-Compliance Notification at Consultant's discretion with possible disciplinary measures imposed as specified in Section 01 35 29 - Health, Safety, and Emergency Response Procedures.

1.24 FIRE SAFETY REQUIREMENTS

.1 Comply with requirements of latest standard for Building Construction Operations issued by the Fire Commissioner of Canada and Fire Safety Regulations of Local Authority.

.2 Enforce fire protection methods, good housekeeping and adherence to local and underwriter's fire regulations including, but not limited to, Fire Protection Act and the Provincial Building Code Act. Provide UL approved fire extinguishers, and other fire fighting services and equipment, except where more explicit requirements are specified as the responsibility of individual Sections.

.3 Implement and follow fire safety measures during Work. Comply with following:
- .1 National Fire Code, 2015.
- .2 Fire Protection Standards FCC 301 and FCC 302.
- .3 Federal and Provincial Occupational Health and Safety Acts and Regulations as specified in Section 01 35 29 - Health, Safety, and Emergency Response Procedures.

.4 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Consultant will advise on the course of action.

.5 Advise the Fire Chief in the area of Work of any work that would impede fire apparatus response, including but not limited to violation of minimum overhead clearance prescribed by the fire chief, erecting of barricades and digging of trenches.

.6 Fire Separations:
- .1 Ensure that fire separations are installed to maintain total integrity and that they are not breached by Work following their installation.
- .2 Replace fire separations which have suffered a lessening of their required rating during construction.

.7 Ensure nothing subverts the integrity of fire protection provided for the building structure.

.8 Coordinate work of all sections so that they do not encroach on space required for fire protection and its installation. Ensure that fire protection damage during construction is totally

replaced.

1.25 FIRE PROTECTION AND ALARM SYSTEMS

.1 Fire protection and alarm systems shall not be:
- .1 Obstructed.
- .2 Shut-off, unless approved by Consultant.
- .3 Left inactive at the end of a working day or shift.

.2 Do not use fire hydrants, standpipes and hose systems for purposes other than fire fighting.

.3 Costs incurred, from the fire department, Facility owner and tenants, resulting from negligently setting off false alarms will be charged to the Contractor in the form of financial progress payment reductions and holdback assessments against the Contract.

1.26 FIRE SAFETY

.1 The Sub-Contractors are to participate on the Fire Safety Committee under the Joint Health and Safety Committee. The Fire Safety Committee under the direction of the Contractor is responsible for implementation and maintenance of the Construction Fire Safety Plan.

.2 Construction Fire Safety Plan:
- .1 The Construction Fire Safety Plan will include the following:
  - .1 Introduction of plan and purpose
  - .2 Fire Safety Committee
  - .3 Terms of reference.
- .2 Committee composition.
- .3 Emergency Procedures.
- .4 Fire protection equipment.
- .5 Building description.
- .6 Provisions for fire fighting.
- .7 Portable extinguishers.
- .8 Exits.
- .9 Emergency Lighting.
- .10 Reduced drawings.
- .11 Fire safety maintenance schedule:
  - .1 General.
  - .2 Maintenance levels.
  - .3 Skill categories.
  - .4 Frequency.
  - .5 Checklists.
- .12 Other information:
  - .1 Instruction on use of fire extinguishers.
  - .2 Emergency Fire Drill procedures.

.3 Portable Fire Extinguishers:
- .1 During construction, Contractor is to provide and maintain on the site at all times, ULC listed 25 lb ABC dry chemical type portable fire extinguishers.

.4 Blockage of Roadways:
- .1 The Fire Department shall be advised of any work that would impede fire apparatus response. This includes violation of minimum overhead clearance, as prescribed by the Fire Department, erecting of barricades and the digging of trenches.

.5 Rubbish and Waste Materials:
- .1 Rubbish and waste materials are to be kept to a minimum.
- .2 The burning of rubbish is prohibited.
- .3 Removal:
  - .1 All rubbish shall be removed from the work site at the end of the workday or shift or as directed by Consultant.
- .4 Storage:
  - .1 Extreme care is required where it is necessary to store oily waste in work areas to ensure maximum possible cleanliness and safety.

.2 Greasy or oily rags or materials subject to spontaneous ignition shall be deposited and kept in an approved receptacle and removed as required in 1.7.3.1.

.6 Flammable Liquids:
- .1 The handling, storage and use of flammable liquids are to be governed by the current National Fire Code of Canada.
- .2 Flammable liquids such as gasoline, kerosene and naphtha may be kept for ready use in quantities not exceeding 45 liters provided they are stored in approved safety cans bearing the Underwriter's Laboratory of Canada or Factory Mutual seal of approval. Storage of quantities of flammable liquids exceeding 45 liters for work purposes, requires the permission of the Fire Department.
- .3 Transfer of flammable liquids having a flash point below 38ºC is prohibited within buildings.
- .4 Transfer of flammable liquids shall not be carried out in the vicinity of open flames or any type of heat-producing devices.
- .5 Flammable liquids having a flash point below 38ºC, such as naphtha or gasoline, shall not be used as solvents or cleaning agents.
- .6 Flammable waste liquids, for disposal, shall be stored in approved containers located in a safe ventilated area. Quantities are to be kept to minimum and the Fire Department is to be notified when disposal is required.

.7 Fire Inspection:
- .1 The Fire Department shall be allowed unrestricted access to the work site.
- .2 The Contractor shall cooperate with the Fire Department during routine inspections of the work site.
- .3 The Contractor shall immediately remedy all unsafe fire situations observed by the Fire Department.

.8 Reporting Fires:
- .1 Know the location of the nearest fire alarm box and telephone, including the emergency phone number.
- .2 Report immediately all fire incidents to the fire department as follows:
  - .1 Activate nearest fire alarm box, or
  - .2 Telephone 911.
  - .3 Where fire alarm box is exterior to building, the person activating the fire alarm box shall remain at the box to direct Fire Department to scene of the fire.
  - .4 When reporting a fire by telephone, give location of fire, name or number of building and be prepared to verify the location.

1.27 WELDING AND CUTTING

.1 Use noncombustible shields for electric and gas welding or cutting executed within two meters of combustible material or in occupied space.

.2 Place tanks supplying gases as close to work as possible. Fix in upright position, free from exposure to sun or high temperatures.

.3 Locate fire extinguishing equipment near all welding and cutting operations.

1.28 OPEN FLAMES, SPARKS, EXPLOSION PROTECTION

.1 Keep open flames and sparks to minimum. When flame or sparks are required, follow proper procedures to prevent fire or explosion.

1.29 HOT WORK AUTHORIZATION

.1 Hot Work will not be permitted on or within the building structure, tanks, or confined spaces, except as outlined herein.

.2 Obtain Consultant's written "Authorization to Proceed" before conducting any form of Hot work on site.

.3 To obtain authorization submit to Consultant:

.1 Contractor's typewritten Hot Work Procedures to be followed on site as specified below.
.2 Description of the type and frequency of Hot Work required.
.3 Sample Hot Work Permit to be used. Shall be included in the safety documentation submission.

.4 Upon review and confirmation that effective fire safety measures will be implemented during performance of hot work, Consultant will provide authorization to proceed as follows:
.1 Issue one written "Authorization to Proceed" covering the entire project for duration of work or;
.2 Separate work, or segregate certain parts of work, into individual entities. Each entity requiring a separately written "Authorization to Proceed" from Consultant. Follow Consultant's directives in this regard.

.5 Requirement for individual authorization based on:
.1 Nature or phasing of work;
.2 Risk to Facility operations;
.3 Quantity of various trades needing to perform hot work on project or;
.4 Other situation deemed necessary by Consultant to ensure fire safety on premises.

.6 Do not perform any Hot Work until receipt of Consultant's written "Authorization to Proceed" for that portion of work.

.7 In tenant occupied Facility, coordinate performance of Hot Work with Facility Manager through the Consultant. When directed, perform Hot Work only during non-operative hours of Facility. Follow Consultant's directives in this regard.

1.30 HOT WORK PROCEDURES

.1 Develop and implement safety procedures and work practices to be followed during the performance of Hot Work.

.2 Procedures to include:
.1 Requirement to perform hazard assessment of site and immediate hot work area for each hot work event in accordance with Hazard Assessment and Safety Plan requirements of Section 01 35 29 - Health, Safety, and Emergency Response Procedures.
.2 Use of a Hot Work Permit system for each hot work event.
.3 The step by step process of how to prepare and issue permit.
.4 Permit shall be issued by Contractor's site Superintendent, or other authorized person designated by Contractor, granting permission to worker or subcontractor to proceed with hot work.
.5 Maintain a fire extinguisher in the immediate area where hot work is being undertaken.
.6 Provision of a designated person to carryout a Fire Safety Watch for a minimum of 2 hours immediately upon completion of the hot work.
.7 Compliance with fire safety codes and standards specified herein and Occupational Health and Safety regulations specified in Section 01 35 29 - Health, Safety, and Emergency Response Procedures.

.3 Generic procedures, if used, must be edited and supplemented with pertinent information tailored to reflect specific project conditions. Clearly label as being the Hot Work Procedures applicable to this contract.

.4 Hot Work Procedures shall clearly establish worker instructions and allocate responsibilities of:
.1 Worker(s),
.2 Authorized person issuing the Hot Work Permit,
.3 Fire Safety Watcher,
.4 Subcontractors and Contractor.

.5 Brief all workers and Subcontractors on Hot Work Procedures and Permit system established for project. Stringently enforce compliance.

.1 Failure to comply with the established procedures may result in the issuance of a Non-Compliance Notification at Consultant's discretion with possible disciplinary measures imposed as specified in Section 01 35 29 - Health, Safety, and Emergency Response Procedures.

1.31 HOT WORK PERMIT

.1 Hot Work Permit to include, as a minimum, the following data:
- .1 Project name and project number;
- .2 Building name, address and specific room or area where hot work will be performed;
- .3 Date when permit issued
- .4 Description of hot work type to be performed;
- .5 Special precautions required, including type of fire extinguisher needed;
- .6 Name and signature of person authorized to issue the permit.
- .7 Name of worker (clearly printed) to which the permit is being issued.
- .8 Time Duration that permit is valid (not to exceed 8 hours). Indicate start time & date and completion time & date.
- .9 Worker signature with date and time upon hot work termination.
- .10 Specified time period requiring safety watch.
- .11 Name and signature of designated Fire Safety Watcher, complete with time & date when safety watch terminated, certifying that surrounding area was under his continual surveillance and inspection during the full watch time period specified in Permit and commenced immediately upon completion of Hot Work.

.2 Permit to be typewritten form. Industry Standard forms shall only be used if all data specified above is included on form.

.3 Each Hot Work Permit to be completed in full and signed as follows:
- .1 Authorized person issuing Permit before hot work commences;
- .2 Worker upon completion of Hot Work;
- .3 Fire Safety Watcher upon termination of safety watch;
- .4 Returned to Contractor's Site Superintendent for safe keeping.
- .5 The permit shall describe compliance with the following procedures. After tank or confined space interiors or building areas have been decontaminated, hot work may be conducted only when the tank or confined space is inverted. Hot work shall not be performed unless monitoring indicates atmospheres within and immediately surrounding are less than eight percent (8%) oxygen inside less than ten percent (10%) of the LFL outside; continuous monitoring shall continue until the hot work is completed. The hot work prohibition includes welding, cutting, grinding, sawing, or other similar operations which could be expected to potentially generate combustion-producing temperatures or sparks, or which could produce potentially hazardous fumes or vapours. An individual at each hot work site shall be designated as a fire watch. This person's sole responsibility shall be to monitor the hot work and have immediate access to at least two (2) twenty (20) pound fire extinguishers located at each hot work site. All extinguishers shall be currently inspection tagged, approved safety pin and tamper resistant seal. A new permit shall be obtained at the start of each work shift during which hot work will be conducted.

1.32 BLASTING

.1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by Consultant.

1.33 POWER ACTUATED DEVICES

.1 Use power actuated devices only after receipt of written permission from Consultant.

1.34 HANDLING AND TRANSPORTATION OF DANGEROUS GOODS

.1 Observe and enforce all measures required by the regulatory agencies including but not limited to Environment Canada, Prince Edward Island Department of Environment, and

Transport Canada.

.2 Most current regulatory guidelines and Acts will apply to the work.

.3 In case of any conflict, the more stringent requirements will apply.

1.35 OPEN EXCAVATIONS

.1 If open foundations or demolition areas are to be left at the end of a work day, protective fencing must be placed around the entire perimeter to limit access by others. Fencing to be self-supporting, approved by the Department of Labour and the Construction Safety and Industrial Safety Regulations.

1.36 POTENTIAL HAZARDS

.1 Hazards include, but are not limited to, toxic, flammable and explosion hazards associated with cleaning solvents.

.2 The Contractor shall become familiar with all potential hazards associated with the work, and shall take necessary measures to avoid injury or damage of any kind.

1.37 HAZARDOUS MATERIALS

.1 Should material resembling hazardous materials, other than those identified with the Contract Documents, including but not limited to spray or trowel applied asbestos, be encountered in course of work; stop work immediately. Do not proceed until written instructions have been received from Consultant.

.2 Any material which contains asbestos that is disturbed or removed during construction work, shall be removed in accordance with the regulations set out by the Occupational Health and Safety Act. All costs for proper cutting, removal and disposal of all asbestos identified in this contract shall be included in Tender.

.3 Where work entails use, storage, or disposal of toxic or hazardous materials, chemicals and/or explosives, or otherwise creates a hazard to life, safety, health, or the environment; work shall be in accordance with the Authority Having Jurisdiction (AHJ).

1.38 ENVIRONMENTAL PROTECTION

.1 Ensure that pollution and environmental control of construction activities are exercised during the Work to requirements of the federal and provincial environmental acts; including, but not limited to, the Prince Edward Island Environmental Protection Act.

1.39 SANITATION / DECONTAMINATION PRACTICES

.1 After each use, all disposable protective equipment shall be collected in a dedicated container for disposal.

.2 All respiratory equipment shall be decontaminated daily after use.

.3 All tools, pumps and equipment used during cleanup should be dedicated to the handling of contaminants and labeled as such and thoroughly decontaminated at the completion of the project.

.4 Contaminated work clothing shall not be worn outside of regulated areas.

.5 Workers shall wash their hands and exposed skin before eating, drinking, smoking or using toilet facilities during work shift, and at the completion of a work shift.

.6 Food, drink and tobacco products shall not be permitted in regulated areas.

1.40 WORK PRACTICES AND ENGINEERING CONTROLS

.1 Access to work areas shall be regulated and limited to authorized persons. A daily roster shall be kept of persons entering such areas.

.2 Handling Contaminants and General Work Practices.

.1 Transportation and handling of contaminants to meet applicable local, provincial and federal regulations.

.2 Emergency respiratory equipment shall be located in readily accessible locations which will remain minimally contaminated with contaminants in an emergency.

.3 Containers and systems shall be handled and opened with care. Approved protective clothing shall be worn by all employees engaged in regulated areas.

.4 All wastes and residues containing contaminants shall be collected in appropriate containers.

.3 Confined or Enclosed Spaces

.1 Entry into confined or enclosed spaces, where there is limited egress, shall be controlled by a permit system. Permits shall be signed by an authorized representative of the employer and shall certify that appropriate measures have been taken to prevent adverse effects on the worker's health as a result of his or her entry into such space.

.2 Confined or enclosed spaces which have contained contaminants shall be thoroughly ventilated to assure an adequate supply of oxygen, tested for contaminants, and inspected for compliance with these requirements prior to each entry. Adequate ventilation shall be maintained while workers are in such spaces. Each individual entering such confined or enclosed space shall be furnished with appropriate personal protective equipment and clothing and be connected by a lifeline harness to standby worker stations outside of the space. The standby worker shall also be equipped for entry with approved personal protective equipment and clothing and have contact with a third person. The standby person shall maintain communication (visual, voice, signal line, telephone, radio, or other suitable means) with the employee inside the confined or enclosed space.

.3 Workers entering confined spaces and standby workers shall be trained at a recognized confined space training program.

1.41 PRE-CONSTRUCTION CONTRACTOR SAFETY CHECKLIST

.1 Use this text as a guideline for completing the following checklist. This checklist is a general, pre-construction review of the Contractor safety program, as well as an information session to identify what the Owner requires of the Contractor. Where the item requires a submission, ensure that it is received. If the item does not apply, enter N/A for not applicable.

.2 The following information will assist in establishing what will be reviewed in each section:

.1 Safety Policy: Each employer is required by law (in Prince Edward Island) to have a safety policy and program and to implement that policy. The Owner will ask for a copy of that program.

.2 Safety Representative: Each Contractor is required to advise the Owner who their safety representative is. That representative has duties as described in the Occupational Health and Safety Act.

.3 Emergency Procedure: Each Contractor must have a site specific layout and emergency plan complete with emergency phone numbers.

.4 Employee Orientation: Each and every person working for a Contractor, including Sub-Contractors, will be given an orientation to familiarize them with the site safety program. Unless otherwise specified, each Sub-Contractor is responsible for the orientation of their workers.

.5 Safe Work Plan: Most Contractors are involved in tasks that subject workers to hazards. In order to ensure that these workers are secured from hazard, the Contractor will supply the Owner with a written safe work plan which affords protection against the hazards. This plan must be signed by a company representative and communicated to the workers involved in the task.

.6 Personal Protective Equipment Review: Advise that all workers require CSA Class "B" hard-hat, CSA "Green Patch" (eight inch) footwear, eye, ear and respiratory protection as required (boots and hats at all times).

.7 Fall Protection: Fall restraint or fall arrest protection required where a fall of 2.4 meters or more is possible. NO EXCEPTIONS.

.8 Housekeeping: Advise of daily, or as needed, clean-up requirements.

.9 Tool Box Talks: Each Contractor is required to conduct weekly safety meetings with their forces and advise the Owner they have been done.

.10 Material Handling / Storage: Advise Contractor about storage areas and handling of material so as not to endanger their worker or another worker. Stacked material to be banded, chained, blocked or otherwise secured.

.11 Landing Platform: Advise Contractor about movement of material on or off platforms. All material to be secured. Platform gates or chains to be kept closed at all times workers are on platform. If not possible, worker to be tied off with fall restraint system independent of platform.

.12 WHMIS Training: Receive verification that all workers are trained and that the Contractor submits their MSDS.

.13 GFCI: Advise Contractor that all tools are required to have ground fault circuit interrupters (where electricity is supplied by Contractor).

.14 Accident Investigations: Any injury to any of their workers must be investigated and reported to the Owner.

.15 Verbal, Written, Gone: Explain Zero Tolerance Program.

.16 Joint / Worker Safety Committee: Sites of over 20 workers must establish a safety committee; over 50 workers, an additional worker committee. Workers required to attend committee meetings will do so and not be prevented by employers.

.17 Fire Protection: All trades involved in performing hot work of any kind are required to provide fire protection at the work location.

.18 Guardrails: Advise Contractor that where temporary removal guardrails required, guardrails must be replaced as soon as possible.

.19 First Aider: Each Contractor is required to have a first aid kit and trained first aider. Employer must name their first aider.

.20 Visitors: Advise Contractor that any visitors to site must be suitably protected from hazard. They must wear hard hat, safety vest, and proper safety footwear while on site.

.21 Task Lighting: Review responsibilities of task specific lighting (who provides it).

.22 Swamper / Rigger Competency: Where cranes are used, the Contractor must use a swamper / rigger. They shall provide the Owner with a written statement identifying, by name(s) their rigger and that the named person is a competent work as described in the Construction regulation.

.23 Scaffolds: Review scaffold building requirement:

- .1 Use all braces required by design.
- .2 Access ladder for platform over 1.5 meters.
- .3 Full width platform if height over 3 meters. PEI Regulations require double planks.
- .4 Tied in three time base dimension or use of outriggers.
- .5 Engineered over 16 meters in height (standard frame type).

.24 Elevating Work Platforms:

- .1 All boom and scissors lifts required to be CSA approved and have approval on machine.
- .2 Operators manual required on machine at all times.
- .3 Maintenance record on machine at all times.
- .4 Operator must receive training in operation of equipment.
- .5 Fall protection must be used at all times on a boom lift.
- .6 Fall protection required to be used on scissors lift when unit is being moved.

.25 Protruding Rebar: Installers of reinforcing steel must protect the protruding hazard or make arrangements to have it protected. Removal of protective coverings for task purposes only is allowed, however, protective covering must be replaced as soon as possible.

.26 WCB Clearance Certificates: Advise Contractor that the Owner will not release any funds for payment until Workers Compensation Board Clearance Certificate has been received by the Owner.

.3 The following checklist is a general pre-construction review of the Contractor's safety program as required by the Owner.

PROJECT: _____ DATE: _____

CONTRACTOR: _____

WORK BEING PERFORMED: _____

Checkmark means YES / X means NO

.1 ____ Safety Policy Submitted
.2 ____ Safety Representative
.3 ____ Emergency Procedure Review
.4 ____ Employee Orientation
.5 ____ Written Safe Work Plan
.6 ____ Personal Protective Equipment Review
  .1 ____ Hard Hat & Footwear
  .2 ____ Safety Glasses & Hearing
.7 ____ Dust & Fumes
.8 ____ Fall Protection
.9 ____ Housekeeping
.10 ____ Tool Box Safety Talks (Weekly)
.11 ____ Material Handling / Storage
.12 ____ Landing Platforms
.13 ____ WHMIS Training Verification
.14 ____ GFCI Requirements
.15 ____ Accident / Incident Investigations Notification
.16 ____ Verbal, Written, Gone
.17 ____ Joint / Worker Safety Committee
.18 ____ Fire Protection
.19 ____ Guardrails
.20 ____ First Aider on Staff - Name Supplied
.21 ____ Visitors & Safety Equipment
.22 ____ Task Lighting
.23 ____ Swampers / Riggers Competency (in writing)
.24 ____ Scaffolds
.25 ____ Elevating Work Platforms
.26 ____ Protruding Rebar Protection - MSDS Received
.27 ____ WCB Clearance Certificate.

_____	_____
(Print name and title)	(Print name and title)
_____	_____
Owner Representatives (Signature)	Contractor Representatives (Signature)
_____(Date)	_____(Date)

END OF SECTION

This page intentionally left blank

1 General

1.1 FIRES

.1 Fires and burning of rubbish on site not permitted.

1.2 DISPOSAL OF WASTES

.1 Do not bury rubbish and waste materials on site.
.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

1.3 DRAINAGE

.1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
.2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.
.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.4 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties.
.2 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m.
.3 Protect roots of designated trees to drip line during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
.4 Minimize stripping of topsoil and vegetation.
.5 Restrict tree removal to areas indicated or designated by Consultant.

1.5 WORK ADJACENT TO WATERWAYS

.1 Do not operate construction equipment in waterways.
.2 Do not use waterway beds for borrow material.
.3 Do not dump excavated fill, waste material or debris in waterways.
.4 Design and construct temporary crossings to minimize erosion to waterways.

1.6 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this contract.
.2 Control emissions from equipment and plant to local authorities emission requirements.
.3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.
.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.7 SMOKING RESTRICTIONS

.1 Smoking is not permitted inside the building at any time or at any stage of construction.

1.8 ENVIRONMENTAL PERMIT APPROVAL

.1 Comply with requirements contained in the Transportation and Public Works Environmental Management Division environmental approval permit for the project.

END OF SECTION

This page intentionally left blank

1 General

1.1 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code of Canada (NBC) 2015 including all amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.2 HAZARDOUS MATERIAL DISCOVERY

.1 Asbestos: Demolition of spray or trowel-applied asbestos is hazardous to health. Should material resembling spray or trowel-applied asbestos be encountered in course of demolition work, immediately stop work and notify Consultant.

.2 Should material suspected of containing PCB's be encountered in the course of demolition work, immediately stop work and notify Consultant.

END OF SECTION

This page intentionally left blank

1 General

1.1 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)
  .1 CCDC 2-2008, Stipulated Price Contract.

1.2 INSPECTION

.1 Allow Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
.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. If such Work is found in accordance with Contract Documents, Owner shall pay cost of examination and replacement.

1.3 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies are to be engaged by Owner for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Owner.
.2 Provide equipment required for executing inspection and testing by appointed agencies.
.3 Employment of Inspection/Testing Agencies does not relax responsibility to perform Work in accordance with Contract Documents.
.4 If defects are revealed during inspection and/or testing, appointed agency may 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.

1.4 PROCEDURES

.1 Notify appropriate agency and Consultant in advance of requirement for tests, in order that attendance arrangements can be made.
.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.
.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.5 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 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.

1.6 REPORTS

.1 Submit digital copies of inspection and test reports to Consultant.

.2 Provide digital copies to Subcontractor of work being inspected or tested.

1.7 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.

1.8 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.
.2 Construct in all locations acceptable to Consultant.
.3 Prepare mock-ups for Consultant's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.
.4 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.
.5 If requested, Consultant will assist in preparing a schedule fixing dates for preparation.
.6 Remove mock-up at conclusion of Work or when acceptable to Consultant.
.7 Mock-ups may remain as part of Work as directed by Consultant.

1.9 EQUIPMENT AND SYSTEMS

.1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

END OF SECTION

1 General

1.1 INSTALLATION AND REMOVAL

.1 Contractor to provide temporary utilities identified in this Section, in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.2 DEWATERING

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

.2 Filter water containing silt through geofabric prior to discharge into municipal storm water system or water course.

1.3 WATER SUPPLY

.1 Arrange for connection with water utility company and pay all costs for installation, maintenance and removal.

.2 Contractor will pay for utility charges at prevailing rates.

.3 Water supply is available on site and will be provided for construction usage at no cost. Make arrangements for the use and transportation of such services to work area through the Consultant.

1.4 TEMPORARY POWER

.1 Power is available on site and will be provided for construction usage at no cost for operating of power tools, lighting to a maximum supply of 208 Volts, three phase, 60 Amps.

.1 Request and make arrangements for the use of such services in writing through the Consultant.

.2 Consultant will designate and approve locations of existing (normal) power sources to which connections can be made to obtain temporary power service, and the feeder routing for this power supply.

.3 Connect temporary power supply for construction activities in accordance with Canadian Electrical Code (CSA 22.1-21).

.1 Perform work and make all connections in accordance with the CSA 22.1-21, and in compliance with the federal and provincial Occupational Health and Safety Regulations and to lockout requirements specified in Section 01 35 29 - Health, Safety and Emergency Response Procedures.

.4 Electrical power and lighting systems installed under this Contract can be used for construction requirements only with prior approval of Consultant and provided that facility operations are not affected. Make good damage circuits or services impacted by this work.

1.5 TEMPORARY LIGHT

.1 Provide and maintain temporary lighting throughout project. Ensure level of illumination is not less than 160 lx.

.2 Connect to existing power supply in accordance with CSA 22.1-21 and provide switching.

.3 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Consultant and provided that facility operations are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than 3 months.

1.6 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Construction heaters used inside building must be vented to outside or be flameless type. Solid fuel salamanders are not permitted.

.3 Provide temporary heat and ventilation in enclosed areas as required to:
  .1 Facilitate progress of Work.
  .2 Protect Work and products against dampness and cold.
  .3 Prevent moisture condensation on surfaces.
  .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
  .5 Provide adequate ventilation to meet health regulations for safe working environment.
.4 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.
.5 Maintain temperatures of 19-21 degrees C in areas where finish work is being performed.
.6 Ventilating:
  .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
  .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
  .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
  .4 Ventilate storage spaces containing hazardous or volatile materials.
  .5 Ventilate temporary sanitary facilities.
  .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
.7 Permanent heating system of building, may be used when available. Be responsible for damage to heating system if use is permitted. Use of permanent system will not affect warranty.
.8 On completion of Work for which permanent heating system is used, replace filters.
.9 Ensure Date of Substantial Performance and Warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Consultant.
.10 Pay costs for maintaining temporary heat, when using permanent heating system.
.11 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
  .1 Conform with applicable codes and standards.
  .2 Enforce safe practices.
  .3 Prevent abuse of services.
  .4 Prevent damage to finishes.
.12 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.7 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies, authorities having jurisdiction, governing codes, regulations and bylaws.

END OF SECTION

1 General

1.1 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)
  .1 CCDC 2-2008, Stipulated Price Contract.
.2 Fall Protection and Scaffolding Regulations, Province of Prince Edward Island.

1.2 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
.2 Identify areas which have to be graveled to prevent tracking of mud.
.3 Indicate use of supplemental or other staging area.
.4 Provide construction facilities in order to execute work expeditiously.
.5 Remove from site all such work after use.

1.3 OVERLOADING

.1 Ensure no part of work is subjected to a load that will endanger its safety or cause permanent deformation.

1.4 FALSEWORK

.1 Design and construct falsework in accordance with CSA s269.2.

1.5 SCAFFOLDING AND FALL ARREST

.1 Provide and maintain scaffolding.
.2 Design, construct and maintain scaffolding in rigid, secure and safe manner in accordance with CAN/CSA-S269.2.
.3 Erect scaffolding independent of walls. Remove when no longer required.
.4 Comply with the requirements of the Fall Protection and Scaffolding Regulations, Province of Prince Edward Island.
.5 Each user of scaffolding shall examine scaffolding for sufficiency before using it. Make scaffolding secure or notify Contractor.

1.6 HOISTING

.1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.
.2 Hoists and cranes shall be operated by qualified operator.
.3 Maintain current inspection certificate.
.4 Qualifications of crane operator must be submitted to Consultant for approval and must be authorized to operate the crane.

1.7 SITE STORAGE/LOADING

.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
.2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

1.8 CONSTRUCTION PARKING

.1 Parking will be permitted on site.
.2 Provide and maintain adequate access to project site.
.3 Clean all areas where used by Contractors equipment.
.4 Parking for delivery and service vehicles for the supply and removal of construction materials and debris will be restricted to within the limit of contract and site fencing.

1.9 OFFICES

.1 Provide office heated to 21 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
.2 Provide marked and fully stocked first-aid case in a readily available location.
.3 Subcontractors to provide their own offices as necessary. Direct location of these offices.
.4 Maintain in clean condition.

1.10 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
.2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.
.3 Provide adequate weather tight, heat and ventilation appropriate for the use and storage of equipment, tools and materials.
.4 Each user of equipment or tools shall be appropriately trained and be responsible to examine for sufficiency before use. Make equipment and tools safe if necessary, or notify the Contractor in writing that user will not commence work with such tools until it is made safe.

1.11 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
.2 Post notices and take such precautions as required by local health authorities.
.3 Except where connected to municipal sewer system, periodically remove wastes from Site.
.4 New and existing permanent facilities may not be used.
.5 Keep sanitary facilities clean and fully stocked with the necessary supplies at all times.

1.12 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.
.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Consultant.
.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
.4 Protect traveling public from damage to person and property.
.5 Contractors traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
.7 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
.8 Dust control: adequate to ensure safe operation at all times.
.9 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
.10 Provide snow removal during period of Work.

1.13 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.
.2 Clean dirt or mud tracked onto paved or surfaced roadways.
.3 Store materials resulting from demolition activities that are salvageable.
.4 Stack stored new or salvaged material not in construction facilities.

1.14 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

This page intentionally left blank

1 General

1.1 REFERENCE STANDARDS

.1 Manual of Uniform Traffic Control Devices for Streets and Highways - 2009 Edition with 2012 Revisions.

.2 Prince Edward Island Transportation and Public Works

.1 Temporary Workplace Traffic Control Manual - 2016.

1.2 PROTECTION OF PUBLIC TRAFFIC

.1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.

.2 Review with City Public Works Manager all precautions to be taken and safety measures to be put in place and obtain acceptance before proceeding with work.

.3 When working on traveled way:

.1 Place equipment in position to present minimum of interference and hazard to traveling public.

.2 Keep equipment units as close together as working conditions permit and preferably on same side of traveled way.

.3 Do not leave equipment on traveled way overnight.

.4 Do not close any lanes of road without approval of City Public Works Manager. Before re-routing traffic erect suitable signs and devices in accordance with instructions contained in Part D of UTCD.

.5 Keep traveled way graded, free of pot holes and of sufficient width for required number of lanes of traffic.

.1 Provide minimum 7 m wide temporary roadway for traffic in two-way sections through Work and on detours.

.2 Provide minimum 5 m wide temporary roadway for traffic in one-way sections through Work and on detours.

.6 As indicated, provide graveled detours or temporary roads to facilitate passage of traffic around restricted construction area.

.7 Provide and maintain road access and egress to property fronting along Work under Contract and in other areas as indicated, unless other means of road access exist that meet approval of Consultant.

1.3 INFORMATIONAL AND WARNING DEVICES

.1 Provide and maintain signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Work which requires road user response.

.2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in Part D, Temporary Conditions Signs and Devices, of UTCD manual.

.3 Place signs and other devices in locations recommended in UTCD manual.

.4 Meet with Consultant prior to commencement of Work to prepare list of signs and other devices required for project. If situation on site changes, revise list to approval of Consultant.

.5 Continually maintain traffic control devices in use by:

.1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.

.2 Removing or covering signs which do not apply to conditions existing from day to day.

1.4 CONTROL OF PUBLIC TRAFFIC

.1 Provide competent flag persons, trained in accordance with, and properly equipped as specified in, UTCD manual in the following situations:

.1 When public traffic is required to pass working vehicles or equipment that block all or part of traveled roadway.

.2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.

.3 When workmen or equipment are employed on traveled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.

.4 Where temporary protection is required while other traffic control devices are being erected or taken down.

.5 Provide full time flag person during daylight hours to control both construction activities and public traffic and to permit pedestrians safe passage.

.6 For emergency protection when other traffic control devices are not readily available.

.7 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.

.8 Delays to public traffic due to contractor's operators: maximum 10 minutes.

.9 Flag person to have two-way radio communications at all times.

END OF SECTION

1 General

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)
  .1 CGSB 1.189M-84, Primer, Alkyd, Wood, Exterior.
  .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
.2 Canadian Standards Association (CSA International)
  .1 CSA-O121-M1978, Douglas Fir Plywood.

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.
.2 Remove from site all such work after use.

1.3 SITE FENCING

.1 Contractor to provide site safety fencing around entire construction site / project specific work zones to separate construction zone from public.
.2 Size of compound to be determined by Contractor, but must contain all construction and construction related activities within the compound, except parking for workers.
.3 Contractor to provide freestanding metal fence panels, 2440mm high x 3050mm long. Cover fence panels with filter fabric to control dust. Panels to have 8-gauge wire mesh with an approx. 50mm x 100mm opening. Provide interlocking steel caps. Provide T-style interlocking bases.
.4 Contractor to provide double truck entrance gates and at least one pedestrian gate. Equip gates with chain / pad locks .
.5 Contractor to lock gate after every days activities are completed.
.6 Contractor to post notices for both construction zone and personal protective equipment requirements.
.7 Provide owner with key access to fencing.

1.4 DUST CONTROL BARRIERS - HOARDING

.1 Provide full dust control barriers, sealed at floor, walls and underside of floor deck / roof deck between renovation spaces and remaining areas of the building. Do not damage finishes that are to remain or that cannot be repaired.
.2 The dust control barrier can be built from floor to underside of ceiling assembly if the negative air can be maintained.
.3 Provide tack mats at access points between construction zone and active building.
.4 Provide negative air machine to maintain negative pressure in construction zone exhausted to exterior.
.5 Dust control barrier assembly:
  .1 5/8" / 16mm GWB on both sides of the wall, non painted, taped joints. Acceptable material: Flame Fighter Fire Tape
  .2 Metal stud framing at 16" o.c.
  .3 Provide 45 minute fire rated metal door and frame for access. Door to be lockable.
  .4 Seal off duct work that passes through the hoarding line.
  .5 Contractor to allow for relocating the barrier as required for construction sequencing.

1.5 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs, and other areas where a change in elevation of greater than 900mm exists.
.2 Provide as required by governing authorities.

1.6 ACCESS TO EXITS

.1 Maintain access to all existing exits at all times.

1.7 WEATHER ENCLOSURES

.1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.
.2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
.3 Design enclosures to withstand wind pressure and snow loading.

1.8 ACCESS TO SITE

.1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.9 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

1.10 FIRE ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.11 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.
.2 Be responsible for damage incurred.

1.12 PROTECTION OF BUILDING FINISHES

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
.2 Provide necessary screens, covers, and hoardings.
.3 Confirm with Consultant locations and installation schedule three days prior to installation.
.4 Be responsible for damage incurred due to lack of or improper protection.

1.13 PROTECTION OF LANDSCAPE ELEMENT

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
.2 Be responsible for damage incurred due to lack of or improper protection.

END OF SECTION

1 General

1.1 GENERAL

.1 Use new material and equipment unless otherwise specified.

.2 Within seven days of written request by Consultant, submit following information for materials and products proposed for supply:

- .1 Name and address of manufacturer.
- .2 Trade name, model and catalog number.
- .3 Performance, descriptive and test data.
- .4 Manufacturer's installation or application instructions.
- .5 Evidence of arrangements to procure.

.3 Use products of one manufacturer for equipment or material of same type or classification unless otherwise specified.

1.2 REFERENCE STANDARDS

.1 Conform to reference standards, in whole or in part as specifically requested in specifications.

.2 If there is question as to whether any product or system is in conformance with applicable standards, Consultant reserves right to have such products or systems tested to prove or disprove conformance.

.3 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

1.3 CONFORMANCE

.1 When material or equipment is specified by standard or performance specifications, upon request of Consultant, obtain from manufacturer an independent testing laboratory report, stating that material or equipment meets or exceeds specified requirements.

1.4 SUBSTITUTION OF MATERIAL

.1 Proposals for substitution may be submitted only after award of Contract. Such requests must include statements of respective costs of items originally specified and proposed substitutions.

.2 Proposals will be considered by Consultant if:

- .1 Products selected by tenderer from those specified, are not available, or
- .2 Delivery date of products selected from those specified would unduly delay completion of Contract.
- .3 Alternative products to those specified, which are brought to attention of, and considered by Consultant as equivalent to those specified and will result in credit to Contract amount.
- .4 Should proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on project. Pay for design or drawing changes required as a result of substitution.
- .5 Amounts of all credits arising from approval of substitutions will be determined by Consultant and Contract price will be reduced accordingly. No substitutions will be permitted without prior written approval of Consultant.

1.5 QUALITY OF PRODUCTS

.1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution

against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Consultant based upon requirements of Contract Documents.

.4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.6 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Consultant if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Consultant reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard of Quality of Work in cases of dispute rest solely with Consultant, whose decision is final.

1.7 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.8 TRANSPORTATION

.1 Pay costs of transportation and handling of products required in performance of Work.

.2 Transportation cost of products supplied by Owner will be paid for by Owner. Contractor to unload, handle and store such products.

1.9 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Consultant.

.9 Touch-up damaged factory finished surfaces to Consultant's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.10 MANUFACTURER'S INSTRUCTIONS

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

.2 Notify Consultant in writing, of conflicts between specifications and manufacturer's instructions, so that Consultant may establish course of action.
.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Consultant to require removal and re-installation at no increase in Contract Price or Contract Time.

1.11 CO-ORDINATION

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.
.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.12 FASTENINGS - GENERAL

.1 Provide metal fastenings and accessories in same texture, color and finish as base metal in which they occur.
.2 Prevent electrolytic action between dissimilar metals.
.3 Use non-corrosive fasteners, anchors and spacers for securing exterior work.
.4 Space anchors within limits of load bearing or shear capacity and ensure that they provide positive permanent anchorage. Wood plugs not acceptable.
.5 Keep exposed fastenings to minimum, space evenly and lay out neatly.
.6 Fastenings which cause spalling or cracking are not acceptable.
.7 Obtain Consultant's approval before using explosive actuated fastening devices. If approval is obtained comply with CSA Z166-1975, and observe restrictions in Section 01 35 29 - Health, Safety and Emergency Response Procedures.

1.13 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
.3 Bolts may not project more than one diameter beyond nuts.
.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur and resilient washers with stainless steel.

1.14 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
.2 Inform Consultant of conflicting installation. Install as directed.

1.15 CONCEALMENT

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
.2 Before installation, inform Consultant if there is interference. Install as directed by Consultant.

1.16 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.
.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.17 CONSTRUCTION EQUIPMENT AND PLANT

.1 On request, prove to the satisfaction of Consultant that the construction equipment and plant are adequate to manufacture, transport, place and finish work to quality and production rates specified. If inadequate, replace or provide additional equipment or plant as directed.

.2 Maintain construction equipment and plant in good operating order.

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 Field engineering survey services to measure and stake site.
.2 Recording of subsurface conditions found.
.3 Survey services to determine measurement inverts for the Work.
.4 Requirements and limitations for cutting and patching the Work.

1.2 QUALIFICATIONS OF SURVEYOR

.1 Qualified registered land surveyor, licensed to practice in Prince Edward Island.

1.3 SURVEY REFERENCE POINTS

.1 Existing base horizontal and vertical control points are designated on drawings.
.2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
.3 Make no changes or relocations without prior written notice to Consultant.
.4 Report to Consultant when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
.5 Require surveyor to replace control points in accordance with original survey control.

1.4 SURVEY REQUIREMENTS

.1 Establish two permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.
.2 Establish lines and levels, locate and lay out, by instrumentation.
.3 Stake for grading, fill and topsoil placement and landscaping features.
.4 Stake slopes and berms.
.5 Establish pipe invert elevations.
.6 Stake batter boards for foundations.
.7 Establish foundation, column locations and floor elevations.
.8 Establish lines and levels for mechanical and electrical work.

1.5 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Consultant of findings.
.2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Consultant.

1.6 LOCATION OF EQUIPMENT AND FIXTURES

.1 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
.2 Inform Consultant of impending installation and obtain approval for actual location.
.3 Submit field drawings to indicate relative position of various services and equipment when required by Consultant.
.4 Record locations of maintained, re-routed and abandoned service lines.

1.7 SUBSURFACE CONDITIONS

.1 Promptly notify Consultant in writing if discovered surface or subsurface conditions at Place of Work differ materially from those indicated in Contract Documents.

.2 Advise the Consultant of a reasonable assumption of probable conditions when determined. After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes or Change Orders.

END OF SECTION

1 General

1.1 SUBMITTALS

.1 Submit written request in advance of cutting or alteration which affects:
  .1 Structural integrity of any element of Project.
  .2 Integrity of weather-exposed or moisture-resistant elements.
  .3 Efficiency, maintenance, or safety of any operational element.
  .4 Visual qualities of sight-exposed elements.
  .5 Work of Owner or separate contractor.

.2 Include in request:
  .1 Identification of Project.
  .2 Location and description of affected Work.
  .3 Statement on necessity for cutting or alteration.
  .4 Description of proposed Work, and products to be used.
  .5 Alternatives to cutting and patching.
  .6 Effect on Work of Owner or separate contractor.
  .7 Written permission of affected separate contractor.
  .8 Date and time work will be executed.

1.2 MATERIALS

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.3 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which may be exposed by uncovering work; maintain excavations free of water.

1.4 EXECUTION

.1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Remove samples of installed Work for testing.

.6 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

.7 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.9 Restore work with new products in accordance with requirements of Contract Documents.

.10 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.11 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material, full thickness of the construction element.

.12 Refinish surfaces to match adjacent finishes: For continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.

.13 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 Progressive cleaning.
.2 Cleaning prior to acceptance.

1.2 RELATED SECTIONS

.1 Section 01 77 00 - Closeout Procedures.
.2 All Sections

1.3 CLEANING MATERIALS

.1 Cleaning Agents and Materials: Low VOC content.

1.4 PROGRESSIVE CLEANING

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by other Contractors.
.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site.
.3 Clear snow and ice from area of construction, bank or pile snow in designated areas only.
.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
.5 Containers:
    .1 Provide on-site steel framed, hinged lid containers for collection of waste materials and debris.
    .2 Provide and use clearly marked, separate bins for recycling.
.6 Remove waste material and debris from site and deposit in waste container at end of each working day.
.7 Dispose of waste materials and debris off site.
.8 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.
.9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
.10 Provide adequate ventilation during use of volatile or noxious substances. Use of enclosure ventilation systems is not permitted for this purpose.
.11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
.12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.5 CLEANING PRIOR TO ACCEPTANCE

.1 Prior to applying for Substantial Performance of the Work, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
.3 Prior to final review, remove surplus products, tools, construction machinery and equipment.
.4 Remove waste products and debris including that caused by sub contractors.
.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant.
.6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
.7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

.8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, floors.
.9 Clean lighting reflectors, lenses, and other lighting surfaces.
.10 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
.11 Clean and polish surface finishes, as recommended by manufacturer.
.12 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
.13 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
.14 Remove dirt and other disfiguration from exterior surfaces.
.15 Clean and sweep roofs, gutters, areaways, and sunken wells.
.16 Sweep and wash clean paved areas.
.17 Clean equipment and fixtures to a sanitary condition; replace filters of mechanical equipment.
.18 Clean roof surfaces, down-spouts, and drainage components.
.19 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
.20 Remove snow and ice from access to facilities.

1.6 FINAL PRODUCT CLEANING

.1 Execute final cleaning prior to final project assessment.
.2 Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum soft surfaces.
.3 Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
.4 Replace filters of operating equipment.
.5 Clean site; sweep paved areas, rake clean landscaped surfaces.
.6 Remove waste and surplus materials, rubbish, and construction facilities from the site.

END OF SECTION

1 General

1.1 DEFINITIONS

.1 Recyclable: Ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse by others.
.2 Recycle: Process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
.3 Recycling: Process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
.4 Reuse: Repeated use of product in same form but not necessarily for same purpose. Reuse includes:
    .1 Returning reusable items including pallets or unused products to vendors.
.5 Waste Reduction Work plan (WRW): Written report which addresses opportunities for reduction, reuse, or recycling of materials.

1.2 DOCUMENTS

.1 Maintain at job site, one copy of following documents:
    .1 Waste Reduction Work plan.

1.3 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
.2 Prepare and submit following prior to project start-up:
    .1 Submit 2 copies of completed Waste Reduction Work plan (WRW).

1.4 WASTE AUDIT (WA)

.1 Conduct WA prior to project start-up.
.2 Prepare WA: Schedule A.
.3 Record, on WA - Schedule A, extent to which materials or products used consist of recycled or reused materials or products.

1.5 WASTE REDUCTION WORKPLAN (WRW)

.1 Prepare WRW prior to project start-up.
.2 WRW should include but not limited to:
    .1 Material types, relative to Island Waste Management Protocols, including.
        .1 Steel/Metals
        .2 Brick/Block/Concrete
        .3 Topsoil
        .4 Subsoil
        .5 Asphalt
        .6 Gypsum products
        .7 Glass
        .8 Mechanical/Electrical equipment
        .9 Asbestos/Hazardous Materials
        .10 Wood
        .11 Destination of materials listed
    .2 Deconstruction/disassembly techniques and sequencing.
    .3 Clear labeling of storage areas.
    .4 Details on materials handling and removal procedures.
.3 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.
.4 Describe management of waste, during demolition and construction, including:
    .1 Daily/Weekly cleaning protocol.

.2 Source separation of packaging materials/surplus materials.
.3 Trade participation in waste management.
.4 Waste containers, quantity and types (by content) on site.

.5 Identify opportunities for reduction, reuse, and recycling of materials. Based on information acquired from WA.
.6 Post WRW or summary where trades and workers at site are able to review content.
.7 Set realistic goals for waste reduction.

1.6 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.
.2 Do not dispose of waste into waterways, storm, or sanitary sewers.

1.7 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises.
.2 Maintain security measures.

1.8 SCHEDULING

.1 Coordinate Work with other activities at site to ensure timely and orderly progress of Work.

2 Products

2.1 NOT USED

.1 Not used.

3 Execution

3.1 APPLICATION

.1 Do Work in compliance with WRW.
.2 Handle waste materials not reused, salvaged, or recycled in accordance with applicable regulations and codes.

3.2 CLEANING

.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
.2 Clean-up work area as work progresses.
.3 Source separate materials to be reused/recycled into specified sort areas.

END OF SECTION

1 General

1.1 INSPECTION AND DECLARATION

.1 Contractor's Inspection:
- .1 Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
  - .1 Notify Consultant in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
  - .2 Request Consultant's Inspection.

.2 Consultant's Inspection:
- .1 Consultant, Owner and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:
- .1 Work has been completed and inspected for compliance with Contract Documents.
- .2 Defects have been corrected and deficiencies have been completed.
- .3 Equipment and systems have been tested, adjusted and are fully operational.
- .4 Certificates required by Boiler Inspection Branch have been submitted.
- .5 Systems have been commissioned.
- .6 Operation of systems have been demonstrated to Owner's personnel.
- .7 Work is complete and ready for Final Inspection.

.4 Final Inspection:
- .1 When items noted above are completed, request final inspection of Work by Owner and Consultant. If Work is deemed incomplete by Consultant complete outstanding items and request re inspection.

.5 Declaration of Substantial Performance:
- .1 When Consultant consider deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for Certificate of Substantial Performance. Refer to CCDC 2, General Conditions Article for specifics to application.

.6 Commencement of Lien and Warranty Periods:
- .1 Date of Owner's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment:
- .1 When Consultant consider final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. Refer to CCDC 2. If Work is deemed incomplete by Owner, complete outstanding items and request re inspection. Cost of re inspection will be deducted from final payment.

.8 Payment of Holdback:
- .1 After issuance of Certificate of Substantial Performance of Work, submit an application of payment of holdback amount in accordance with CCDC2.

1.2 CERTIFICATE OF SUBSTANTIAL PERFORMANCE

.1 Upon approval, a Certificate of Substantial Performance will be issued to the Owner by the Consultant with a copy delivered to the Contractor. This Certificate will take the form shown in Section 01 77 00 - Closeout Procedures.

.2 The Certificate of Substantial Performance will establish the date of the Consultant's inspection as the date of Substantial Performance of the Contract, and will commence the required 60-day period before release of the lien holdback amount.

.3 During the 60-day period, Contractor shall continue to complete the work.

.4 The Contractor shall immediately deliver to the Consultant specified submissions upon receipt of the Certificate of Substantial Performance.

1.3 ESTABLISHMENT OF WARRANTIES

.1 Warranties shall commence at date of Substantial Performance of the Work.

1.4 CERTIFICATE FOR PAYMENT OF LIEN HOLDBACK AMOUNT

.1 The Contractor shall submit statement and supporting documents for application of Release of Lien Holdback amount. These documents include those listed in Paragraph 2.2.2 and 2.2.3 and the Statutory Declaration Form CCDC 9A.

.2 Within five working days of receipt of application for Release of Lien Holdback amount and if approved, the Consultant will prepare a Certificate for Payment of the Lien Holdback amount. This Certificate dated on the day following termination of the 60 day period will be issued to the Owner with a copy delivered to the Contractor.

.3 The Owner will before the date of this Certificate ensure that no liens related to the Contract are registered and that no notice of liens has been received at the end of the 60-day period.

.4 Should no liens exist, the Lien Holdback will be due and payable one day after termination of the 60-day period in the amount indicated on the approved application for Certificate of Substantial Performance.

.5 The Owner will review jointly with the Contractor's Insurance related to the Contract before the 60-day period is terminated to ensure that all parties are adequately covered.

1.5 TOTAL PERFORMANCE

.1 The Contractor shall inspect the work to establish its completion in accordance with the Contract Documents and when satisfied of this completion request of the Consultant a final inspection.

.2 The Consultant will compile a final deficiency list at this inspection and issue it to the Contractor and Owner.

.3 The Contractor shall correct final deficiencies before a date agreed upon by the Contractor and Consultant.

.4 When the Contractor has satisfied himself that these corrections have been completed in a satisfactory manner by his inspection, he shall schedule a re-inspection by the Consultant, and the Owner's representatives if required, within five working days of the Contractor's request.

.5 When the Consultant is satisfied that all deficiencies have been rectified and the work is complete, the Contractor shall submit an application for the final progress payment.

.6 When "seasonal deficiencies", as determined by the Owner and/or Consultant exist, a sum of money will be withheld in accordance with the requirements of CCDC2-GC5.8.

1.6 WARRANTY PERIOD

.1 The Owner will advise the Consultant of defects observed during Warranty periods.

.2 The Consultant will notify the Contractor of these defects and request him to remedy the defects in accordance with the Contract Documents.

.3 Thirty (30) days before expiration of Warranties the Owner's representatives, the Consultant and the Contractor will review the work as arranged by the Contractor noting defects of products and workmanship.

.4 The Contractor shall immediately remedy such noted defects.

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 Project Record Documents as follows:
- .1 As-Built drawings;
- .2 As-Built specifications;
- .3 Reviewed shop drawings.

.2 Operations and Maintenance data as follows:
- .1 Operations and Maintenance Manual;
- .2 Maintenance Materials;
- .3 Spare Parts;
- .4 Special Tools.

1.2 INSPECTIONS AND DECLARATIONS

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
- .1 Notify Consultant in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
- .2 Request Consultant's Inspection.

.2 Consultant's Inspection: Consultant and Contractor will perform inspection of Work to identify defects or deficiencies. Correct defective and deficient Work accordingly.

.3 Completion: Submit written certificate that following have been performed:
- .1 Work has been completed and inspected for compliance with Contract Documents.
- .2 Defects have been corrected and deficiencies have been completed.
- .3 Equipment and systems have been tested, adjusted, balanced and are fully operational.
- .4 Certificates required by authorities having jurisdiction have been submitted.
- .5 Operation of systems have been demonstrated to Owner's personnel.
- .6 Work is complete and ready for Final Inspection.

.4 Final Inspection: When items noted above are completed, request final inspection of Work by Consultant, and Contractor. If Work is deemed incomplete by Consultant, complete outstanding items and request re inspection.

.5 Declaration of Substantial Performance: When Consultant considers deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for Substantial Performance of the Work.

.6 Commencement of Warranty Periods: The date of Substantial Performance of the Work shall be the date for commencement of the warranty period.

.7 Commencement of Lien Periods: The date of publication of the certificate of Substantial Performance of the Work shall be the date for commencement of the lien period, unless required otherwise by the lien legislation applicable at the Place of the Work.

.8 Final Payment: When Consultant considers final deficiencies and defects have been corrected and it appears requirements of Contract have been completed, make application for final payment.

.9 Payment of Hold-back: After issuance of certificate of Substantial Performance of the Work, submit an application for payment of hold-back amount.

1.3 PROJECT RECORD DOCUMENTS

.1 Consultant will provide two white print sets of contract drawings and two copies of Specifications Manual specifically for "as-built" purposes.

.2 Maintain at site one set of the contract drawings and specifications to record actual as-built site conditions.

.3 Maintain up-to-date, real time as-built drawings and specifications in good condition and make available for inspection by the Consultant at any time during construction.

.4 As-Built Drawings:
- .1 Record changes in red ink on the prints. Mark only on one set of prints and at completion of project and prior to interim inspection, neatly transfer notations to second set (also by use of red ink). Submit both sets to Consultant. All drawings of both sets shall be stamped "As-Built Drawings" and be signed and dated by Contractor.
- .2 Show all modifications, substitutions and deviations from what is shown on the contract drawings or in specifications.
- .3 Record following information:
  - .1 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure;
  - .2 Field changes of dimension and detail;
  - .3 Location of all capped or terminated services and utilities.
  - .4 Chases for mechanical, electrical and other services;
  - .5 Ceiling and floor elevations;
  - .6 Reflected ceiling plan condition showing finished layout of all ceiling-mounted services and devices;
  - .7 Plumbing, heating, air conditioning and ventilation, sprinkler and electrical service installation locations; all to be dimensioned and referenced to building columns or load bearing walls;
  - .8 All design elevations, sections, floor plans and details dimensioned and marked-up to consistently report finished installation conditions;
  - .9 Any details produced in the course of the contract by the Consultant to supplement or to change existing design drawings must also be marked-up and dimensioned to reflect final as-built conditions and appended to the as-built drawing document;
  - .10 All change orders issued over the course of the contract must be documented on the finished as-built documents, accurately and consistently depicting the changed condition as it applies to all affected drawing details.

.5 As-built Specifications: legibly mark in red each item to record actual construction, including:
- .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly items substituted from that specified.
- .2 Changes made by Addenda and Change Orders.
- .3 Mark up both copies of specifications; stamp "as-built", sign and date similarly to drawings as per above clause.

.6 Maintain As-built documents current as the contract progresses. Consultant will conduct reviews and inspections of the documents on a regular basis. Frequency of reviews will be subject to Consultant's discretion. Failure to maintain as-builts current and complete to satisfaction of the Consultant shall be subject to financial penalties in the form of progress payment reductions and holdback assessments.

1.4 REVIEWED SHOP DRAWINGS

.1 Compile full set of shop drawings and product data reviewed on project and incorporate into Operations and Maintenance Manual. Supply number of shop drawing sets equal to the required number of final Operations and Maintenance manuals.

.2 Submit shop drawing sets at same time and as part of the contents of the Operation and Maintenance manuals specified in this section.

1.5 OPERATIONS AND MAINTENANCE MANUALS

.1 Definition: an organized compilation of operating and maintenance data including detailed technical information, documents and records describing operation and maintenance of individual products or systems as specified in individual sections of the specifications.

.2 Manual Language: final manuals to be in English language.

.3 Number of copies required:

.1 Submit 2 draft copies of the manual for review and inspection by Consultant. Make revisions and additions as directed and resubmit.
.2 Upon review and acceptance by Consultant, submit three final copies. Initial copies are not to be considered as part of the final copies unless they have been fully revised and are identical to the final approved version.

.4 Submission Date: submit complete operation and maintenance manual to Consultant three weeks prior to application for Interim Certificate of Completion of project.

.5 Binding:
.1 Assemble, coordinate, bind and index required data into Operation and Maintenance Manual.
.2 Where multiple binders are needed, correlate data into related consistent groupings.
.3 Identify contents of each binder on spine.
.4 Organize and divide data into sections same as 16 division numerical order of contract specifications and thereafter subdivided into various equipment or building systems.
.5 Material: separate each section by use of cardboard dividers and labels. Provide tabbed fly leaf for each separate product or system within each section and with typed description of product and major component parts of equipment.
.6 Type lists and notes. Do not hand write.
.7 Drawings, diagrams and manufacturers' literature must be legible, determined solely by the Consultant. Provide with reinforced, punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.6 Manual Contents:
.1 Cover sheet containing:
.1 Date submitted.
.2 Project title, location and project number.
.3 Names and addresses of Contractor, and all Sub-contractors.
.2 Table of Contents: provide full table of contents in each binder(s), clearly indicate which contents are in each binder.
.3 List of maintenance materials.
.4 List of spare parts.
.5 List of special tools.
.6 Original or certified copy of Warranties and Guarantees.
.7 Copies of approvals, and certificates issued by Inspection Authorities.
.8 Copies of reports and results from tests designated as Contractor's responsibilities.
.9 Product Information Data on all materials, equipment and systems as specified in individual sections of the specifications to include:
.1 List of equipment including manufacturer's name, supplier, local source of supplies and service depot(s). Provide full addresses and telephone numbers.
.2 Nameplate information including equipment number, make, size, capacity, model number and serial number.
.3 Parts list.
.4 Installation details.
.5 Operating instructions.
.6 Maintenance instructions for equipment.
.7 Maintenance instructions for finishes.

.7 Shop drawings:
.1 Bind one complete set of reviewed shop drawings into each copy of operations and maintenance manual.
.2 Bind the shop drawings in a manner such that they correspond with the specification section they relate to.
.3 Where large quantity of data is supplied due to size of project, fold and bind professionally into separate correctly sized binder.

.8 Equipment and Systems Data: the following list indicates the type of data and extent of information required to be included for each item of equipment and for each system:

.1 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 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
.3 Include installed color coded wiring diagrams.
.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include seasonal and any special operating instructions.
.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
.6 Servicing and lubrication schedule, and list of lubricants required.
.7 Manufacturer's printed operation and maintenance instructions.
.8 Sequence of operation by controls manufacturer.
.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
.10 Provide installed control diagrams by controls manufacturer.
.11 Provide Contractor's coordination drawings, with installed color coded piping diagrams.
.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
.14 Include test and balancing reports.
.15 Additional requirements as specified in individual specification sections.

.9 Materials and Finishes Maintenance Data:
.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and color and texture designations.
.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
.3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
.4 Additional Requirements: as specified in individual specifications sections.

1.6 SPARE PARTS, TOOLS AND MAINTENANCE MATERIALS

.1 Provide spare parts, special tools and extra materials for maintenance purposes in quantities specified in individual specification sections.
.2 Tag all items with associated function or equipment.
.3 Provide items of same manufacture and quality as items in Work.
.4 Deliver to site in well packaged condition. Store in location as directed by Consultant.
.5 Clearly mark as to contents indicating:
.1 Part number.
.2 Identification of equipment or system for which parts are applicable.
.3 Installation instructions or intended use as applicable.
.4 Name, address and telephone number of nearest supplier.
.6 Prepare and submit complete inventory list of items supplied. Include list within Maintenance Manual.
.7 Turnover to Facility Manager and obtain signature. Include receipt with Maintenance Manual.

1.7 SPECIAL TOOLS

.1 Provide special tools, in quantities specified in individual specification section.
.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to site; place and store.
.4 Receive and catalog all items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

1.8 CLOSEOUT SUBMITTALS

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
.2 Copy will be returned after final inspection, with Consultant's comments.
.3 Revise content of documents as required prior to final submittal.
.4 Two weeks prior to Substantial Performance of the Work, submit to the Consultant, three final hard copies and one electronic final copy (PDF) of operating and maintenance manuals in English.
.5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.
.6 If requested, furnish evidence as to type, source and quality of products provided.
.7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
.8 Pay costs of transportation.
.9 Failure to deliver maintenance materials, spare parts, special tools and as-builts will delay progress payments.

1.9 OPERATION AND MAINTENANCE MANUAL FORMAT

.1 Organize data in the form of an instructional manual.
.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
.3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.
.4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
.5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
.7 Text: Manufacturer's printed data, or typewritten data.
.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
.9 Provide one (PDF) file of the manual to the Consultant for distribution.

1.10 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;
  .1 date of submission; names,
  .2 addresses, and telephone numbers of Consultant and Contractor with name of responsible parties;
  .3 schedule of products and systems, indexed to content of volume.
.2 For each product or system:
  .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
.3 Product Data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.
.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control and Section 01 77 00 - Closeout Procedures.
.6 Training: Refer to Section 01 91 13 - General Commissioning Requirements.

1.11 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on 2 sets of white print, opaque drawings, and in copy of Project Manual.
.2 Provide felt tip marking pens, maintaining separate colors for each major system, for recording information.
.3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
.4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
    .1 Measured depths of elements of foundation in relation to finish first floor datum.
    .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
    .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
    .4 Field changes of dimension and detail.
    .5 Changes made by change orders.
    .6 Details not on original Contract Drawings.
    .7 References to related shop drawings and modifications.
.5 Specifications: legibly mark each item to record actual construction, including:
    .1 Manufacturer, trade name, and catalog number of each product actually installed, particularly optional items and substitute items.
    .2 Changes made by Addenda and change orders.
.6 Other Documents: maintain manufacturer's certifications, required by individual specifications sections.

1.12 STORAGE, HANDLING AND PROTECTION

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
.2 Store in original and undamaged condition with manufacturer's seal and labels intact.
.3 Store components subject to damage from weather in weatherproof enclosures.
.4 Store paints and freezable materials in a heated and ventilated room.
.5 Remove and replace damaged products at own expense and to satisfaction of Consultant.

1.13 WARRANTIES AND BONDS

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
.2 List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
.3 Obtain warranties and bonds, executed in duplicate by Subcontractors, suppliers, and manufacturers where specifically requested by individual specification sections, within ten days after completion of the applicable item of work.
.4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.
.5 Verify that documents are in proper form, contain full information, and are notarized.
.6 Co-execute submittals when required.
.7 Retain warranties and bonds until time specified for submittal.

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 Procedures for demonstration and instruction of Products, equipment and systems to Owner's personnel.
.2 Seminars and demonstrations.

1.2 PRECEDENCE

.1 Division 01 - General Requirements Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.3 RELATED SECTIONS

.1 Division 22 - Plumbing.
.2 Division 23 - Heating Ventilating and Air Conditioning.
.3 Division 26 - Electrical System Standards & Design Guidelines
.4 Division 28 - Electronic Safety & Security.

1.4 DESCRIPTION

.1 Demonstrate operation and maintenance of equipment and systems to Owner's personnel two (2) weeks prior to date of substantial performance.
.2 Owner will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

1.5 COMPONENT DEMONSTRATION

.1 Manufacturer to provide authorized representative to demonstrate operation of equipment and systems.
.2 Instruct Owner's personnel, and provide written report that demonstration and instructions have been completed.

1.6 SUBMITTALS

.1 Submit schedule of time and date for demonstration of each item of equipment and each system four (4) weeks prior to designated dates, for Consultant's approval.
.2 Submit training logs with the O&M manuals.
.3 Give time and date of each demonstration, with list of persons present.

1.7 CONDITIONS FOR DEMONSTRATIONS

.1 Equipment has been inspected and put into operation.
.2 Testing, adjusting, and balancing has been performeda and equipment and systems are fully operational.
.3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

2 Products

2.1 NOT APPLICABLE

.1 Not applicable.

3 Execution

3.1 PREPARATION

.1 Verify that suitable conditions for demonstration and instructions are available.
.2 Verify that designated personnel are present.

.3 Explain component design and operational philosophy and strategy.
.4 Present system demonstrations.
.5 Accept and respond to seminar and demonstration questions with appropriate answers.

3.2 EXPLANATION OF DESIGN STRATEGY

.1 Explain design philosophy of each system. Include following information:
  .1 An overview of how system is intended to operate.
  .2 Description of design parameters, constraints and operational requirements.
  .3 Description of system operation strategies.

3.3 DEMONSTRATION AND INSTRUCTIONS

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at agreed upon times, at the designated location.
.2 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.
.3 Instruct personnel on control and maintenance of sensory equipment and operational equipment associated with maintaining energy efficiency and longevity of service.
.4 Review contents of manual in detail to explain all aspects of operation and maintenance.
.5 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.

3.4 TIME ALLOCATED FOR INSTRUCTIONS

.1 Ensure amount of time required (as a minimum requirement) for instruction of each item of equipment or system follows as:

SECTION	SECTION NAME	TIME (HRS)
23 09 33	Electric and Electronic Control System for HVAC	1 hr
23 81 26	Split Systems	1 hr
26 09 23.03	Lighting Control Devices - Dimming	1 hr
26 09 23.04	Lighting Control Devices - Motion Sensors	1 hr
26 50 00	Lighting	2 hrs
26 52 00	Emergency Lighting	1 hr
28 31 00	Access Control	4 hrs
28 31 02	Fire Alarm System	4 hrs

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 20 00 - Concrete Reinforcing.
.2 Section 03 30 00 - Cast-in-Place Concrete.
.3 Section 03 35 00 - Concrete Finishing.
.4 Section 07 92 00 - Joint Sealants.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
  .1 CAN/CSA-A23.1:19, Concrete Materials and Methods of Concrete Construction.
  .2 CAN/CSA-O86-19, Engineering Design in Wood (Limit States Design).
  .3 CSA O121-17, Douglas Fir Plywood.
  .4 CSA O151-17, Canadian Softwood Plywood.
  .5 CSA O153-13 (R2017), Poplar Plywood.
  .6 CAN3-O188.0, Standard Test Methods for Mat-Formed Wood Particleboards and Waferboard.
  .7 CSA O437 Series-93 (R2013), Standards for OSB and Waferboard.
  .8 CSA S269.1-2016, Falsework for Construction Purposes.
  .9 CAN/CSA-S269.3-M92 (R2013), Concrete Formwork.
.2 Council of Forest Industries of British Columbia (COFI)
  .1 COFI Exterior Plywood for Concrete Formwork.

1.3 SHOP DRAWINGS

.1 Submit shop drawings for formwork and falsework in accordance with Division 01 - General Requirements.
.2 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1, for falsework drawings.
.3 Indicate sequence of erection and removal of formwork/falsework as directed by Consultant.
.4 Each shop drawing submitted shall bear stamp and signature of qualified professional engineer registered or licensed to practice in the Province of Prince Edward Island, Canada.

1.4 QUALITY CONTROL

.1 Pre-Pour Meeting
  .1 Attend a quality control meeting including all relevant sub-trades to review the quality of the formwork, reinforcement installation, exposed concrete finishes, under floor services, pour sequence and related issues.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.
.4 Place materials defined as hazardous or toxic waste in designated containers.
.5 Ensure emptied containers are sealed and stored safely for disposal.
.6 Use sealers, form release and stripping agents that are non-toxic, biodegradable and have zero or low VOC's.

2 Products

2.1 MATERIALS

.1 Formwork materials:
  .1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121.
.2 Tubular column forms: round, spirally wound laminated fiber forms, smooth, non patterned PVC internally treated with release material. Spiral pattern to show in hardened concrete.
.3 Form ties:
  .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm dia. in concrete surface.
  .2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.
.4 Form release agent: non-toxic.
.5 Form release agent: chemically active release agents containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing concrete from sticking to forms.
.6 Falsework materials: to CSA-S269.1.
.7 Sealant: to Section 07 92 00 - Joint Sealing.
.8 Allow for sleeves through the foundation as follows. Locations as indicated on drawings to be as directed on site.

3 Execution

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and centers before proceeding with formwork/falsework and ensure dimensions agree with drawings.
.2 Obtain Consultant's approval for framing openings not indicated on drawings.
.3 Hand trim sides and bottoms of excavation and remove loose earth from earth forms before placing concrete.
.4 Fabricate and erect falsework in accordance with CSA S269.1.
.5 Refer to architectural drawings for concrete members requiring architectural exposed finishes.
.6 Do not place shores and mud sills on frozen ground.
.7 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.
.8 Align form joints and make watertight. Keep form joints to minimum.
.9 Locate horizontal form joints for exposed columns 2400 mm above finished floor elevation.
.10 Use 25 mm chamfer strips on external corners and square at interior corners, joints, unless specified otherwise.
.11 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
.12 Construct forms for architectural concrete, and place ties as indicated and/or as directed. Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.
.13 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
.14 Clean formwork in accordance with CAN/CSA-A23.1, before placing concrete.

3.2 REMOVAL

.1 Leave formwork in place for following minimum periods of time after placing concrete.
  .1 72 hours for walls and sides of beams.
  .2 72 hours for columns.

.3 28 days for beam soffits, slabs, decks and other structural members, or 7 days when replaced immediately with adequate shoring to standard specified for falsework.

.4 72 hours for footings and abutments.

.2 Re-use formwork and falsework subject to requirements of CAN/CSA-A23.1.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 10 00 - Concrete Forming and Accessories.
.2 Section 03 30 00 - Cast-in-Place Concrete.
.3 Section 32 16 00 - Curbs, Gutters, Sidewalks and Driveways.

1.2 REFERENCES

.1 American Concrete Institute (ACI)
  .1 ACI 315R-2018, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.
  .2 American National Standards Institute/American Concrete Institute (ANSI/ACI)
    .1 ANSI/ACI 315-99, Details and Detailing of Concrete Reinforcement.
  .3 American Society for Testing and Materials (ASTM)
    .1 ASTM A775 / A775M-91c, Specification for Epoxy-Coated Reinforcing Steel Bars.
  .4 Canadian Standards Association (CSA)
    .1 CAN/CSA-A23.1:19, Concrete Materials and Methods of Concrete Construction.
    .2 CAN3-A23.3:19, Design of Concrete Structures for Buildings.
    .3 CSA G30.3-M1983 (R1998), Cold Drawn Steel Wire for Concrete Reinforcement.
    .4 CSA G30.5-M1983 (R1998), Welded Steel Wire Fabric for Concrete Reinforcement.
    .5 CSA G30.14-M1983 (R1998), Deformed Steel Wire for Concrete Reinforcement.
    .6 CSA G30.15-M1983 (R1998), Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
    .7 CAN/CSA-G30.18-09 (R2014), Billet-Steel Bars for Concrete Reinforcement.
    .8 CAN/CSA-G40.21 (R2018), Structural Quality Steels.
    .9 CAN/CSA-G164-2018, Hot Dip Galvanizing of Irregularly Shaped Articles.
    .10 CSA W186-M1990 (R2016), Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.3 SOURCE QUALITY CONTROL

.1 Upon request, provide Consultant with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to commencing reinforcing work.
.2 Upon request inform Consultant of proposed source of material to be supplied.

1.4 SHOP DRAWINGS

.1 Submit shop drawings including placing of reinforcement in accordance with Division 01 - General Requirements.
.2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacings, locations of reinforcement and mechanical splices if approved by Consultant, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacings and locations of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada, ANSI/ACI 315 and ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.
.3 Detail lap lengths and bar development lengths to CAN3-A23.3, unless otherwise indicated. Provide type A tension lap splices where indicated.
.4 Each shop drawing submitted shall bear stamp and signature of qualified professional engineer registered or licensed to practice in the Province of Prince Edward Island, Canada.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 MATERIALS

.1 Substitute different size bars only if permitted in writing by Consultant.
.2 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.
.3 Cold-drawn annealed steel wire ties: to CSA G30.3.
.4 Welded steel wire fabric: to CSA G30.5. Provide in flat sheets only.
    .1 All 152 x 152 MW x 18.7 x 18.7
.5 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1.
.6 Mechanical splices: subject to approval of Consultant.
.7 Steel Fiber: DRAMIX 3D 55 / 60 to Manufacturers recommendations.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ANSI/ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada. ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures unless indicated otherwise.
.2 Obtain Consultant's approval for locations of reinforcement splices other than those shown on placing drawings.
.3 Upon approval of Consultant, weld reinforcement in accordance with CSA W186.
.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

3 Execution

3.1 FIELD BENDING

.1 Do not field bend or field weld reinforcement 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 which develop cracks or splits.

3.2 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CAN/CSA-A23.1.
.2 Use plain round bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint. When paint is dry, apply a thick even film of mineral lubricating grease.
.3 Prior to placing concrete, obtain Consultant's approval of reinforcing material and placement.
.4 Ensure cover to reinforcement is maintained during concrete pour.
.5 Protect epoxy coated portions of bars with covering during transportation and handling.
.6 Provide concrete half-bricks to support welded wire mesh in proper position in floor slabs during placing of concrete.
.7 Provide 20mm dowels into thickened concrete slabs at 1200mm on center or as noted on drawings.

3.3 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

END OF SECTION

This page intentionally left blank

1 General

1.1 DESCRIPTION OF WORK

.1 The work of this Section comprises the furnishings of all equipment, labor and materials necessary for the provision of all concrete for the work of this project, which includes but is not necessarily limited to, the following:

- .1 All concrete work required for the building which includes, but is NOT necessarily limited to:
  - .1 Foundation walls and footings.
  - .2 Entrance/exit slabs and sidewalks.
  - .3 Floor slabs on grade.
  - .4 Other miscellaneous concrete as indicated.
  - .5 All concrete work including housekeeping pads and reinforcement, both inside and outside of building, required for the work of Mechanical and Electrical Division. This work will be the financial responsibility of, and carried out by the General Contractor under the direction of the Mechanical and Electrical Division Subcontractors, respectively.

1.2 RELATED REQUIREMENTS

.1 Section 03 10 00 - Concrete Forming and Accessories.
.2 Section 03 20 00 - Concrete Reinforcing.
.3 Section 03 35 00 - Concrete Finishing.
.4 Section 05 50 00 - Metal Fabrications.
.5 Section 31 23 00 - Excavation and Fill.
.6 Section 32 16 00 - Curbs, Gutters, Sidewalks and Driveways.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM)

- .1 ASTM C109/C109M-16, Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50-mm Cube Specimens).
- .2 ASTM C260-10a (2016), Specification for Air-Entraining Admixtures for Concrete.
- .3 ASTM C309-11, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .4 ASTM C332-17, Specification for Lightweight Aggregates for Insulating Concrete.
- .5 ASTM C494-17, Specification for Chemical Admixtures for Concrete.
- .6 ASTM C827-16, Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
- .7 ASTM C939-16a, Test Method for Flow of Grout for Preplaced-Aggregate Concrete.
- .8 ASTM D1751-04 (2013), Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types).
- .9 ASTM D1752-04a (2013), Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-51.34-M86, Vapor Barrier, Polyethylene Sheet for Use in Building Construction.

.3 Canadian Standards Association (CSA)

- .1 CAN/CSA-A3000-18, Cementitious Materials Compendium.
- .2 CAN/CSA-A23.1:19, Concrete Materials and Methods of Concrete Construction.
- .3 CAN/CSA-A23.2:19, Methods of Test for Concrete.

1.4 CERTIFICATES

.1 Submit certificates in accordance with Division 01 - General Requirements.

.2 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CAN/CSA-A23.1.
.3 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CAN/CSA-A23.1.

1.5 TESTING AND INSPECTION

.1 Testing and inspection of concrete and concrete materials will be carried out by testing laboratory engaged and paid by the Contractor in accordance with Division 01 - General Requirements. Frequency of tests will be determined by the testing laboratory.
.2 Remove defective concrete and embedded debris and repair as directed by Consultant.

1.6 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Division 01 - General Requirements.
.2 Pre-Pour Meeting
  .1 Convene a pre-pour meeting 2 weeks prior to beginning concrete works.
  .2 Ensure concrete forming, finishing and concrete supplier personnel, attend.
  .3 Verify project requirements.
  .4 Review all aspects of the work including construction sequence, access to work by other Trade Contractors, Quality of falsework for trueness to dimensions, quality of finish expected at exposed concrete and all other aspects of the work.
.3 Submit to Consultant, minimum 4 weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete.
.4 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures for review by Consultant on following items:
  .1 Falsework erection.
  .2 Hot weather concrete.
  .3 Cold weather concrete.
  .4 Curing.
  .5 Finishes.
  .6 Formwork removal.
  .7 Joints.

1.7 ENVIRONMENTAL CONDITIONS

.1 Provide all protection during concrete placing and curing in hot and in cold weather, and to CAN/CSA-A23.1, Clause 21.
.2 Prior to placing, ensure that all needed material and equipment is on hand, and obtain the Consultant's approval for particular methods to be used.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.
.4 Use excess concrete for: additional paving, post footing anchorage, swale rip-rap reinforcing, mud slab, flowable fill, retaining wall footing ballast, storm structure covers, underground utility pipe kickers, storm pipe flared end section, toe wash protection, shoulder and toe outfall restraints for temporary erosion pipes.
.5 Use trigger operated spray nozzles for water hoses.
.6 Designate a cleaning area for tools to limit water use and runoff.
.7 Carefully coordinate the specified concrete work with weather conditions.
.8 Ensure emptied containers are sealed and stored safely for disposal.
.9 Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with an inert, noncombustible material and remove for disposal. Dispose of all waste in

accordance with applicable local, provincial and national regulations.

.10 Choose least harmful, appropriate cleaning method which will perform adequately.

2 Products

2.1 MATERIALS

.1 Portland cement: to CAN/CSA-A5.

.2 Blended hydraulic cement: to CSA A362-98.

.3 Supplementary cementing materials: to CAN/CSA-A23.5.

.4 Cementitious hydraulic slag: to CAN/CSA-A363.

.5 Water: to CAN/CSA-A23.1.

.6 Aggregates: to CAN/CSA-A23.1. Coarse aggregates to be normal density.

.7 Air entraining admixture: to CSA CAN3 - A 266.1

.8 Chemical admixtures: to CSA CAN3 - A 266.2 Consultant to approve accelerating or set retarding admixtures during cold and hot weather placing.

.9 Shrinkage compensating grout: premixed compound consisting of metallic aggregate, Portland cement, water reducing and plasticizing agents.

.1 Compressive strength: 50 MPa at 28 days.

.2 Consistency:

.1 Fluid: to ASTM C827. Time of efflux through flow cone (ASTM C939), under 30s.

.2 Flowable: to ASTM C827. Flow table, 5 drops in 3s, (ASTM C109, applicable portion) 125 to 145%.

.3 Plastic: to ASTM C827. Flow table, 5 drops in 3s, (ASTM C109, applicable portions) 100 to 125 %.

.4 Dry pack to manufacturer's requirements.

.3 Net shrinkage at 28 days: maximum nil %.

.10 Curing compound: to CAN/CSA-A23.1 white and to ASTM C309, Type 1-chlorinated rubber. Coordinate with finish floor materials for compatibility.

.11 Premoulded waterstops: bentonite and polyethylene sandwich, minimum 19mm thickness x 25mm wide, water-activated, expanding type forming compression seal.

.1 Acceptable Material:

.1 Parastop.

.2 Volclay Waterstop-RX.

.3 Hydrotite.

.12 Ribbed waterstops: extruded PVC, 150mm long, flanges tapered 6.3mm to 9.5mm at center bulb with pre-welded corners and intersecting pieces to following properties:

.1 Tensile strength: to ASTM D412, Die C method, minimum 11.4MPa.

.2 Elongation: to ASTM D412, Die C method, minimum 275%.

.3 Tear resistance: to ASTM D624, Die B method minimum 48 kN/m.

.4 Acceptable Material:

.1 W.R. Meadows Sealtight No. 6380.

.2 CPD No. 5.

.13 Labyrinth waterstops: extruded PVC Arctic Grade of sizes indicated with prewelded corner and intersecting pieces.

.1 Tensile strength: to ASTM D412, method A, Die "C".

.2 Elongation: to ASTM D412, method A, Die "C", minimum 250%.

.3 Tear resistance: to ASTM D624, method A, Die "B", minimum 30 kN/m.

.14 Premoulded joint fillers:

.1 Bituminous impregnated fiber board: to ASTM D1751.

.15 Polyethylene film: 10 mil thickness to CAN/CGSB-51.34.

.16 Joint Sealer: chemical curing, multi-component, Class B, Type I for horizontal joints, Type II for vertical joints to CAN/CGSB 19.24.

.17 Under Slab Vapor Barrier: see Section 31 23 00 - Excavation and Fill.

2.2 MIXES

.1 Proportion normal density concrete in accordance with CAN/CSA-A23.1, Alternative 1 to give following properties:
- .1 Concrete foundation walls and footings, except where specified otherwise:
  - .1 Cement: use Type 10 Portland cement.
  - .2 Minimum compressive strength at 28 days: 25 MPa.
  - .3 Class of exposure: F-2.
  - .4 Nominal size of coarse aggregate: 20mm.
  - .5 Slump at point and time of discharge: 80mm +/- 20.
  - .6 Air content: 4 to 7%
- .2 Concrete floor slabs generally, interior areas:
  - .1 Cement: use Type 10 Portland cement.
  - .2 Minimum compressive strength at 28 days: 25 MPa.
  - .3 Class of exposure: N.
  - .4 Nominal size of coarse aggregate: 20mm.
  - .5 Slump at point and time of discharge: 80mm +/- 20
- .3 Exterior Concrete Slabs and Sidewalks:
  - .1 Cement: use Type 10 Portland cement.
  - .2 Minimum compressive strength at 28 days: 35 MPa.
  - .3 Class of exposure: C-2.
  - .4 Nominal size of course aggregate: 20 mm.
  - .5 Slump at point and time of discharge: 80 mm +/- 20.
  - .6 Air content: to Table 10.

.2 If requested by Consultant, provide certification that plant, equipment, and all materials to be used in concrete comply with the requirements of CAN/CSA-A23.1.

.3 Use of calcium chloride not permitted.

2.3 ADMIXTURES

.1 Admixtures will be permitted only to correct deficiency in mixture or to make correct placement requirements as recommended by Testing Laboratory and approved by Consultant.

.2 Use of accelerating admixtures, if approved by Consultant, will not relax cold weather placement requirements of CAN/CSA-A23.1. Use of calcium chloride not permitted.

3 Execution

3.1 PREPARATION

3.2 CONSTRUCTION

.1 Do cast-in-place concrete work in accordance with CAN/CSA-A23.1.

.2 Sleeves and inserts.
- .1 No sleeves, ducts, pipes or other openings shall pass through joists, beams, column capitals or columns, except where indicated or approved by Consultant.
- .2 Where approved by Consultant, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere. Sleeves and openings greater than 100 x 100 mm not indicated, must be approved by Consultant.
- .3 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain approval of modifications from Consultant before placing of concrete.
- .4 Check locations and sizes of sleeves and openings shown on drawings.
- .5 Sleeve, do not core required openings.

.3 Anchor bolts.
- .1 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.

.4 Drainage holes and weep holes:
  .1 If wood forms are used, remove them after concrete has set.
  .2 Install weep hole tubes and drains as indicated.

.5 Dowels: In locations where new concrete is doweled to existing concrete drill holes in existing concrete to depths, diameters and spacing indicated and install dowels using natural aggregate grout mixed to flow consistency to suit application, in strict accordance with manufacturer's instructions or as noted on drawings.

.6 Placing Grout: Place shrinkage compensating grout under base plates for structural steel and other equipment, using procedures in accordance with manufacturer's recommendations, which result in 100%, contact over grouted area.
  .1 Refer to structural drawings for thickness and edge profile of grout under base plate for structural steel.

.7 Finishing.
  .1 Finish concrete to CAN/CSA-A23.1 with final finishing as follows:
    .1 Foundation walls: ensure that all form ties etc. are cut back to minimum 15mm below surface and depressions packed with cement mortar. Remove fins and other projections on exterior face to provide smooth surface for installation of membrane waterproofing, damp proofing, insulation or polyethylene slip sheet, as applicable at exterior and insulation on interior.
    .2 Refer to Section 03 35 00 for interior & exterior slab finish.
  .2 Rub exposed edges of concrete with Carborundum to produce 3mm radiused edges unless otherwise detailed.

.8 Waterstops.
  .1 Install waterstops to provide continuous water seal. Do not distort or pierce water stop in such a way as to hamper performance. Do not displace reinforcement when installing waterstops. Use equipment to manufacturer's requirements to field splice waterstops. Tie waterstops rigidly in place.
  .2 Use only straight heat sealed butt joints in field. Use factory welded corners and intersections unless otherwise approved by Consultant.

.9 Joint fillers.
  .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Consultant. When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
  .2 Locate and form isolation joints as indicated. Install joint filler.
  .3 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.

.10 Under Slab Vapor Barrier.
  .1 Install Under slab Vapor Barrier directly under concrete slabs-on-grade inside building.
  .2 Lap membrane minimum 150 mm at joints and seal.
  .3 Seal punctures in membrane before placing concrete. Use patching material at least 150 mm larger than puncture and seal.

.11 Polyethylene Slip Sheet/Bond Breaker
  .1 Install 10mil polyethylene slip-sheet at exterior face of all foundation walls from top of footing to future finished grade. Provide temporary support until backfilling is completed.
  .2 Use 10mil polyethylene sheet as bond breaker between foundation walls and slabs-on-grade and slabs on steel floor decking. Provide temporary support until slabs are placed. Trim flush with top of slab.

.12 Under Slab Rigid Insulation:
  .1 Install rigid insulation as indicated.

3.3 SITE TOLERANCE

.1 Concrete tolerance in accordance with CAN/CSA-A23.1 straight edge method.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 30 00 - Cast-in-Place Concrete.
.2 Section 32 16 00 - Curbs, Gutters, Sidewalks and Driveways.

1.2 DESCRIPTION OF WORK

.1 The work of this section comprises the furnishing of all labor, material and equipment necessary for the following, in accordance with the requirements of this Section and as shown on the Drawings.
  .1 Finishing of all interior floor slabs and in-fill areas.
  .2 Finishing of exterior slabs at entrances, exits and walkways.
  .3 Supply and application of all curing, sealing, hardening compounds.
  .4 Saw-cutting of all saw-cut control joints.
  .5 Filling of saw-cut control joints at interior concrete floor slabs.
  .6 Sandblasting concrete finishes.

1.3 REFERENCES

.1 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-25.20-95, Surface Sealer for Floors.
.2 Canadian Standards Association (CSA)
  .1 CSA-A23.1:19, Concrete Materials and Methods of Concrete Construction.

1.4 PERFORMANCE REQUIREMENTS

.1 Product quality and quality of work in accordance with Division 01 - General Requirements.
.2 Submit written declaration that components used are compatible and will not adversely affect finished flooring products and their installation adhesives.

1.5 PRODUCT DATA

.1 Submit product data in accordance with Division 01 - General Requirements.
.2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Division 01 - General Requirements. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for concrete floor treatment materials. Indicate VOC content.
.3 Include application instructions for concrete floor treatments.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Work area:
  .1 Make the work area water tight protected against rain and detrimental weather conditions.
.2 Temperature:
  .1 Maintain ambient temperature of not less than 10°C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 80% during same period.
.3 Moisture:
  .1 Ensure concrete substrate is within moisture limits prescribed by flooring manufacturer.
.4 Safety:
  .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.
.5 Ventilation:
  .1 Contractor will arrange for ventilation system to be operated during installation of concrete floor treatment materials.
  .2 Ventilate enclosed spaces in accordance with Division 01 - General Requirements.

.3 Provide continuous ventilation during and after coating application.

1.7 QUALITY CONTROL

.1 Pre-Pour Meeting
  .1 Attend a pre-pour quality control meeting including all relevant sub-trades to review the quality of exposed concrete finishes, hardener/sealer application, saw cuts, prepared sub-base, under floor services, pour sequence and related issues.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.
.4 Place materials defined as hazardous or toxic waste in designated containers.
.5 Ensure emptied containers are sealed and stored safely for disposal.
.6 Use chemical hardeners that are non-toxic.
.7 Dispose of surplus chemical and finishing materials in accordance with federal, provincial and municipal regulations.
.8 Dispose of waste from stripping of floors in a manner that will not have unfavorable effects on the environment.

2 Products

2.1 SEALING COMPOUNDS

.1 Surface sealer: to CAN/CGSB-25.20, Type 1 - solvent-based, clear.
.2 Surface sealers may not be manufactured or formulated with aromatic solvents hexavalent chromium and their compounds.

2.2 CURING AND SEALING COMPOUNDS

.1 Curing for plain interior floor slabs: all new interior floors at ground floor level shall be moist cured in accordance with the requirements of CAN/CSA A23.1-00, Par, 21.1.6.1 (a).
.2 Curing and sealing compound for floor slab and housekeeping pad: liquid type, water-based acrylic to ASTM C-309.
  .1 Acceptable Material:
    .1 Meadows "Vocomp 20".
    .2 CPD Acrylic Cure and Seal (Water Based).
    .3 Sternson Florseal WB.
    .4 Master Builders "Master-Kure-100W".
    .5 Pecora DynaTrol II SG.
.3 Cementitious Saw-Cut Control Joint Filler:
  .1 One-component, non-shrink, fast-setting and drying, polymer-modified cementitious mortar, compatible with adhesive for resilient sheet flooring.
  .2 Acceptable Material:
    .1 MAPEI Planipatch.
    .2 Master Builders EMACO R-300.
.4 Flexible Saw-Cut Control Joint Filler:
  .1 Two component, non-priming, self-leveling, chemical curing polyurethane sealant.
  .2 Acceptable Material:
    .1 Tremco "THC-900".
    .2 Sonneborn "SL-2".
    .3 Pecora NR 200.
.5 Use compatible additives, admixtures, curing compounds and hardeners.
.6 Do not sprinkle dry cement or dry cement and sand mixture over concrete surfaces.

2.3 MIXES

.1 Mixing, ratios and application in accordance with manufacturer's instructions.

3 Execution

3.1 EXAMINATION

.1 Verify that slab surfaces are ready to receive work and elevations are as indicated on shop drawings. Refer also to Section 03 10 00 - Concrete Forming and Accessories.

3.2 PREPARATION OF EXISTING SLAB

.1 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radiused edges unless otherwise indicated.
.2 Saw cut control joints to CSA-A23.1, 24 hours maximum after placing of concrete. Saw cuts not cut straight will be rejected and concrete replaced.
.3 Use strong solvent to remove chlorinated rubber or existing surface coatings.
.4 Use protective clothing during stripping of chlorinated rubber or existing surface coatings.

3.3 APPLICATION

.1 After floor treatment is dry, seal control joints and joints at junction with vertical surfaces with Joint Filler.
.2 Apply floor treatment in accordance with Sealer manufacturer's written instructions.
.3 Clean over spray. Clean sealant from adjacent surfaces.
.4 Co-ordinate curing and sealing compounds with floor finishes.

3.4 CONCRETE FINISHES

.1 Finish concrete in accordance with CAN3-A23.1.
    .1 Interior floor slabs: Hard, smooth dense, troweled to flat tolerance classification (5mm in 3m).
    .2 Finishes:
        .1 Exposed concrete is to be smooth, even, joints are to be rubbed to remove joint edges and free from excess air pockets.
.2 Do not sprinkle dry cement or dry cement and sand mixture over concrete surfaces.
.3 Saw cut crack control joints to CAN3-A23.1, to match existing locations and to layouts indicated on drawings.

3.5 APPLICATION OF CURING AND SEALING COMPOUNDS

.1 Apply in strict accordance with manufacturer's instructions and at rate recommended by manufacturer to meet moisture-retention requirements of ASTM C309.
.2 Apply to concrete floor slab using appropriate type as specified under PART 2 of this section. Use ONLY curing and sealing compound by same manufacturer as manufacturer of hardener, and recommended by manufacturer as compatible with hardener.
    .1 Where applicable apply curing and sealing compound following application of hardener at time recommended by manufacturer.
    .2 Coordinate with finish schedule for applied flooring.

3.6 PROTECTION

.1 Protect finished installation in accordance with manufacturer's instructions.

3.7 FILLING OF SAW-CUT CONTROL JOINTS

.1 Clean and prepare saw-cut control joints at interior floor slabs to joint filler manufacturer's requirements.
.2 Install self-leveling sealant at the bottom of all saw-cut control joints in the concrete floor slabs.

.3 Install cementitious joint filler over flexible sealant in all joints. Strike filler flush with surface of concrete slab and leave ready for installation of floor finish.

3.8 APPLICATION OF EXTERIOR SEALING COMPOUNDS

.1 After concrete has cured for thirty (30) days apply sealing compound to all exterior concrete walks, in accordance with manufacturer's recommendations.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 05 13 - Masonry Mortaring.
.2 Section 04 05 19 - Masonry Anchorage and Reinforcing.
.3 Section 04 05 23 - Masonry Accessories.
.4 Section 04 22 00 - Concrete Unit Masonry.
.5 Section 05 50 00 - Metal Fabrications.
.6 Section 07 21 13 - Board Insulation.
.7 Section 07 92 00 - Joint Sealants.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).
  .1 CAN/CSA A165 Series-04, Standards on Concrete Masonry Units.
  .2 CAN/CSA A179-04, Mortar and Grout for Unit Masonry.
  .3 CAN/CSA A371-04, Masonry Construction for Buildings.

1.3 SUBMITTALS

.1 Make submittals in accordance with Division 01 - General Requirements.
.2 Product Data.
  .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Division 01 - General Requirements.
.3 Manufacturer's Instructions.
  .1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports.
    .1 Certified test reports showing compliance with specified performance characteristics and physical properties.
    .2 Submit laboratory test reports in accordance Division 01 - General Requirements.
    .3 Submit laboratory test reports certifying compliance of masonry units and mortar ingredients with specification requirements.
  .2 Certificates:
    .1 Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store, handle and protect materials in accordance with Division 01 - General Requirements.
.2 Deliver materials to job site in dry condition.
.3 Storage and Protection.
  .1 Keep materials dry until use except where wetting of bricks is specified.
  .2 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

1.6 SITE CONDITIONS

.1 Site Environmental Requirements.
.2 Cold weather requirements:
  .1 Supplement Clause 5.15.2 of CSA-A371 with following requirements.
    .1 Maintain temperature of mortar between 5°C and 20°C until batch is used or becomes stable.

.2 Maintain ambient temperature between 5°C and 20°C and protect site from wind chill.

.3 Hot weather requirements.

.1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.

.2 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.

2 Products

2.1 MATERIALS

.1 Masonry materials are specified in Related Sections.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions, and data sheets.

3.2 PREPARATION

.1 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

3.3 INSTALLATION

.1 Do masonry work in accordance with CSA-A371 except where specified otherwise.

.2 Build masonry plumb, level, and true to line, with vertical joints in alignment.

.3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

3.4 CONSTRUCTION

.1 Exposed masonry.

.1 Remove chipped, cracked, and otherwise damaged units, in exposed masonry and replace with undamaged units in accordance with CSA A-165, Clause 82.

.2 Jointing.

.1 Allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, joints true to line, compressed, uniformly concave joints where concave joints are indicated.

.2 Allow joints to set just enough to remove excess water, then rake joints uniformly to 6 mm depth and compress with square tool to provide smooth, compressed, raked joints of uniform depth where raked joints are indicated.

.3 Strike flush joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.

.4 Exposed joints: Concave.

.3 Cutting.

.1 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects.

.2 Make cuts straight, clean, and free from uneven edges.

.4 Building-In.

.1 Build in items required to be built into masonry.

.2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.

.3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.

.5 Wetting of bricks.
- .1 Except in cold weather, wet bricks having an initial rate of absorption exceeding 1 g/minute/1000 mm2: wet to uniform degree of saturation, 3 to 24 hours before laying, and do not lay until surface dry.
- .2 Wet tops of walls built of bricks qualifying for wetting, when recommencing work on such walls.

.6 Support of loads.
- .1 Use 20 MPa concrete to Section 03 30 00 - Cast-in-Place Concrete, where concrete fill is used in lieu of solid units.
- .2 Use grout to CSA A179 where grout is used in lieu of solid units.
- .3 Install building paper below voids to be filled with concrete; keep paper 25 mm back from faces of units.

.7 Provision for movement.
- .1 Leave 3 mm space below shelf angles.
- .2 Leave 40 mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges.
- .3 Built masonry to tie in with stabilizers, with provision for vertical movement.

.8 Loose steel lintels.
- .1 Install loose steel lintels. Centre over opening width.

.9 Control joints.
- .1 Construct continuous control joints as indicated.

.10 Expansion joints.
- .1 Build-in continuous expansion joints as indicated.

.11 Interface with other work.
- .1 Cut openings in existing work as indicated.
- .2 Openings in walls: approved by Consultant.
- .3 Make good existing work. Use materials to match existing.

3.5 LATERAL SUPPORT

.1 Install all interior masonry lateral support angles supplied under the work of this contract.

3.6 SITE TOLERANCES

.1 Tolerances in notes to Clause 5.3 of CSA-A371 apply.

3.7 FIELD QUALITY CONTROL

.1 Damaged masonry WILL be removed at Contractor's expense.

3.8 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.9 PROTECTION

.1 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 05 00 - Common Work Results for Masonry.
.2 Section 04 22 00 - Concrete Unit Masonry.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).
  .1 CAN/CSA A179-04, Mortar and Grout for Unit Masonry.

1.3 SUBMITTALS

.1 Product Data.
  .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Division 01 - General Requirements.
  .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Division 01 - General Requirements. Indicate VOC's mortar, grout, parging, color additives and admixtures.
.2 Manufacturer's Instructions.
  .1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
  .1 Submit laboratory test reports in accordance Division 01 - General Requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 MATERIALS

.1 Use same brands of materials and source of aggregate for entire project.
.2 Mortar and grout: CSA A179.
.3 Use aggregate passing 1.18 mm sieve where 6 mm thick joints are indicated.
.4 Color: ground colored natural aggregates or metallic oxide pigments.
.5 Mortar for exterior masonry above grade:
  .1 Load bearing: type S based on property specifications.
  .2 Non-Load bearing: type N based on property specifications.
  .3 Parapet walls, chimneys, unprotected walls: type N based on property specifications.
  .4 All other applications: type N
.6 Mortar for foundation walls, manholes, sewers, pavements, walks, patios and other exterior masonry at or below grade: type M based on property specifications.
.7 Mortar for interior masonry.
  .1 Load bearing: type N based on property specifications.
  .2 Non-Load bearing: type N based on property specifications.
.8 Following applies regardless of mortar types and uses specified above:
  .1 Mortar for calcium silicate brick and concrete brick: type O based on Proportion specifications.
  .2 Mortar for stonework: type N based on proportion specifications.

.3 Mortar for grouted reinforced masonry: type S based on property specifications.
.9 White mortar: use white Portland cement, and lime to produce mortar type specified.
.10 Colored mortar: use coloring admixture not exceeding 10% of cement content by mass, or integrally colored masonry cement.
.11 Non-Staining mortar: use non-staining masonry cement for cementitious portion of specified mortar type.
.12 Grout: to CSA A179, Table 3, minimum 25MPa.

2.2 MIXES

.1 Color and mix grout to semi-fluid consistency.
.2 Colored mortars: incorporate color into mixes in accordance with manufacturer's instructions.
.1 Use clean mixer for colored mortar.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions, and data sheets.

3.2 CONSTRUCTION

.1 Do masonry mortar and grout work in accordance with CSA A179 except where specified otherwise.
.2 Grout the following masonry components:
.1 All cores of block for full height of vertical reinforcement.
.2 All cores of block for full height of dowels.
.3 All lintel blocks and continuous bond beams.
.4 All cores in which both horizontal and vertical anchor bolts and similar devices are embedded.
.5 Top two courses of block at locations where concrete block forms back up for exterior walls.
.6 Reinforce and fully grout every core of block walls, as well as door frames, as detailed.
.7 Top two courses where block walls terminate below structure and carry up as steel stud partition.
.8 All other locations where vertical reinforcing or grout is indicated on drawings.

3.3 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 05 00 - Common Work Results for Masonry.
.2 Section 04 05 13 - Masonry Mortaring.
.3 Section 04 22 00 - Concrete Unit Masonry.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).
  .1 CAN/CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/ Methods of Test for Concrete.
  .2 CAN/CSA A370-14 (R2018), Connectors for Masonry.
  .3 CAN/CSA A371-14 (R2019), Masonry Construction for Buildings.
  .4 CSA G30.14-M1983(R1998), Deformed Steel Wire For Concrete Reinforcement.
  .5 CSA G30.18-09 (R2019), Carbon Steel Bars for Concrete Reinforcement.
  .6 CSA S304.1-04 (R2010), Design of Masonry Structures.
  .7 CSA W186-M1990 (R2016), Welding of Reinforcing Bars in Reinforced Concrete
  .8 CAN/CSA A179-14 (R2019), Mortar and Grout For Unit Masonry.

1.3 SUBMITTALS

.1 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Division 01 - General Requirements.
  .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Division 01 - General Requirements. Indicate VOC's for epoxy coatings and galvanized protective coatings and touch-up products.
.2 Shop Drawings :
  .1 Submit shop drawings in accordance with Division 01 - General Requirements.
  .2 Shop drawings consist of bar bending details, lists and placing drawings.
  .3 On placing drawings, indicate sizes, spacing, location and quantities of reinforcement and connectors.
.3 Manufacturer's Instructions:
  .1 Submit manufacturer's installation instructions.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 MATERIALS

.1 Use 2-rod continuous ladder type reinforcement with adjustable hook type box ties with side rods minimum 4.76mm and box tie rods minimum 4.76mm at all masonry cavity walls.
.2 Reinforcement sized to suit wall thickness and width of cavity.
.3 Finish, hot-dipped galvanized to ATM A153, Class B2, 457 g/m2.
.4 Connectors and wire reinforcement to CSA-A370 and as follows:
  .1 Use truss type reinforcement sized to suit wall thickness at all single wythe masonry walls. Finish, hot-dipped galvanized to ASTM A153 Class B2, 457 g/m2.
  .2 Load bearing walls: use reinforcement with two 4.76mm side rods and 4.76mm cross rods.

.3 Non-load bearing walls: use reinforcement with two 3.66mm side rods and 3.66mm cross rods.
.4 Acceptable Material:
.1 Blok-Lok adjustable Econo-Cavity Lok II, BL 30.
.2 Dur-O-Wall, adjustable DA 310 Truss.
.3 Wire Bond, 2 wire Series 200.
.4 Wire Bond, 2 wire Series 300.

.5 Use adjustable, triangular galvanized steel ties with clip type anchors with 4.76mm x length required galvanized steel ties, for securing all new masonry where ends of new masonry walls abut concrete walls.
.1 Acceptable Material:
.1 Blok-Lok, Type "C".
.2 Dur-O-Wall DA801.
.3 Wire Bond Type 1, 1000 and 1100 R tie.

.6 Use flexible rectangular ties with flat/hump plate anchors between structural steel and masonry, with 4.76 mm galvanized tie, overall length 300 mm, width of tie sized to suite wall.
.1 Acceptable Material:
.1 Blok-Lok, Adjustable Flex O Lock - Type "C" w/BLT 9.
.2 Dur-O-Wall D/A 210 w/triangle ties 700.

.7 Anchorage to existing concrete or concrete block:
.1 Acceptable Material:
.1 Blok-Lok BL-5407

.8 Bar type reinforcement:
.1 To CSA-A371 and CAN/CSA G30.18, Grade 400, deformed bars.

.9 Bolts and anchors:
.1 To CSA-A370.

.10 Corrosion protection:
.1 To CSA-S304 and as specified for horizontal reinforcing in interior walls.

2.2 FABRICATION

.1 Fabricate reinforcing in accordance with CAN/CSA-A23.1 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Ontario.
.2 Fabricate connectors in accordance with CSA-A370.
.3 Obtain Consultant's approval for locations of reinforcement splices other than shown on placing drawings.
.4 Upon approval of Consultant, weld reinforcement in accordance with CSA W186.
.5 Ship reinforcement and connectors, clearly identified in accordance with drawings.

2.3 SOURCE QUALITY CONTROL

.1 Upon request, provide Consultant with certified copy of mill test report of reinforcement steel and connectors, showing physical and chemical analysis, minimum 5 weeks prior to commencing reinforcement work.
.2 Upon request inform Consultant of proposed source of material to be supplied.

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 GENERAL

.1 Supply and install masonry connectors and reinforcement in accordance with CSA-A370, CSA-A371, CAN/CSA-A23.1 and CSA-S304.1 unless indicated otherwise.

.2 Prior to placing concrete, obtain Consultant's approval of placement of reinforcement and connectors.
.3 Supply and install additional reinforcement to masonry as indicated.

3.3 BONDING AND TYING

.1 Bond walls of two or more wythes using metal connectors in accordance with CSA-S304, CSA-A371 and as indicated.
.2 Tie masonry veneer to backing in accordance with NBC, CSA-S304.1, CSA-A371 and as indicated.
.3 Bond masonry cavity walls using metal ties spaced at 400mm o.c. vertically and in accordance with CSA-A370.
.4 Tie ends of all new concrete unit masonry walls with adjustable triangular ties spaced at 400mm o.c. vertically, anchored securely to existing wall.
.5 Tie masonry to steel columns using connectors.
    .1 Attach ties to continuous hump-type anchor straps welded to structural steel at 400 mm spacing.
    .2 Embed ties solidly in mortar to develop maximum resistance to design forces.
.6 Interconnect concrete block at column enclosures and elsewhere as indicated using flat plate anchors.

3.4 HORIZONTAL REINFORCING

.1 Install truss type reinforcing as follows:
    .1 Interior walls:
        .1 Load-bearing walls: at vertical intervals of 400mm.
        .2 Non-load bearing walls: at vertical intervals of 400mm.
    .2 In addition:
        .1 Install reinforcing in the first and second courses immediately above and below all wall openings and at the top course immediately below roof and floor levels.
        .2 Reinforcement in the second bed joint above or below openings shall extend 600mm beyond the jambs.
        .3 All other reinforcement shall be continuous except that it shall not pass through vertical masonry control joints.
        .4 Lap side rods minimum 150 mm at splices.
        .5 Use prefabricated corner and tee sections to form continuous reinforcement around corners and for anchoring abutting walls and partitions.
        .6 Material in corner and tee sections shall correspond to the type and design of reinforcement used.

3.5 VERTICAL REINFORCING

.1 For load bearing masonry walls, install vertical No. 20 rebar reinforcement in cavities of hollow concrete masonry at 600 mm spacing.
.2 Fill cores solid with grout to requirement of Section 04 05 13 - Masonry Mortar and Grout.

3.6 REINFORCED LINTELS AND BOND BEAMS

.1 Reinforce masonry lintels and bond beams as indicated.
.2 Make joints in lintels/bond beams to match adjacent walls.
    .1 Place and grout reinforcement in accordance with CSA-S304.1, CSA-A371, and CSA-A179. Use concrete of 20 MPa strength.
        .1 Provide 200mm deep masonry bond beams at all floor and roof levels filled solid with grout reinforced with two 25M rebar.
    .2 Provide 200mm deep masonry bond beam at all floors and roof levels filled solid with grout reinforced with two 20M rebar.
    .3 Provide one 20M vertical rebar each side of all openings in masonry walls. Extend rebar minimum 800mm beyond opening.

3.7 GROUTING

.1 Grout masonry in accordance with CSA-S304.1, CSA-A371 and CSA-A179 and as indicated.

3.8 ANCHORS

.1 Supply and install metal anchors as indicated.

3.9 LATERAL SUPPORT AND ANCHORAGE

.1 Supply and install lateral support and anchorage in accordance with CSA-S304.1 and as indicated.

3.10 MOVEMENT JOINTS

.1 Reinforcement will not be continuous across movement joints unless otherwise indicated.

3.11 FIELD BENDING

.1 Do not field bend reinforcement and connectors except where indicated or authorized by Consultant.
.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.
.3 Replace bars and connectors which develop cracks or splits.

3.12 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcement steel and connectors with compatible finish to provide continuous coating.

3.13 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 05 00 - Common Work Results For Masonry.
.2 Section 04 22 00 - Concrete Unit Masonry.
.3 Section 07 27 00 - Air Barriers.

1.2 SYSTEM DESCRIPTION

.1 System Description: Use the trapezoidal shaped Mortar Net with Insect Barrier technology adhered to the face of the Mortar Net.

1.3 SUBMITTALS

.1 General:
  .1 Submit listed submittals in accordance with Conditions of the Contract and Division 01 - General Requirements.
.2 Product Data:
  .1 Submit product data, including manufacturer's product sheet, for specified products.
.3 Quality Assurance Submittals: Submit the following:
  .1 Certifications: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria.
  .2 Manufacturer's Instructions: Manufacturer's Installation Instructions.

1.4 QUALITY ASSURANCE

.1 Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

1.5 DELIVERY, STORAGE AND HANDLING

.1 General: Comply with Division 1 Product Requirements Sections.
.2 Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid constructions delays.
.3 Packing, Shipping, Handling and Unloading:
.4 Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
.5 Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

1.6 SEQUENCING

.1 General: Install trapezoidal shaped Mortar Net with Insect Barrier product after flashing has been installed, the first 1 or 2 courses of brick have been laid, and weep holes have been created. Install product before third or higher courses of brick have been laid.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 MATERIALS

.1 Control joint filler:

.1 Brick masonry: purpose-made closed cell neoprene to ASTM D1056, Class RE41.
.2 Acceptable Material:
.1 Dur-O-Wall "Rapid Expansion Joint" - DA 2015

.2 Weep hole vents:
.1 Acceptable Material: Rid-O-Mice, Stainless steel weep cover

.3 Masonry flashing:
.1 Minimum 40 mil thick specially compounded, plasticized polyvinyl chloride permanently bonded to 10 x 10 woven glass fiber mesh.
.2 Acceptable Material:
.1 Lexsuco FR-40.
.3 At walls with air/vapor barrier membrane use through-wall flashing supplied by air vapor barrier manufacturer specifically for this purpose.

.4 Nailing Inserts:
.1 0.6mm thick purpose made galvanized steel inserts for setting in mortar joints.

.5 Cavity Wall Drainage System:
.1 The Mortar Net accessory.
.1 Trapezoidal shaped Mortar Net/Insect Barrier, 254 mm high x thickness of the cavity.
.2 Materials: Manufacturer's standard trapezoidal shaped Mortar Net material with Insect Barrier for specified product.
.1 All dimensions are nominal. Measurements are inclusive of the continuous bottom strip and the trapezoidal shape.
.2 Continuous bottom strip on all sizes of material is 76.2 mm high, regardless of material thickness or overall material height.
.3 Product is a 90% open weave mesh in a trapezoidal configuration connected by a continuous bottom strip.
.4 The insect barrier fabric is made of nylon and polyester woven material and is attached to the face of the trapezoidal Mortar Net material.
.3 Source Quality: Obtain the trapezoidal shaped Mortar Net materials with Insect Barrier from a single manufacturer.
.4 Acceptable Materials:
.1 Mortar Net USA, Ltd.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

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.
.1 Match product size to cavity size.
.2 Cavity should be no more than 6.4 mm wider than 25.4 mm thick material and 51 mm thick material, and 10.2 mm thick material should touch both the outer wythe and the inner wall.
.3 Inspect for and repair holes in flashing immediately prior to installing Mortar Net with Insect Barrier.

3.3 PREPARATION

.1 Preparation:
.1 Clean flashing and weep holes so they are free of mortar droppings and debris immediately prior to installing Mortar Net with Insect Barrier.
.2 Washing flashing with water or chemicals prior to installation is not necessary.

.3 Place spacer against the outside of the interior wall so the Mortar Net with Insect Barrier is against the inside of the exterior wythe or apply additional rows of Mortar Net with Insect Barrier to fill width of cavity.

.4 If no spacer is used, flashing should extend not less than 152 mm above the top of the Mortar Net with Insect Barrier to avoid the possibility of mortar bridging between the exterior wythe and interior wall.

.5 Adhesives, fasteners, specials skills or tools are not required.

3.4 INSTALLATION

.1 Mortar Net with Insect Barrier Installation:

.1 Install one continuous row of trapezoidal shaped Mortar Net with Insect Barrier at base of wall and over all wall openings directly on flashing.

.2 To prevent mortar bridging between the outer wythe and inner wall, install flashing extending from the bottom of the Mortar Net with Insect Barrier to at least 152 mm above the top of the Mortar Net with Insect Barrier.

.3 Multiple thicknesses of The Mortar Net with Insect Barrier may be installed to match cavity widths and if excessive droppings are expected.

.4 Inspection, preparation and installation procedure for multiple thicknesses is the same as for single thickness.

.5 When installing multiple thicknesses, align the trapezoidal shaped sections with each other.

.6 To match cavity width to product thickness without using multiple thicknesses of the Mortar Net with Insect Barrier, place rigid insulation of appropriate thickness against outside face of inner wall.

.7 Lay the first 1 or 2 courses of brick at flashing level, then install Mortar Net with Insect Barrier continuously by placing it against the inside of the openings. Install Mortar Net with Insect Barrier with fabric facing to the exterior of the wall.

.8 No fasteners or adhesives are required, and mortar need not have set.

.9 The Mortar Net with Insect Barrier shall not come in contact with wall ties standard wall tile installations, but if it does, it may be cut or torn to accommodate wall ties, conduit, plumbing or other materials that bridge or intrude into cavity between inner and outer walls.

.10 Compress the Mortar Net with Insect Barrier horizontally so it can be forced into cavities slightly smaller than its nominal thickness without affecting Mortar Net with Insect Barrier or wall performance.

.11 When forcing the Mortar Net with Insect Barrier into a cavity, be sure mortar has set sufficiently to resist outward pressure from product.

3.5 PROTECTION

.1 Protection: Protect installed product from damage during construction.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED REQUIREMENTS

.1 Section 04 05 00 - Common Work Results for Masonry.
.2 Section 04 05 13 - Masonry Mortaring.
.3 Section 04 05 19 - Masonry Anchorage and Reinforcing.
.4 Section 04 05 23 - Masonry Accessories.
.5 Section 07 21 13 - Board Insulation.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
  .1 CAN/CSA A165 SERIES-04, CSA Standards on Concrete Masonry Units.

1.3 QUALITY ASSURANCE

.1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
.2 Units having a required fire resistance rating shall be identified by the manufacturer by marking each pallet or cube, or by other means.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 MATERIALS

.1 Standard hollow concrete masonry units to CSA-A165.
  .1 Classification: H/15/A/M
  .2 Size: modular
  .3 Special shapes: provide as follows:
    .1 Bull-nosed units for all exposed corners.
    .2 Square sash-block units at all control joint locations.
    .3 Purpose-made shapes for lintels and bond beams.
    .4 Solid units at wall caps where wall terminates below ceiling.
    .5 Additional shapes as indicated.
  .4 Acceptable Materials:
    .1 E.J. Casey Concrete Limited
    .2 L.E. Shaw Limited
    .3 South Shore Ready Mix Limited
    .4 V.J. Rice Concrete Limited

3 Execution

3.1 INSTALLATION

.1 Concrete block units.
  .1 Bond: running.
  .2 Coursing height: 200 mm for one block and one joint.
  .3 Jointing:
    .1 Concave where exposed or where paint or other similar finish coating is specified

.2 Tile or similar applied finish.
.3 Flush at exterior face to receive air/vapor barrier membrane.
.4 Maintain cavity at masonry walls free from mortar droppings.

.2 Concrete block lintels.
.1 Install reinforced concrete block lintels over openings in masonry where steel or reinforced concrete lintels are not indicated.
.2 End bearing: not less than 200 mm as indicated on drawings.

3.2 QUALITY CONTROL

.1 Notwithstanding visual inspection requirements of CSA Standards, masonry units shall be free of surface indentations, surface cracks due to manufacture, or chipping.
.2 THE REQUIREMENTS OF CLAUSE .1 ABOVE WILL BE STRICTLY ENFORCED AND CONTRACTOR WILL BE REQUIRED TO EITHER REPLACE UNACCEPTABLE UNITS, OR AT THE CONSULTANT'S DISCRETION, DEMOLISH PART OF ALL OF A WALL DEEMED BY THE CONSULTANT, AS NOT MEETING THOSE REQUIREMENTS.

3.3 HEATING PIPING IN CONCRETE UNIT MASONRY WALLS

.1 Where heating piping supply and return lines travel vertically in concrete block walls cores of block to be aligned and/or webs cut, and masonry work coordinated with work of Mechanical Sections to permit installation of heating lines.

3.4 CONCRETE MASONRY LINTELS

.1 Install reinforced concrete block lintels over openings in masonry where steel or reinforced concrete lintels are not indicated.
.2 End bearing: not less than 200mm.

3.5 GROUTING-IN OF DOOR FRAMES

.1 Fill fire-rated door frames solid with mortar.

3.6 RETAINING WALL

.1 Install retaining wall to the requirements of the manufacturer's printed instructions and as indicated on the drawings.
.2 Crushed stone or gravel base: consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
.1 Gradations: within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1 rather than ASTM E 11.

SIEVE DESIGNATION	% PASSING
19mm	100
12.5mm	70-100
3.3mm	40-3.4
2.00mm	23-50
0.425mm	7-25
0.075mm	3-8

.3 Manufactured sand for bedding: hard, durable, crushed stone particles, conforming to the gradation of concrete sand as specified in CAN/CSA A23.1, Section 5.3.2 Sand shall be free from clay lumps, cementation, organic material, frozen material and other deleterious materials.
.1 Gradations: within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1 rather than ASTM E 11.

SIEVE DESIGNATION	% PASSING
10mm	100
5mm	95-100

SIEVE DESIGNATION	% PASSING
2.5mm	80-100
1.25mm	50-90
0.630mm	25-60
0.315mm	10-35
0.160mm	2-10

3.7 CLEANING

.1 Standard block: Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block and finally by brushing.

.2 Glazed block: Clean masonry as work progresses using soft, clean cloths, within few minutes after laying. Upon completion, when mortar has set so that it will not be damaged by cleaning, clean with soft sponge or clean cloths, brush, and clean water. Polish with soft, clean cloths.

END OF SECTION

This page intentionally left blank

1 General

1.1 SUMMARY

.1 Work included: Provide metal fabrications including but not limited to following:
- .1 Bollards.
- .2 Miscellaneous mechanical equipment brackets.
- .3 Miscellaneous masonry angles, lintels & brackets.

1.2 RELATED REQUIREMENTS

.1 Following description of work is included for reference only and shall not be presumed to be complete:
- .1 Section 03 30 00 - Cast-in-Place Concrete.
- .2 Section 04 05 00 - Common Work Results for Masonry.
- .3 Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .4 Section 06 20 00 - Finish Carpentry.
- .5 Section 06 41 00 - Architectural Wood Casework.
- .6 Section 09 91 00 - Painting.
- .7 Division 10 - Specialties.

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM A53/A53M-07, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A269-10, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- .3 ASTM A307-07b, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .4 ASTM A123/A123M-09, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .5 ASTM A153/A153M-09, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- .6 ASTM A325M-07a, Specification for High-Strength Bolts for Structural Steel joints.
- .7 ASTM A653M-09a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .8 ASTM B117-09, Practice for Operating Salt Spray (Fog) Apparatus.
- .9 ASTM E119-09c, Test Methods for Fire Tests of Building Construction and Materials.
- .10 ASTM E736-00 (2006), Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
- .11 ASTM F436M-10, Specification for Hardened Steel Washers.
- .12 ASTM F738M-02 (2008), Specification for Stainless Steel Metric Bolts, Screws, and Studs.
- .13 ASTM F836M-02, Specification for Style 1 Stainless Steel Metric Nuts.
- .14 ASTM F844-07a, Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB 1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
- .2 CAN/CGSB 1.181-99, Ready Mixed Organic Zinc-Rich Coating
- .3 CAN/CGSB 85.10-99, Protective Coatings for Metals

.3 Canadian Standards Association (CSA International)
- .1 CAN/CSA G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CAN/CSA S16-09, Design of Steel Structures.
- .4 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.

.5 CSA W59-03 (R2008), Welded Steel Construction (Metal Arc Welding).
.6 CSA S136-07 - North American Specification for the Design of Cold Formed Steel Structural Members (Using Appendix B provisions applicable to Canada).
.7 CSA W47.1-09 - Certification of Companies for Fusion Welding of Steel.
.8 CSA W47.2-M1987 (R2008) - Certification of Companies for Fusion Welding of Aluminum.
.9 CSA W48.1-M1991 (R1998) - Carbon Steel Covered Electrodes for Shielded Metal Arc Welding.
.10 CSA W48-06 - Filler Metals and Allied Materials for Metal Arc Welding.
.11 CSA W59-03 (R2008) - Welded Steel Construction (Metal Arc Welding).
.12 CSA W117.2-06 - Safety in Welding, Cutting, and Allied Processes.
.13 SSPC - Steel Structures Painting Council, "Steel Structures Painting Manual, Vol. 2".

1.4 SUBMITTALS FOR REVIEW

.1 Submission procedures, refer to Division 01 - General Requirements.
.2 Shop Drawings:
  .1 Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
  .2 Indicate welded connections using standard welding symbols. Indicate net weld lengths.
  .3 Each shop drawing submitted shall bear stamp and signature of qualified professional engineer registered or licensed to practice in the Province of Prince Edward Island, Canada.

1.5 SUBMITTALS FOR INFORMATION

.1 Submission procedures, refer to Division 01 - General Requirements.

1.6 CLOSEOUT SUBMITTALS:

.1 Submission procedures, refer to Division 01 - General Requirements.

1.7 QUALITY ASSURANCE

.1 Welder's Certificates: Submit to Division 01 - General Requirements, certifying welders employed on the Work, verifying qualification within the previous twelve (12) months to CSA-W47.1 (steel) CSA-W47.2 (aluminum) CSA-W55.3.
.2 Welded Steel Construction: CSA-W59.
.3 Welded Aluminum Construction: CSA-W59.2.
.4 Prepare Shop Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the place where the Project is located.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off-the-ground, undercover storage locations. Do not load areas beyond the designed limits.
.2 Handle and store metal materials at job site in such a manner to prevent damage to other materials, (to existing buildings) or property.
.3 Handle components with care, and Provide protection for surfaces against marring or other damage. Ship and store members with cardboard or other resilient spacers between surfaces. Use lifting chokers of material which will not damage surface of steel members.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from

progress claims.

2 Products

2.1 MATERIALS

.1 Steel sections and plates: New Material Conforming to CAN/CSA-G40.20/G40.21, Grade 300W.

.2 Hollow Structural Sections: New material conforming to CSA G40.20 and CSA G40.21, Grade 350W, Class H.

.3 Steel Pipe: ASTM A53, Type E or S, Grade A or B, Standard weight, Schedule 40.

.4 Stainless Steel:

.1 Provide highest architectural quality in various forms, straight and true. Ensure there are no scratches, scars, creases, buckles, ripples or chatter marks. Provide finished surfaces suitable for polishing where required. Ensure finished surfaces exposed to view are free of pitting, seam marks, roller marks, oil-canning, stains, discolorations or other imperfections.

.2 Stainless Steel Sheet, Strip, Plate, and Flat Bar: ASTM A167 or ASTM A666, Type 304 and Type 316 alloy with exposed surfaces having No. 4 polished finish. Sizes as required to meet design requirements.

.3 Stainless Steel Tubing: ASTM A554, Grade MT 304.

.4 Stainless Steel Exterior Tubing: ASTM A554, Grade MT 316.

.5 Stainless Steel Pipe: ASTM A312M, Grade TP 304.

.6 Stainless Steel Exterior Pipe: ASTM A312M, Grade TP 316.

.7 Castings: ASTM A743M, Grade CF 8 or Grade CF 20. Type 304.

.8 Castings: ASTM A743M, Grade CF 8M. Type 316.

.5 Structural aluminum: to CSA HA series - M, Type 6061-T6, clear anodized.

.6 Welding Materials: Conforming to CSA W48.1-M and CSA W59-M.

.7 High Strength Bolts: Supply bolts, nuts and washers conforming with ASTM A 325M. Supply each type and size of bolt and nut of same manufacture and of same lot.

.1 Bolts: Heavy, hexagon head high strength structural bolts, of standard size, of lengths required for thickness of members joined and for type of connection.

.2 Nuts: Heavy hexagon semi-finished nuts.

.3 Washers: For general use bolt, nut and stud application to provide increased bearing surfaces, spacing and to prevent galling. Flat and smooth hardened washers, quenched and tempered to suit applications and conforms to ASTM F844. Provide AISI Type 304 stainless steel washers at exterior locations.

.4 Hardened Steel Washers: To suit applications and conforms to ASTM F436M.

.5 Stainless Steel Bolts: To suit applications and conforms to ASTM F738M.

.6 Stainless Steel Nuts: To suit applications and conforms to ASTM F836M.

.7 Lock Washers: Helical spring type steel "lock" washers to suit applications and conforms to federal specification FF-W-84. Provide AISI Type 304 stainless steel lock washers at exterior locations.

.8 Security Fasteners: Button head Torx® Plus R screw tamper resistant # 10, 25 mm long 2 per glass stop minimum stainless steel machine screws.

.8 Common or Ordinary Bolts and Anchor Bolts: Unfinished bolts conforming with ASTM A307, Grade A, with hexagon heads and nuts where exposed in the finish work. Supply common bolts of lengths required to suit thickness of material being joined, but not projecting more than 6 mm beyond nut, without the use of washers. Supply anchor bolts of lengths noted, but projecting not less than 13 mm beyond nut unless otherwise noted.

.9 Galvanized Primer Paint: Zinc rich conforming to CAN/CGSB-1.181 for new galvanized metal.

.10 High Performance Corrosion Protection for Perimeter Steel: 1 component, moisture cured, micaceous iron oxide/zinc filled primer, UL Classified in accordance with UL 263 (ASTM E119), corrosion protection in accordance with ASTM B117, meeting Class B Slip Certification in accordance with American Institute of Steel Construction (AISC) requirements for slip critical bolted connections, tested in accordance with ASTM E736 for its suitability for

application of primer over steel to receive sprayed fireproofing "Series394, Perime Prime" by Tnemec Company Incorporated; www.tnemec.com.

.11 Steel Pipe Handrails: Conforming to ASTM A53M, Type "S", Schedule 40, Grade A steel pipe of sizes down.

.12 Steel Pipe Bollards: Conforming to ASTM A53M, Schedule 80 steel pipe of sizes shown.

.13 Galvanized: Hot dipped galvanized with minimum zinc coating of 600 g/m2 to CAN/CSA-G164-M.

.14 Galvanized Sheet Steel: Supply 0.91 mm (20 ga) core thickness commercial quality to ASTM A653M, CS Type A, with Z275 zinc coating designation to ASTM A653M.

.15 Perforated Sheet Steel: Commercial flattened sheet steel of thickness indicated, with machine die cut round holes of 3 mm dia. at 5.537 mm oc in 60° staggered pattern and similar to sheet stock manufactured by Greening Donald Co. Ltd., or by Unalloy WRC-a division of Samuel Manu-Tech Inc. or by Gerard Daniel Worldwide.

.16 Expanded Steel Mesh: Flattened, expanded, carbon steel mesh of 10 msg gauge thickness, weighing minimum 112 lbs/100 sq ft, style 1.330" SWD x 3.2000" LWD, 11-1/2" - No. 9 by Gerard Daniel Worldwide, Canadian Division, or Expanded Metal Corporation or Dramex International.

.17 Aluminum Extrusions: ASTM B209M, size accurately formed as shown on Drawings, extruded aluminum alloy AA-6063-T5 or T6 for aluminum. Ensure surfaces are free from defects impairing appearance, strength and durability.

.18 Aluminum Sheet: ASTM B221M, Minimum thickness 3 mm of type and characteristics to match finished extrusions; sheet which is not exposed shall be Utility Aluminum mill finished; for intricate forming with decorative finishes use AA 1100 and for siding and exposed panels use AA-3003 with specified finish.

.19 Handrail Wall Brackets: In accordance with OBC requirements and to meet design requirements indicated on Drawings.

.20 Grout:

.1 Cementitious, non shrinking, non expanding grout: 'Sika Grout 212' by Sika Canada Inc., or 'Non Shrink Structural Grout - Dry Pack Grout' by Euclid Chemical Company or 'Sealtight CG 86 Construction Grout' by W.R. Meadows.

.2 Epoxy, non-shrinking, non expanding grout: 'Sika Anchor Fix.

.3 Master Flow 100.

.4 Master Emaco ADH 1420.

2.2 FABRICATION

.1 Fabricate each item of work of this Section in accordance with following general requirements:

.1 Members square and straight.

.2 Members plumb and true.

.3 Joints accurately and tightly fitted.

.4 Intersecting members in true, finish planes.

.5 Fasteners concealed.

.2 Fabricate, fit and assemble work in shop where possible. Where shop fabrication is not possible, make trial assembly in shop.

.3 Provide hangers, rods, bars, bolts, anchors, brackets, rivets, bearing plate and bracing, fitting, drilling, stopping, soldering, as required for a complete assembly.

.4 Isolate dissimilar metals to prevent galvanic corrosion.

.5 Weld connections unless otherwise indicated.

.6 Shop Welding:

.1 Execute welding to avoid damage or distortion to work. Should there be, in the opinion of Consultant or Inspection Company, doubts as to adequacy of welds, they shall be tested for efficiency and any work not meeting Standards be removed and replaced with new work satisfactory to Consultant. Carry out welding in accordance with following standards:

.1 Fabricator shall be fully certified by Canadian Welding Bureau for fusion welding of steel structures to CSA W47.1 and for fusion welding of aluminum to CSA W47.2.
.2 CSA W48-M - for Electrodes (if rods are used, only coated rods are allowed).
.3 CSA W59-M - for design of connections and workmanship.
.4 CSA W117.2 - for safety.

.7 Thoroughly clean welded joints and steel exposed for a sufficient space to properly perform welding operation. Neatly finish welds. Ensure welds exposed to view and finish painted are continuous and ground smooth.

.8 Provide exposed metal fastenings and accessories of same material, texture, color and finish as base metal to which they are applied or fastened.

2.3 FINISHES

.1 Cleaning and Shop Painting:
.1 Clean steel to SSPC SP6 and remove loose mill scale, weld flux and splatter.
.2 Shop prime steel with 1 coat of primer paint to dry film thickness of 0.025 mm (1 mil). Paint on dry surfaces free from rust, scale, grease. Do not paint when temperature is lower than 7 deg C. Paint items under cover and leave under cover until primer is dry. Follow paint manufacturer's recommendations regarding application methods, equipment, temperature, and humidity conditions.
.3 Shop prime non galvanized perimeter steel members and structural steel members to receive sprayed fire resistive materials with 1 coat of high performance corrosion protection primer to dry film thickness of 0.025 mm (1 mil). Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 deg C. Paint items under cover and leave under cover until primer is dry. Follow paint manufacturer's recommendations regarding application methods, equipment, temperature, and humidity conditions.
.4 Shop prime galvanized steel in accordance with CAN/CGSB-85.10.
.5 Clean but do not paint surfaces being welded in the field and surfaces in contact after assembly.

.2 Hot Dip Galvanizing:
.1 After fabrication, hot dip galvanize specific miscellaneous steel items noted on Drawings and/or called for herein. Plug relief vents air tight. After galvanizing, remove plugs, ream holes to proper size and re-tap threads. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with "Galvafroid" by W.R. Meadows in accordance with manufacturer's printed directions.
.2 Galvanized members exposed to elements when in final location; members embedded in concrete; members specified in this Section or noted on Drawings.
.3 Hot-dip galvanize members, in accordance with CAN/CSA-G164-M and the requirements of following ASTM standards, with minimum coating weights or thickness as specified:
.1 Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips: ASTM A123M; average weight of zinc coating per sq/ft of actual surface, for 4.8 mm and less thickness members 2 ounces, for 6 mm and heavier members 2.3 ounces.
.2 Iron and Steel Hardware: ASTM A153M; minimum weight of zinc coating, in ounces per sq ft of surface shall be in accordance with Table 1 of ASTM A153M, for the various classes of materials used on the Project.
.3 Steel Sheet: ASTM A653M; weight of zinc coating, per sq ft on both sides of sheet. Coating designation Z275 (G90), minimized spangle and chemically treated.

.3 Color: to be selected by Consultant.

.4 Aluminum: Exposed aluminum surfaces shall have clear anodized coating (Architectural Class II). Pre-treat aluminum with caustic tech treatment prior to applying integral, clear,

anodic oxide coating. Apply clear, anodic oxide coating in accordance with AAMA 611, 0.4 mils minimum coating thickness and also conforms to Aluminum Finish Designation AA-M12C22A31, Architectural Class II. Protect clear anodized coating with removable protective film.

.5 Zinc-rich primer: Ready, mixed, zinc-rich primer conforming to CAN/CGSB-1.181.
  .1 Acceptable material:
    .1 Sealtight Galvafroid Zinc-Rich Coating by W.R. Meadows of Canada Limited.
    .2 Zinc Clad No. 7 Organic Zinc Rich Primer by Sherwin Williams Company of Canada Ltd.

.6 Isolation Coating: Bituminous paint, alkali-resistant bituminous paint or epoxy resin solution to provide dielectric separation which will dry to be tack-free and withstand high temperatures. Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers. Carboline Bitumastic 50 by Carboline Canada, or Copper Creek Top Service 760 Black by Sherwin Williams Company, 410-02 by Bakor Inc. or other Product and manufacturer acceptable to Consultant.

2.4 PIPE BOLLARDS

.1 Fabricate from HSS Round, Grade 250 W to size 203mm nominal, complete with anchor lugs.
.2 Supply to Section 03 30 00 - Cast-In-Place Concrete for installation in concrete bases.
.3 Provide post guards of 1/8" high density polyethylene (HDPE) with guaranteed fade resistance for six (6) years, complete with cap.
.4 Post Guard Colour: Yellow.
.5 Acceptable Material:
  .1 Post Guard by Sure Guard.
  .2 Global Industries.
  .3 Uline.
  .4 Idealshield.
  .5 Innoplast.

2.5 RADON PIT FRAME & COVER

.1 75mm x 75mm x 6mm galvanized angle cover support & frame.
.2 6mm checker board plate cover.
.3 6mm galvanized square edge bar cover support, 4 edges.
.4 6mm galvanized retractable lift handle, 150mm long.

2.6 SHELF ANGLE

.1 Steel angles: galvanized, size 90mm x 150mm x 8mm as indicated.
.2 Cut horizontal leg to suit
.3 Epoxy in place with 16mm bolts at 760mm O/C, drill to 100mm deep.

3 Execution

3.1 ERECTION

.1 Do welding work in accordance with CSA W59 unless specified otherwise.
.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
.3 Provide suitable means of anchorage acceptable to Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
.4 Exposed fastening devices to match finish and be compatible with material through which they pass.
.5 Provide components for building by other sections in accordance with shop drawings and schedule.
.6 Make field connections with bolts to CAN/CSA-S16.1, or weld.
.7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.
.9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.2 INSTALLATION

.1 Verify dimensions at the Place of the Work to ensure work of this Section fits to that of other parts of the Work.
.2 Erect the work of this Section plumb, square, true and level.
.3 Securely anchor work of this Section and rivet, weld or bolt to structural framing of the building. Where secured to concrete, Provide bolts for setting in concrete. Provide expansion bolt supports to masonry.
.4 Provide necessary fitting, setting and cutting required in connection with the fitting of work of this Section to other parts of the Work.
.5 Field Painting: Paint bolt heads, washers, nuts, field welds and previously unpainted items. Touch up with matching paint, shop primer damaged during transit and installation.

3.3 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.
.3 On completion of installation, carefully clean metal work.

END OF SECTION

This page intentionally left blank

1 General

1.1 SECTION INCLUDES

.1 Floor, wall, and roof framing.
.2 Sheathing.
.3 Site fabricated rafters.
.4 Miscellaneous rough carpentry, including:
  .1 Rooftop equipment curbs and bases.
  .2 Wood blocking, cants and nailers.
  .3 Wood furring and grounds.
  .4 Fasteners.

1.2 RELATED REQUIREMENTS

.1 Section 06 17 53 - Shop-Fabricated Wood Trusses
.2 Section 06 20 00 - Finish Carpentry
.3 Section 06 41 00 - Architectural Wood Casework
.4 Section 07 21 16 - Blanket Insulation.
.5 Section 07 26 00 - Vapor Retarders
.6 Section 09 91 00 - Painting
.7 Section 10 28 13 - Toilet Accessories
.8 Division 23 - Mechanical
.9 Division 26 - Electrical

1.3 REFERENCES

.1 American National Standards Institute (ANSI)
  .1 ANSI A208.1-1999, Particleboard, Mat Formed Wood.
.2 American Society for Testing and Materials (ASTM)
  .1 ASTM D1761-00, Standard Test Methods for Mechanical Fasteners in Wood.
  .2 ASTM D5055-00, Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.
  .3 ASTM D5456-01ae1, Specification for Evaluation of Structural Composite Lumber Products.
.3 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-11.3-M87, Hardboard.
  .2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
  .3 CAN/CGSB-51.34-M86, Vapor Barrier, Polyethylene Sheet for Use in Building Construction.
  .4 CAN/CGSB-71.26-M88, Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.
.4 Canadian Standards Association (CSA)
  .1 CSA A123.2-M1979(R1999), Asphalt Coated Roofing Sheets.
  .2 CAN/CSA-A247-M86, Insulating Fiberboard.
  .3 CSA B111-1974, Wire Nails, Spikes and Staples
  .4 CAN/CSA-G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.
  .5 CSA O112 Series-M1977, CSA Standards for Wood Adhesives.
  .6 CSA O121-M1978, Douglas Fir Plywood.
  .7 CAN/CSA-O122-M89, Structural Glued-Laminated Timber.
  .8 CAN/CSA-O141-91, Softwood Lumber.
  .9 CSA O151-M1978, Canadian Softwood Plywood.
  .10 CSA O153-M1980, Poplar Plywood.
  .11 CAN/CSA-O325.0-92(R1988), Construction Sheathing.
  .12 CAN3-O437 Series-93, Standards on OSB and Waferboard.
.5 National Lumber Grades Authority (NLGA)
  .1 Standard Grading Rules for Canadian Lumber 2010.

.6 Truss Design and Procedures for Light Metal Connected Wood Trusses, Truss Plate Institute of Canada.

1.4 QUALITY ASSURANCE

.1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
.2 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.

1.5 DELIVERY, STORAGE, AND PROTECTION

.1 Store plywood panels flat and level.
.2 Keep finish faces inward and cover stacks to protect from bumping and abrasion.
.3 Protect tongue and groove plywood panel edges and corners.
.4 Protect panels from sunlight, water or excessive humidity.
.5 Store materials off the ground, covered with weatherproof tarps.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Set aside damaged wood and dimensional lumber off-cuts for approved alternative uses (e.g. bracing, blocking, cripples, bridging).
.2 Collect and separate for disposal waste material generated by this Section.
.3 Place in appropriate on-site bins in accordance with Waste Management Plan.
.4 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 FRAMING AND STRUCTURAL MATERIALS

.1 Lumber:
  .1 Unless specified otherwise, softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:
    .1 CAN/CSA-O141.
    .2 NLGA Standard Grading Rules for Canadian Lumber.
  .2 Glued end-jointed (finger-jointed) lumber are not acceptable.
.2 Fence Material:
  .1 Pressure treated posts, size as shown.
  .2 Cedar board, 19mm x 140mm.
.3 Light-frame trusses in accordance with "Truss Design and Procedures for Light Metal Connected Wood Trusses", Truss Plate Institute of Canada.
.4 Structural Composite Lumber (SCL) in accordance with ASTM D5456.
.5 Framing and board lumber: in accordance with NBC.
.6 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:
  .1 S4S is acceptable.
  .2 Board sizes: "Standard" or better grade.
  .3 Dimension sizes: "Standard" light framing or better grade.
  .4 Post and timbers sizes: "Standard" or better grade.

2.2 PANEL MATERIALS

.1 Plywood, OSB and wood based composite panels: to CAN/CSA-O325.0.
.2 Douglas fir plywood (DFP): to CSA O121, standard construction.
.3 Canadian softwood plywood (CSP): to CSA O151, standard construction.
.4 Poplar plywood (PP): to CSA O153, standard construction.
.5 Interior mat-formed wood particleboard: to ANSI 208.1.

.6 Specifically:
.1 Roof sheathing: Douglas Fir Plywood (DFP) exterior sheathing grade, square edge, to thickness indicated, to CSA O121.

2.3 ACCESSORIES

.1 Exterior wall sheathing paper: refer to Section 07 27 00 - Air Barriers.
.2 Polyethylene film: to CAN/CGSB-51.34, Type 1, 0.15 mm thick (6 mil).
.3 Air seal sill gasket: closed cell polyurethane or polyethylene.
.4 Sealants: Section 07 92 00 - Joint Sealants.
.5 General purpose adhesive: to CSA O112 Series.
.6 Nails, spikes and staples: to CSA B111.
.1 Use common spiral nails and spiral spikes except where indicated otherwise.
.2 Use hot galvanized finish steel for exterior work, including sheathing.
.7 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.
.8 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and inorganic fiber plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.
.9 Nailing discs: flat caps, minimum 25 mm diameter, minimum 0.4 mm thick, sheet metal, fiber, formed to prevent dishing. Bell or cup shapes not acceptable.
.10 Roof sheathing H-Clips: formed "H" shape, thickness to suit panel material, extruded 6063-T6 aluminum alloy type approved by Consultant.
.11 Use surface fastenings of following type except where specific type is indicated.
.1 To hollow masonry, drywall and panel surfaces, use toggle bolt.
.2 To solid masonry and concrete use expansion shield with lag screw.
.3 To structural steel use bolts through drilled hole, or welded stud-bolts or power drilled hole, or welded stud-bolts or power driven self-drilling screws, or welded stud-bolts, or explosive actuated stud-bolts.
.4 To exterior face of concrete foundation wall with galvanized power driven fasteners penetrating minimum 38mm into concrete.
.5 Joist hangers: minimum 1mm thick sheet steel, galvanized G90 coating designation, 6672N bearing strength.
.6 Roof sheathing H-clips: formed "H" shape, thickness to suit panel material, type approved by Consultant.
.12 Galvanizing: to CSA G164-M1981, use galvanized fasteners for work in exterior walls, work in high humidity areas, etc. and with pressure-preservative treated lumber.

2.4 MISCELLANEOUS HARDWARE

.1 Beam anchors:
.1 Purpose made for connecting wood beams to concrete, hot-dripped galvanized steel, 2.6mm base thickness, c/w integral anchor lugs and pre-drilled for nails.
.2 Acceptable Material:
.1 Simpson "Strong Tie" (Coordinate with beam size and confirm model number before ordering)
.2 Beam anchors:
.1 Purpose-made for connecting wood beams to wood posts, hot-dipped galvanized steel, 1.6mm (16 ga) base thickness, pre-drilled for nails.
.2 Acceptable Material:
.1 Simpson "Strong Tie" (Coordinate with beam and post sizes and confirm model number before ordering).
.3 Post anchors:
.1 Purpose-made for connecting wood posts to concrete, elevated type, hot-dipped galvanized 2.6mm (14 ga) stand-off and adjustment plates, 1.6mm (16 ga) cover plates pre-drilled for nails.
.2 Acceptable Material:
.1 Simpson "Strong Tie" (Coordinate with post size and confirm model number before ordering)

.4 Wire mesh:
  .1 Re-galvanized, welded steel wire hardware grade cloth, 6mm +/- mesh.
  .2 Acceptable Material:
    .1 Greening - Donald #4/0.047.

2.5 AIR BARRIER SHEET

.1 Refer to Section 07 27 00 - Air Barriers.

3 Execution

3.1 EXAMINATION

.1 Verify that site conditions are ready to receive work and opening dimensions are as indicated on Drawings.

3.2 PREPARATION

.1 Store wood products in dry environment.

3.3 INSTALLATION

.1 Comply with requirements of NBCC 2015 Part 9 supplemented by following paragraphs.
.2 Install members true to line, levels and elevations, square and plumb.
.3 Construct continuous members from pieces of longest practical length.
.4 Install spanning members with "crown-edge" up.
.5 Select exposed framing for appearance. Install lumber materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.
.6 Install wall sheathing in accordance with manufacturer's printed instructions.
.7 Install roof sheathing in accordance with requirements of NBCC.
.8 Install H-clips as required by spacing of roof framing.
.9 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding electrical equipment mounting boards, and other work as required.
.10 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.
  .1 Align and plumb faces of furring and blocking to tolerance of 1:600.
.11 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
.12 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized fasteners.
.13 Install sleepers as indicated.
.14 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

3.4 PARAPETS, CURBS AND RELATED BLOCKING ETC.

.1 Fabricate as detailed and to CRCA recommendations except where specifically detailed otherwise.
.2 Use pressure treated lumber and plywood throughout all external applications and as shown.
.3 Apply two (2) coats of brush applied wood preservative to all end cuts of lumber and plywood.
.4 Install wood framing and plywood sheathing at roof parapets, curbs, etc., as indicated in longest practical lengths.
.5 Anchor to steel framing and/or concrete with galvanized bolts at spacing indicated.
.6 Supply wood spreader to Section 05 50 00 - Metal Fabrications for attachment to galvanized metal.

3.5 MISCELLANEOUS FURRING, BLOCKING AND STRAPPING

.1 Install furring and blocking as required to space out and support casework, cabinets, toilet and bath accessories, recessed panels and cabinets for work of Electrical and Mechanical Divisions, and other work as required, which includes, but is not limited to the following:
  .1 At vanity tops and counter tops/worktops provide 38 x 140 wood blocking between steel studs at each metal bracket and at each end of vanity top and counter top/worktops.
  .2 At all toilet and bath accessories provide wood blocking between studs, as required.
  .3 Generally both vertical and horizontal blocking will be required to secure 100 mm deep accessories recessed in 100 mm thick walls.
  .4 At all wall-hung lavatories provide 37 x 285 wood blocking between double, back to back, studs to receive steel hanger.
  .5 At cabinetwork provide 38 x 140 blocking between studs, as required to support cabinetwork.
  .6 At wall mounted handrails provide 38 x 140 blocking between studs, located at mounting brackets for handrail.
  .7 At zone valve boxes, fire hose cabinets and fire-extinguisher cabinets provide blocking between studs as required to support and secure cabinets.
  .8 At lockers, as required to secure lockers to wall.
  .9 At all wall mounted doorstops.
  .10 At ALL other wall-mounted items provide wood blocking between studs as required.
.2 Install furring to support any sheathing type material where there is no blocking and where sheathing is not suitable for direct nailing.
.3 Spacing of furring as required to provide adequate support for material.
.4 Install strapping as indicated or required to support panel material, except where metal strapping is specifically indicated.
.5 Align and plumb faces of furring and blocking to tolerance of 1:600.

3.6 NAILING STRIPS, FRAMING AND ROUGH BUCKS

.1 Install rough bucks, nailers and linings to rough openings as required to provide backing for window frames, door frames and other work.
.2 Install continuous pressure treated wood framing as indicated under all window stools.
.3 Install sloped sill framing and water stop as required by NBCC, latest edition.
.4 Countersink bolts where necessary to provide flush surface.

3.7 FASTENERS

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
.2 Provide minimum three (3) 50 mm nails at each end to secure blocking between studs.
.3 Countersink bolts where necessary to provide clearance for other work.
.4 Screws for fastening pressure treated lumber to be ceramic coated.

3.8 EQUIPMENT BACKBOARDS

.1 Provide backboards for mounting equipment. Use 19mm thick DFP.G1S on 19 x 38mm furring around perimeter and at maximum 300mm intermediate spacing.
.2 Supply and install these backboards where indicated or directed by Mechanical and Electrical Division.
.3 For bidding purposes, include for the following, cut to size required:
  .1 Electrical Divisions: two (2) 1219 x 2438.
  .2 Mechanical Divisions: two (2) 1219 x 2438.

3.9 ERECTION TOLERANCES

.1 Framing Members: <6 mm / <1/4 inch from true position, maximum.

.2 Surface Flatness of Floor: <2 mm in 1 m / <1/4 inch in 10 ft maximum, and <13 mm in 9 m / <1/2 inch in 30 ft maximum.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 - Rough Carpentry.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CSA O80 Series-97(R2002), Wood Preservation.
- .2 CAN/CSA-O86-01, Engineering Design in Wood.
- .3 CAN/CSA-O141-91(R1999), Softwood Lumber.
- .4 CSA S307-M1980(R2001), Load Test Procedure for Wood Roof Trusses for Houses and Small Buildings.
- .5 CSA S347-99(R2004), Method of Test for Evaluation of Truss Plates Used in Lumber Joints.
- .6 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.

.2 National Lumber Grades Authority (NLGA)
- .1 NLGA-03, Standard Grading Rules for Canadian Lumber.

.3 Truss Plate Institute of Canada (TPIC)
- .1 TPIC - 1996 (R2001), Truss Design Procedures and Specifications for Light Metal Plate Connected Wood Trusses (Limit States Design).

1.3 DESIGN REQUIREMENTS

.1 Design light metal plate connected wood trusses in accordance with TPIC truss design procedures for wood truss chords and webs in accordance with engineering properties in CAN/CSA-O86 and design roof trusses, bracing, bridging and connectors and roof joists in accordance with CAN3-086.1, to safely carry live loads, snow and drift loads for building locality as ascertained by NBC Climatic Information for Building Design in Canada, and minimum uniform and minimum concentrated loading stipulated in NBC commentary.

.2 Design trusses, bracing in accordance with CAN/CSA-O86.1 and/or for loads indicated.

.3 Limit live load deflection to 1/360th of span where plaster ceilings are hung directly from trusses.

.4 Limit live load deflections to 1/180th of span unless otherwise specified or indicated.

.5 Design for transportation, lifting and final design requirements.

1.4 QUALITY ASSURANCE

.1 Qualifications:
- .1 Fabricator for trusses to show evidence of quality control program such as provided by regional wood truss associations, or equivalent.
- .2 Fabricator for welded steel connections to be certified in accordance with CSA W47.1.

.2 Pre-Installation Meeting:
- .1 Attend pre-installation meeting one week prior to beginning work of this Section.
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordination with other building subtrades.

.3 Health and Safety:
- .1 Do construction in accordance with Division 01 - General Requirements.

1.5 SUBMITTALS

.1 Submittals in accordance with Division 01 - General Requirements.

.2 Shop Drawings:
- .1 Each shop drawing submission showing connection details to be signed and stamped by professional engineer registered or licensed in provinces of Prince

Edward Island, Canada. Engineer to carry a minimum of $2,000,000 professional liability insurance.

.2 Indicate special structural application and specification as according to local authorities having jurisdiction.

.3 Indicate species, sizes, and stress grades of lumber used as truss members. Show pitch, span, camber, configuration and spacing of trusses. Indicate connector types, thicknesses, sizes, locations and design value. Show bearing details. Indicate design load for members.

.4 Submit stress diagram or print-out of computer design indicating design load for truss members. Indicate allowable load and stress increase.

.5 Indicate arrangement of webs or other members to accommodate ducts and other specialties.

.6 Show location of lateral bracing for compression members.

.7 Show lifting points for handling and erection.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, handle, store and protect materials in accordance with Division 01 - General Requirements.

.2 Store trusses on job site in accordance with manufacturer's instructions. Provide bearing supports and bracings. Prevent bending, warping and overturning of trusses.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.

.2 Place in appropriate on-site bins in accordance with Waste Management Plan.

.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 MATERIALS

.1 Lumber: spruce species, No 1 grade, softwood, S4S, with maximum moisture content of 19% at time of fabrication and to following standards:

.1 CAN/CSA-O141.

.2 NLGA (National Lumber Grading Association), Standard Grading Rules for Canadian Lumber.

.2 Fastenings: to CAN/CSA-O86.

.3 Roof truss anchors:

.1 Purpose-made for securing roof truss to a double plate, hot-dip galvanized steel, 1.2mm base thickness, pre-drilled for nails.

.2 Acceptable Material:

.1 Simpson "Strong Tie".

2.2 FABRICATION

.1 Fabricate wood trusses in accordance with reviewed shop drawings.

.2 Provide for design camber and roof slopes when positioning truss members.

.3 Connect members using galvanized metal connector plates.

.4 Provide web stiffeners in accordance with joist manufacturer's recommendations. Nail in place in accordance with joist manufacturer's recommendations.

2.3 SOURCE QUALITY CONTROL

.1 Identify lumber by grade stamp of an agency certified by Canadian Lumber Standards Administration Board.

.2 Certify by agency accredited by Standards Council of Canada that preservative treated wood is in accordance with CSA O80 Series.

3 Execution

3.1 ERECTION

.1 Erect wood trusses as indicated.
.2 Handling, installation, erection, bracing and lifting in accordance with manufacturers instructions.
.3 Make adequate provisions for handling and erection stresses.
.4 Exercise care to prevent out-of-plane bending of trusses.
.5 Install temporary horizontal and cross bracing to hold trusses plumb and in safe condition until permanent bracing and decking are installed.
.6 Install permanent bracing in accordance with approved shop drawings, prior to application of loads to trusses.
.7 Do not cut or remove any truss material without approval of Consultant.

3.2 CLEANING

.1 Remove surplus materials, excess materials, rubbish, tools and equipment on completion of installation.

END OF SECTION

This page intentionally left blank

1 General

1.1 SECTION INCLUDES

.1 Standing and running trim.
.2 Fasteners and adhesives.

1.2 RELATED SECTIONS

.1 Section 06 41 00 - Architectural Wood Casework
.2 Section 07 92 10 - Joint Sealing
.3 Section 08 11 14 - Metal Doors and Frames
.4 Section 08 14 10 - Flush Wood Doors
.5 Section 08 71 10 - Door Hardware
.6 Section 08 80 50 - Glazing
.7 Section 09 91 10 - Painting

1.3 REFERENCES

.1 American National Standards Institute (ANSI)
  .1 ANSI A208.1, Particleboard.
  .2 ANSI A208.2, Medium Density Fibreboard (MDF).
  .3 ANSI/HPVA HP-1, American National Standard for Hardwood and Decorative Plywood
.2 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
  .1 Architectural Woodwork Quality Standards, most recent edition.
.3 Canadian General Standards Board (CGSB)
  .1 .1 CAN/CGSB-11.3, Hardboard.
.4 Canadian Standards Association (CSA)
  .1 CSA B111, Wire Nails, Spikes and Staples.
  .2 CSA O121, Douglas Fir Plywood.
  .3 CAN/CSA O132.2 Series 90 - Wood Flush doors.
  .4 CAN/CSA O141, Softwood Lumber.
  .5 CSA O151, Canadian Softwood Plywood.
  .6 CSA O153, Poplar Plywood.
.5 National Lumber Grades Authority (NLGA)
  .1 Standard Grading Rules for Canadian Lumber, most recent edition.
.6 National Hardwood Lumber Association (NHLA)
  .1 Rules for the Measurement and Inspection of Hardwood and Cypress, most recent edition.
.7 Door and Hardware Institute (DHI)
  .1 Recommended Locations for Doors and Hardware
  .2 Installation Guide for Doors and Hardware
  .3 Installation of Commercial Steel Doors and Frames
  .4 National Fire Protection Association
  .5 NFPA No. 80 - Fire Doors and Windows
.8 ASTM International:
  .1 ASTM D792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of plastics by Displacement.
  .2 ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 QUALITY ASSURANCE

.1 Lumber by grade stamp of agency certified by Canadian Lumber Standards Accreditation Board (CLSAB).
.2 Plywood, particleboard, OSB and wood based composite panels to CSA and ANSI standards.

.3 Wood fire rated frames and panels: listed and labelled by an organization accredited by Standards Council of Canada to CAN4 S104 and CAN/ULC-S105.

1.5 SUBMITTALS

.1 Indicate details of construction, profiles, jointing, fastening and other related details.
.2 Indicate materials, thicknesses, finishes and hardware.
.3 Shop Drawings:
  .1 Indicate details of construction, profiles, jointing, fastening and other related details.
  .2 Indicate all materials, thicknesses, finishes and hardware.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, handle, store and protect materials in accordance with Division 01 - General Requirements.
.2 Protect materials against dampness during and after delivery.
.3 Store materials in ventilated areas, protected from extreme changes of temperature or humidity.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Place in appropriate on-site bins in accordance with Waste Management Plan.
.2 Set aside damaged wood and dimensional lumber off-cuts for approved alternative uses (e.g. bracing, blocking, cripples, bridging).
.3 Collect and separate for disposal waste material generated by this Section.
.4 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 LUMBER MATERIAL

.1 Softwood lumber: unless specified otherwise, S4S, moisture content 19% or less in accordance with following standards:
  .1 CAN/CSA O141.
  .2 NLGA Standard Grading Rules for Canadian Lumber.
  .3 AWMAC premium grade, moisture content as specified.
.2 Machine stress rated lumber is acceptable for all purposes.
.3 Hardwood lumber: moisture content 10% or less in accordance with following standards:
  .1 National Hardwood Lumber Association (NHLA).
  .2 AWMAC custom grade, moisture content as specified.

2.2 PANEL MATERIAL

.1 Panel materials to be urea-formaldehyde free.
.2 Douglas fir plywood (DFP): to CSA O121, standard construction.
.3 Canadian softwood plywood (CSP): to CSA O151, standard construction.
.4 Hardwood plywood: to ANSI/HPVA HP-1.
.5 Poplar plywood (PP): to CSA O153, standard construction.
.6 Hardboard: to CAN/CGSB-11.3.
.7 Medium density fibreboard (MDF): to ANSI A208.2, density 769 kg/m3.
.8 Decorative overlaid composite panels.
  .1 Decorative overlay, heat and pressure laminated with suitable resin to 12.7 mm thick particleboard MDF core.
  .2 Overlay bonded to both faces where exposed two sides, and when panel material require surface on one side only, reverse side to be overlaid with a plain (buff) balancing sheet.

.3 Edge finishing: matching melamine and polyester overlay edge strip with self-adhesive.

2.3 ACCESSORIES

.1 Nails and staples: to CSA B111; galvanized to CAN/CSA-G164 for exterior work, interior humid areas and for treated lumber; plain finish elsewhere.
.2 Wood screws: plain, type and size to suit application.
.3 Splines: wood.
.4 Adhesive: recommended by manufacturer.
.5 Use least toxic sealants, adhesives, sealers, and finishes necessary to comply with requirements of this section.
.6 Door silencers; Single stud rubber/neoprene type.
.7 Wood Handrails: maple with clear finish, max 43mm dia., size and extent per drawings. Install on steel brackets per Drawings.

3 Execution

3.1 INSTALLATION

.1 Do finish carpentry to Quality Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC), except where specified otherwise.
.2 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.
.3 Form joints to conceal shrinkage.

3.2 CONSTRUCTION

.1 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 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round cleanly cut hole and plug with wood plug to match material being secured.
  .4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.
.2 Standing and running trim
  .1 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° scarf type joint.
  .4 Install door and window trim in single lengths without splicing.

END OF SECTION

This page intentionally left blank

1 General

1.1 SECTION INCLUDES

.1 Cabinet units.
.2 Countertops.
.3 Cabinet hardware.

1.2 RELATED SECTIONS

.1 Section 08 80 00 - Glazing
.2 Section 09 91 00 - Painting

1.3 REFERENCES

.1 ANSI A135.4-2012 - Basic Hardboard Standard.
.2 ASTM A153/A153M-09 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
.3 AWMAC - Architectural Woodwork Standards (AWS) – Edition 2, 2014.
.4 BHMA A156.9-2010 - Cabinet Hardware.
.5 CAN/ULC-S102-10 - Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
.6 NEMA LD 3-2005 - High Pressure Decorative Laminates (HPDL).
.7 NPA A208.1-2009 - Particleboard.
.8 NPA A208.2-2009 - Medium Density Fibreboard (MDF) for Interior Applications.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Project Meetings as per Division 01 - General Requirements.
.2 Pre-installation Meetings: Convene two (2) weeks before starting work of this section.

1.5 SUBMITTALS FOR REVIEW

.1 As per Division 01 - General Requirements.
.2 Product Data:
    .1 Provide data for hardware accessories.
.3 Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.

1.6 SUBMITTALS FOR INFORMATION

.1 As per Division 01 - General Requirements.

1.7 CLOSEOUT SUBMITTALS

.1 As per Division 01 - General Requirements.

1.8 QUALITY ASSURANCE

.1 Perform fabrication and installation to Custom grade.
.2 Manufacturers Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.
.3 Installers Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by the fabricator.

1.9 DELIVERY, STORAGE, AND PROTECTION

.1 As per Division 01 - General Requirements, transport, handle, store, and protect products.
.2 Deliver materials after area of operation is fully enclosed; plaster and concrete work dry and area broom clean.

.3 Protect units from moisture damage as specified in AWS.

1.10 SITE CONDITIONS

.1 Ambient Conditions:
- .1 Ensure project conditions conforms to requirements of AWS Section 2.
- .2 Moisture contents of wood at time of installation shall be for interior locations at established Optimum Moisture Content and Optimum Indoor Relative Humidity as outlined in AWS Section 2.

2 Products

2.1 LUMBER MATERIALS

.1 Lumber: Maximum moisture content of Hardwood and Softwood, lumber grades as required for 9% grade specified.

2.2 SHEET MATERIALS

.1 Wood Sheet Materials: Panel grades as required for custom grade specified.
- .1 Hardwood / Softwood Plywood: Suitable for transparent finish.
- .2 Particleboard: NPA A208.1; composed of wood chips, medium density, moisture resistant, Class 1 fire retardant; of grade to suit application; sanded faces.
- .3 Medium Density Fibreboard (MDF): NPA A208.2; composed of wood fibres, made with waterproof binders containing no urea-formaldehyde resin, moisture resistant; of grade to suit application; sanded faces.
- .4 Hardboard: ANSI A135.4; heat and pressure consolidated inter-felted lignocellulosic fibre board, unperforated, Service Tempered grade, S2S

2.3 PLASTIC LAMINATE MATERIALS

.1 Acceptable Manufacturers:
- .1 Refer to the Material / Finish schedule.

.2 High Pressure Decorative Laminate (HPDL): NEMA LD 3, Class 1 flame spread rated, minimum 0.7 mm thick.

.3 Laminate Backing Sheet (BKL): NEMA LD 3, 0.7 mm thick, Class 1 flame spread rated, undecorated, colour to match face laminate.

.4 Thermofused Decorative Overlay (Melamine or LPDL): NEMA LD 3, low pressure, melamine-impregnated decorative paper thermally fused to MDF core.

.5 Cabinet Liner (CLS): NEMA LD 3, not less than 0.5 mm thick, colour White.

2.4 EDGEBANDS

.1 Plastic Edge Trim (PVC): Extruded flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
- .1 Thickness: 3mm x material thickness.
- .2 Colour: Refer to the Material / Finish schedule.

2.5 ACCESSORIES

.1 Adhesive: Type recommended by AWS to suit application and type recommended by laminate manufacturer to suit application.

.2 Fasteners: Galvanized steel to ASTM A153/A153M of size and type to suit application.

2.6 GLASS

.1 Glass: Supplied and installed by Architectural Wood Casework Contractor, to be as specified in Section 08 80 00 - Glazing.

2.7 HARDWARE

.1 Hardware: BHMA A156.9 Meeting the requirements of AWS for grade specified.

.2 Drawer and Door Pulls: D-Pull, nickel finish; 97mm centres
  .1 Manufacturer / Product: Onward / 1080 SCV
.3 Cam Lock: Chrome
  .1 Manufacturer / Product: Richelieu / BP140101140
.4 Drawer Slides: Zinc, ball bearings separating tracks, full extension soft-closing type,
  .1 Manufacturer / Product: Worth / DSPRO100SC
.5 Hinges: Nickel Plated, soft-closing type
  .1 Manufacturer / Product: Blum / 120° Full Overlay
.6 Shelf Pilasters: 16mm U-Shaped, Zinc
  .1 Manufacturer / Product: Richelieu / #2552G96
.7 Pilaster clips: 16mm, Zinc
  .1 Manufacturer / Product: Richelieu / #256ZG
.8 Grommets: Plastic, black, 600mm dia.
  .1 Manufacturer / Product: Richelieu / 60091090

2.8 PLASTIC LAMINATE CASEWORK

.1 Casework Construction: Meeting grade as specified.
  .1 Type: flush overlay cabinet and door interface.
.2 Exposed Surfaces:
  .1 Drawers and Drawer Fronts: HPDL
  .2 Interior surfaces: HPDL
  .3 Edges: PVC.
.3 Semi-exposed Surfaces:
  .1 Surfaces (other than drawer bodies): LPDL colour White.
  .2 Adjustable Shelves: LPDL
  .3 Edges: PVC.
  .4 Drawer Sides, fronts, and Backs: Baltic Birch Plywood, 13mm, dado construction
  .5 Drawer Bottoms less than wide 762mm: Baltic Birch Plywood, 6mm
  .6 Drawer Bottoms 762mm wide or greater: Baltic Birch Plywood, 13mm

2.9 PLASTIC LAMINATE COUNTERTOPS

.1 Meeting the requirements of grade as specified for counter construction supplemented as follows:
.2 High Pressure Decorative Laminate (HPDL):
  .1 Product: Refer to the Material / Finish schedule.
.3 Core Material: Baltic Birch Plywood.
.4 Backsplash: Butt joint style, height 100 mm
.5 Edge Treatment: PVC

2.10 FABRICATION

.1 Shop prepare and identify components for matching during site assembly.
.2 Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.
.3 When necessary to cut and fit on site, provide materials with ample allowance for site cutting and scribing.

3 Execution

3.1 EXAMINATION

.1 As per Division 01 - General Requirements: verify existing conditions before starting work.
.2 Verify that field measurements are as indicated on Shop Drawings instructed by the fabricator.
.3 Verify adequacy of backing and support framing.
.4 Verify mechanical, electrical, plumbing, HVAC and other building components, affecting work in this Section are in place and ready.

3.2 INSTALLATION

.1 Install Work to grade as indicated.
.2 Set and secure casework in place; rigid, plumb, and level.
.3 Use fixture attachments in concealed locations for wall mounted components.
.4 Use concealed joint fasteners to align and secure adjoining cabinet units and counter tops.
.5 Carefully scribe casework abutting other components, with maximum gaps of 1 mm. Do not use additional overlay trim for this purpose.
.6 Secure casework and counter bases to floor using appropriate angles and anchorages.
.7 Countersink mechanical fasteners used at exposed and semi-exposed surfaces, excluding installation attachment screws and those securing casework end to end.
.8 Cut equipment cut-outs shown on plans using templates provided.
.9 Site glaze glass materials using the interior dry method specified in Section 08 80 00 - Glazing.

3.3 PREPARATION FOR SITE FINISHING

.1 Seal surfaces in contact with cementitious materials.
.2 Sand work smooth and set exposed nails and/or screws.
.3 Apply wood filler in exposed nail and/or screw indentations.
.4 On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.

3.4 ADJUSTING

.1 Test installed work for rigidity and ability to support loads.
.2 Adjust hardware to function smoothly and correctly.
.3 Fill and retouch nicks, chips, and scratches; replace unrepairable damaged items.

3.5 CLEANING

.1 As per Division 01 - General Requirements: cleaning of installed work.
.2 Clean casework, counters, glass, hardware, fittings, and fixtures of dust, pencil and ink marks and broom clean the area of operation.

3.6 SCHEDULES

.1 Refer to drawings.

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 Fibreglass reinforced plastic panels and trim.

1.2 RELATED SECTIONS

.1 Section 09 51 00 - Acoustical Ceilings: Ceiling suspension system.

1.3 REFERENCE STANDARDS

.1 ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics 2010, with Editorial Revision (2015).
.2 ASTM D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of Barcol Impressor 2013a.
.3 ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2016.
.4 ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels 2017.
.5 CAN/ULC S102 - Method of Testing for Surface Burning Characteristics of Building Materials and Assemblies 2018.
.6 CFIA - Accepted Construction Materials, Packaging Materials and Non Food Chemical Products Listings Current.
.7 ISO 846 - Plastics -- Evaluation of the action of microorganisms 1997.
.8 ISO 2812-1 - Paints and varnishes -- Determination of resistance to liquids -- Part 1: Immersion in liquids other than water 2017.

1.4 SUBMITTALS

.1 See Division 01 - General Requirements, for submittal procedures.
.2 Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colours available; and installation instructions.
.3 Maintenance Materials: Provide the following for Owner's use in maintenance of project.
    .1 See Division 01 - General Requirements, for additional provisions.
    .2 Extra Panels: Quantity equal to 5 percent of total installed.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

2 Products

2.1 MANUFACTURERS

.1 Fibreglass Reinforced Plastic Panels:
    .1 Nudo Products Inc.: FiberLite FRP
    .2 Marlite, Standard FRP.

2.2 PANEL SYSTEMS

.1 Panels:
    .1 Panel Size: 1.2 by 2.4 m.
    .2 Panel Thickness: 2.5 mm / 0.090".
    .3 Surface Design: Embossed / textured.
    .4 Colour: Refer to Material / Finish Schedule.
    .5 Attachment Method: Adhesive only, trim joints.
    .6 Rating: UL Class A Interior Finish Material when tested in accordance with CAN/ULC S102

2.3 MATERIALS

.1 Panels: Fibreglass reinforced plastic (FRP), complying with ASTM D5319.
  .1 Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with CAN/ULC S102.
  .2 Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  .3 Scratch Resistance: Barcol hardness score greater than 35, when tested in accordance with ASTM D2583.
  .4 Surface Characteristics and Cleanability: Provide products that are smooth, durable and easily cleanable in compliance with CFIA, listing of acceptable construction materials.
  .5 Chemical Cleanability: Excellent chemical resistance to common cleaners and detergents when tested in accordance with ISO 2812-1.
  .6 Biological Resistance: Rating of 0, when tested in accordance with ISO 846.
.2 Trim: Vinyl; colour coordinating with panel.
.3 Adhesive: Type recommended by panel manufacturer.
.4 Sealant: Type recommended by panel manufacturer; white, colour coordinating with panel.

3 Execution

3.1 EXAMINATION

.1 Verify existing conditions and substrate flatness before starting work.
.2 Verify that substrate conditions are ready to receive the work of this section.
.3 Verify that layout of hangers will not interfere with other work; make adjustments in layout as necessary.
.4 Do not begin ceiling installation until services above ceiling are complete except for final trim

3.2 INSTALLATION - WALLS

.1 Install panels in accordance with manufacturer's instructions.
.2 Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
.3 Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
.4 Apply panels to wall with seams plumb and pattern aligned with adjoining panels.
.5 Install panels with manufacturer's recommended gap for panel field and corner joints.
.6 Place trim on panel before fastening edges, as required.
.7 Fill channels in trim with sealant before attaching to panel.
.8 Install trim with adhesive as required.
.9 Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
.10 Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION

1 General

1.1 DESCRIPTION

.1 This section specifies the requirements for the supply and installation of the elements required for waterproofing below grade structures.
.2 Waterproofing system: Self-adhesive SBS modified bitumen membrane.

1.2 RELATED SECTIONS

.1 Section 07 92 00 - Joint Sealants.

1.3 SUBMITTALS

.1 Submit shop drawings in accordance with Division 01 - General Requirements.
.2 Submit two (2) copies of the most current technical data sheets. These documents must describe the physical properties of the material.

1.4 QUALITY ASSURANCE

.1 Manufacturer Qualifications:
  .1 The manufacturer of elastomeric bitumen products will provide proof of ISO 9001 and ISO 14001 certifications.
.2 Contractor Qualifications:
  .1 Waterproofing work shall be performed only by skilled applicators, employed by an installation contractor operating all adequate and necessary equipment to execute such work in accordance with the manufacturer's recommendations and recognized standards.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, handle, store and protect materials in accordance with Division 01 - General Requirements.
.2 Store materials in accordance with manufacturer's written instructions.
.3 Rolls of materials should be handled with care and proper equipment.
.4 Rolls of materials shall be carefully stored and adequately protected in accordance with the manufacturer's recommendations.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 WATERPROOFING MEMBRANE

.1 Description: A self-adhesive waterproofing membrane composed of SBS modified bitumen and a Tri-Laminate Woven Polyethylene facer. The self-adhesive side is covered by a silicone release sheet.
.2 Characteristics:
  .1 Thickness: 1.5 mm
  .2 Roll Size: Width: 1 m / Length: 18.7 m
  .3 Strain energy (kN/m): (MD) = 3.1 (XD) = 1.7
  .4 Ultimate elongation (%): (MD) =40 (XD) =25
  .5 Static puncture resistance (N): 400
  .6 Tear resistance (N): (MD) = 375 (XD) = 400

.7 Tensile strength (kN/m): (MD) = 11.3 (XD) = 15.4

.3 Acceptable material:

.1 COLPHENE 3000 by Soprema.

2.2 PRIMER FOR SELF-ADHESIVE MEMBRANES

.1 Description: Primer composed of SBS synthetic rubber, adhesive resins and volatile solvents. Used as primer to improve the adhesion of self-adhesive membranes.

.2 Acceptable Material:

.1 Elastocol Stick by Soprema

2.3 ACCESSORIES

.1 Waterproofing Mastic

.1 Description: A black, solvent-based mastic containing SBS modified bitumen, fibres and mineral fillers.

.2 Acceptable material:

.1 SOPRAMASTIC by Soprema

.2 Protection / Insulation Board:

.1 Refer to Section 07 21 13 - Board Insulation.

3 Execution

3.1 EXAMINATION AND PREPARATION OF SURFACES

.1 Surface examination and preparation must be completed in conformance with manufacturer's recommendations.

.2 Before waterproofing work begins, the Owner's Representative and the membrane Contractor's Foreman will inspect and approve substrate condition and ensure that related work has been properly executed. If necessary, a non-conformity notice will be issued to the Contractor so that required corrections can be made. The start of the membrane application will mean that substrate conditions are acceptable for work completion.

.3 Before commencing work, all surfaces must be smooth, dry, clean and free of ice and debris as per manufacturer's recommendations.

.4 No materials will be installed during rain or snowfall.

.5 Verify the compatibility of all membrane components with curing compounds, coatings or other materials which are already installed on the surfaces to be treated.

.6 Any cracks over 3 mm wide should be reported to the design professional. After approval from the qualified authority, the crack should be filled in with waterproofing mastic. A 150 mm (6 inches) wide strip of membrane should be installed, centered over the crack.

3.2 METHOD OF EXECUTION

.1 Work shall be performed on a continuous basis as surface and weather conditions allow.

.2 Adjoining surfaces shall be protected against any damage that could result from the waterproofing installation.

3.3 EQUIPMENT

.1 Maintain all equipment and tools in good working order.

3.4 PRIMER APPLICATION

.1 Surface where membrane is applied shall receive an SBS synthetic rubber primer coating at the rate of: (porous surfaces: 0.3 to 0.5 L/m2, non-porous surfaces: 0.1 to 0.25 L/m2). . If not covered the same day, primed surfaces must be re-primed.

3.5 WATERPROOFING MEMBRANE INSTALLATION

.1 Select the proper product according to temperatures during application. For membrane applications at temperatures below 10º C, contact your local Soprema representative.

.2 All small protrusions (pipes, etc.) through the waterproofing membrane, should be pre-stripped with a membrane and sealed with waterproofing mastic.
.3 To begin application, align the first roll of membrane to a previously drawn chalk line.
.4 All edges must be pre-stripped with a 150 mm (6 in.) wide strip of membrane centered on the corner. This membrane must be installed in direct contact with the substrate not leaving any voids under the membrane strip.
.5 Install the membrane onto the primed surface by peeling back the paper backing on the underside and adhering the membrane to the surface.
.6 Subsequent rolls must be installed in the same manner and should be aligned with the preceding roll with a side lap of at least 75 mm. End laps must be overlapped at least 150 mm.
.7 Holes and tears in the membrane must be repaired with the appropriate membrane material. The repair must exceed the affected surface area by at least 75 mm. The membrane piece applied for the repair must be sealed around its edges with mastic.
.8 Use a roller approved by manufacturer to apply pressure over the entire surface of the membrane to ensure perfect adhesion.
.9 The Contractor shall verify meticulously the membrane installation at the end of each day of work and before backfilling.
.10 All inside corner overlaps should be sealed with a bead of mastic after membrane installation.
.11 The uppermost edge of the membrane is to be mechanically fastened to the concrete substrate using applicable fasteners and termination bars.
.12 Apply mastic on the top edge of membrane to prevent water infiltration.
.13 Any waterproofing membrane left exposed after backfilling shall be protected from ultra violet and mechanical damages.

3.6 INSULATION INSTALLATION- PERIMETER FOUNDATION

.1 Install the panels vertically or horizontally on the foundation wall so as to minimize the number of joints.
.2 Place the panels by offsetting vertical joints and abut the panels to each other perfectly to ensure continuous thermal insulation.
.3 Cut and adjust the insulating panels around pipes, electrical and mechanical elements, openings and any other penetrations.
.4 Stop the insulation at least 75 mm (3") around devices that emit heat.
.5 When another layer of insulation is required, it must be installed with staggered vertical and horizontal joints.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 30 00 - Cast-in-Place Concrete.
.2 Section 06 10 00 - Rough Carpentry.
.3 Section 07 21 16 - Blanket Insulation.
.4 Section 07 26 00 - Vapor Retarders.
.5 Section 09 21 16 - Gypsum Board Assemblies.
.6 Section 31 23 00 - Excavation and Fill.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
  .1 ASTM E96-00e1, Test Methods for Water Vapor Transmission of Materials.
  .2 ASTM C208-95(R2001), Specification for Cellulosic Fiber Insulating Board.
  .3 ASTM C591-01, Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
  .4 ASTM C612-00a, Specification for Mineral Fiber Block and Board Thermal Insulation.
  .5 ASTM C165 (2012), Standard Test Method for Measuring Compressive Properties of Thermal Insulations.
  .6 ASTM C665 (2011), Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
  .7 ASTM C728-97e1, Specification for Perlite Thermal Insulation Board.
  .8 ASTM C1126-00, Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation.
  .9 ASTM C1289-02, Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
  .10 ASTM C1338 (2008), Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
.2 Canadian General Standards Board (CGSB).
  .1 CGSB 71-GP-24M-77(R1983), Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation.
.3 Underwriters Laboratories of Canada (ULC).
  .1 CAN/ULC-S102 (2010), Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
  .2 CAN/ULC-S604-91, Type A Chimneys.
  .3 CAN/ULC-S701-01, Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
  .4 CAN/ULC-S702 (2012), Standard for Thermal Insulation Mineral Fibre for Buildings.
  .5 CAN/ULC-S704-01, Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 WALL RIGID INSULATION

.1 Standard of Acceptance: IKO Ener-Air, Polyisocyanurate.
  .1 Location: Exterior walls.
  .2 Thickness & R-Value per assemblies.

.3 Compressive Strenghth: 16 PSI min.

2.2 CONCRETE FACED FOUNDATION INSULATION

.1 50mm thick insulation, extruded polystyrene.
.2 Latex modified concrete surface, 8mm thick factory bonded to insulation.
.3 Tongue and groove along longitudinal foam edges.
.4 Butt joint lateral edges.
.5 Galvanized steel wall attachments with corrosion proof masonry fasteners.
.6 Install from underside of wall cladding / siding and extend minimum 300mm / 12" below grade.
.7 Acceptable Material:
  .1 Tech-Crete Processors Ltd.
  .2 WallGuard by T. Clear Corporation.

2.3 FOUNDATION WALLS AND CONCRETE SLABS ON GRADE

.1 Extruded polystyrene to CAN/ULC S701-97, Type IV, ship lapped, to thickness indicated.
.2 Minimum compressive strength: 210 kPA (30 psi).
.3 Thermal Resistance: R Value per inch = 5.0.
.4 Compressive Strength: 30 PSI min.
.5 Acceptable Material:
  .1 Celfort Celfortec-300
  .2 Dow Styrofoam SM.
  .3 Dow Styrofoam High Load 60.
  .4 Sopra-XPS 30 by Soprema.

2.4 ADHESIVE

.1 Synthetic rubber base insulated Type A adhesive having a moisture permeability of 1.71 ng/Pa.s.m2.
.2 Insulation clips: impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self locking type.

2.5 ACCESSORIES

.1 Mechanical fasteners in accordance with insulation manufacturer's written recommendations.
.2 Insulation clips: in accordance with manufacturer's written recommendations.
.3 Foundation sealing compound: Bitumen sealing compound.
.4 Adhesive: All purpose construction adhesive in accordance with insulation manufacturer's written recommendations.

3 Execution

3.1 EXAMINATION

.1 Examine substrates and immediately inform Consultant in writing of defects.
.2 Prior to commencement of work ensure: substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.3 WORKMANSHIP

.1 Install insulation after building substrate materials are dry.
.2 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.
.4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN4-S604 type A chimneys.
.5 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
.6 Offset both vertical and horizontal joints in multiple layer applications.
.7 Do not enclose insulation until it has been inspected and approved by Consultant.

3.4 RIGID INSULATION INSTALLATION

.1 Apply adhesive in accordance with manufacturer's recommendations.
.2 Embed insulation boards into vapour barrier type adhesive, applied as specified, prior to skinning of adhesive.
.3 In addition to adhesive, install insulation boards with insulation clips and disk, per manufacturer requirements.
.4 Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 150 mm wide 0.15 mm modified bituminous membrane over expansion and control joints using compatible adhesive and primer before application of insulation.

3.5 UNDERSLAB AND PERIMETER FOUNDATION INSULATION

.1 Under horizontal slab application: extend boards to the dimension indicated on the drawings. Lay boards on level compacted fill.
.2 Exterior vertical application: extend boards on exterior face of perimeter foundation wall with adhesive to the dimension indicated on the drawings.

3.6 WALL INSTALLATION

.1 Install insulation boards on outer surface of wall sheathing / membrane.

3.7 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

This page intentionally left blank

1 General

1.1 WORK INCLUDED

.1 Provide and install all thermal and sound insulation and accessories on the interior of the building between the steel studs and as indicated above ceiling necessary to complete all as shown on the drawings or specified.

1.2 RELATED REQUIREMENTS

.1 Section 06 10 00 - Rough Carpentry.
.2 Section 07 21 13 - Board Insulation.
.3 Section 07 26 00 - Vapor Retarders.

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
  .1 ASTM C167, Standard Test Method for Thickness and Density of Blanket or Batt Thermal Insulations.
  .2 ASTM C356, Standard Test Method for Linear Shrinkage of Performed High-Temperature Thermal Insulation Subjected to Soaking Heat.
  .3 ASTM C423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
  .4 ASTM C518, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
  .5 ASTM C553-02, Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
  .6 ASTM C665-01e1, Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
  .7 ASTM C1320-99, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
  .8 ASTM E90, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
  .9 ASTM E413, Classification for Rating Sound Insulation.
  .10 ASTM E1050, Standard Test Method for Impedance and Absorption of Acoustical Materials using a Tube, Two Microphones and a Digital Frequency Analysis System.
.2 Underwriters Laboratories of Canada (ULC).
  .1 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
  .2 CAN/ULC S114, Standard Method of Test for Determination of Non-Combustibility in Building Materials.
  .3 CAN/ULC S115, Standard Method of Test Firestop Systems.
  .4 CAN/ULC-S604-1991, Type A Chimneys.
  .5 CAN/ULC-S702-1997, Standard for Thermal Insulation Mineral Fiber for Buildings.

1.4 SUBMITTALS

.1 Make submittals in accordance with Contract conditions and Division 01 - General Requirements.
.2 Product Data: Submit project data including manufacturer's literature for insulation materials and accessories, indicating compliance with specified requirements and material characteristics.
  .1 Submit list on insulation manufacturer's letterhead of materials and accessories to be incorporated into the Work.
  .2 MSDS report.
  .3 Include product name.
  .4 Include preparation instructions and recommendations, installation methods and storage and handing requirements.

.5 Include contact information for manufacturer and their representative for this project.

.3 Field Reports:

.1 Submit manufacturer's field reports within three (3) days of each manufacturer representative's site visit and inspection.

.4 Insulation Installer Qualifications:

.1 Submit letter verifying insulation installer's experience with work similar to work of this Section.

1.5 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: Supply maintenance data for insulation materials for incorporation into manual specified in Division 01 - General Requirements.

.2 Record Documentation: In accordance with Division 01 - General Requirements.

.1 List materials used in insulation work.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver and acceptance requirements:

.1 Deliver material in accordance with Division 01 - General Requirements.

.2 Deliver materials and accessories in insulation manufacturer's original packaging with identification labels intact and in sizes to suit project.

.3 Ensure insulation materials are not exposed to moisture during delivery.

.4 Replace wet or damaged insulation materials.

.2 Storage and handling requirements: Store materials off ground in dry location and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

.1 Store in original packaging until installed.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.

.2 Place in appropriate on-site bins in accordance with Waste Management Plan.

.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 INSULATION - ACOUSTIC

.1 Acoustical and fire batt insulation for walls and floors to CAN/ULC S702, Type 1.

.1 Fire Performance:

.1 Non-combustibility: To CAN/ULC S114.

.2 Surface burning characteristics: To CAN/ULC S102.

.1 Flame spread: 0.

.2 Smoke developed: 0.

.2 Acoustical Performance:

.1 Airborne sound transmission loss: To ASTM E90.

.2 Rating sound insulation: To ASTM E413.

.3 Sound absorption co-efficients: To ASTM E423.

.4 Impedance and absorption of acoustic materials: To ASTM E1050.

.3 Acceptable Material:

.1 Rockwool, AFB, Acoustical Fire Batt.

2.2 INSULATION - THERMAL

.1 Thermal batt insulation for exterior stud walls: To CAN/ULC S702, Type 1.

.1 Fire performance:

.1 Non-combustibility: To CAN/ULC S114.

.2 Surface burning characteristics: To CAN/ULC S102.
.1 Flame spread: 0.
.2 Smoke developed: 0.
.3 Thermal Resistance: R Value per 152mm = 24.
.2 Acceptable Materials:
.1 EcoTouch - Owens Corning.
.2 Unfaced Fiber Glass Batts - Johns Manville.
.3 CertainTeed Insulation Canada.
.4 Knauf Insulation - Ecobatt Thermal.

2.3 INSULATION FOR FIRESTOPPING

.1 Insulation for firestopping installations to ASTM C612.
.1 Fire performance:
.1 Non-combustibility: To CAN/ULC S114.
.2 Surface burning characteristics: To CAN/ULC S102.
.1 Flame spread: 0.
.2 Smoke developed: 0.
.2 Acoustical Performance:
.1 Airborne sound transmission loss: To ASTM E90.
.2 Rating sound insulation: To ASTM E413.
.3 Sound absorption co-efficients: To ASTM E423.
.4 Impedance and absorption of acoustic materials: To ASTM E1050.
.3 Acceptable Material:
.1 Rockwool, AFB, Acoustical Fire Batt.

2.4 ACCESSORIES

.1 Staples: 12.7mm minimum leg.
.2 Tape: as recommended by manufacturer.
.3 Mechanical fasteners in accordance with insulation manufacturer's written recommendations.
.4 Acoustical sealant in accordance with Section 07 92 19 - Acoustical Joint Sealants.
.5 Firestopping materials in accordance with Section 07 84 00 - Firestopping.

3 Execution

3.1 INSULATION INSTALLATION

.1 Install thermal or acoustic insulation between studs to maintain continuity of thermal or acoustical protection to building elements and spaces.
.2 Install acoustic insulation above ceiling at locations shown.
.3 Install insulation in areas as indicated. Friction-fit in position installed as recommended by manufacturer.
.4 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
.5 Do not compress insulation to fit into spaces.
.6 Keep insulation minimum 75mm from heat emitting devices such as recessed light fixtures, and minimum 50mm from sidewalls of CAN/CGA-B149.1 and CAN/CGA-B149.2 Type B vents.
.7 Seal joints with acoustical joint sealant.
.8 Do not enclose insulation until it has been inspected and approved by Consultant.
.9 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 Attic: Blown insulation pneumatically placed into truss / rafter spaces through access holes.

1.2 REFERENCE STANDARDS

.1 ASTM C739 - Standard Specification for Cellulosic Fiber Loose-Fill Thermal Insulation 2021a.
.2 ASTM C764 - Standard Specification for Mineral Fiber Loose-Fill Thermal Insulation 2019.
.3 ASTM C1015 - Standard Practice for Installation of Cellulosic and Mineral Fiber Loose-Fill Thermal Insulation 2017.
.4 CAN/ULC S102 - Method of Testing for Surface Burning Characteristics of Building Materials and Assemblies 2018.
.5 CAN/ULC S102.2 - Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies 2018.
.6 CAN/ULC S114 - Test for Determination of Non Combustibility in Building Materials 2018.
.7 CAN/ULC S129 - Standard Method of Test for Smoulder Resistance of Insulation (Basket Method) 2015.
.8 CAN/ULC S703 - Standard for Cellulose Fibre Insulation for Buildings 2009 (R2015).

1.3 SUBMITTALS

.1 Refere to Division 01 - General Requirements, for submittal procedures.
.2 Product Data: Provide data on product characteristics, performance criteria, and limitations.
.3 Certificates: Certify that products of this section meet or exceed specified requirements.
.4 Manufacturer's Installation Instructions: Indicate procedure for preparation and installation.
.5 Installer's Qualification Statement.

1.4 QUALITY ASSURANCE

.1 Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

2 Products

2.1 MANUFACTURERS

.1 Standard of Acceptance:
  .1 Owens Corning’s, AttiCat, Expanding Blown-In Insulation
  .2 Substitutions: refer to Division 01 - General Requirements.

2.2 MATERIALS

.1 Applications: Provide blown insulation in attic, as indicated on Drawings.
.2 Blown Insulation: ASTM C764, fibreglass type, nodulated for pour and bulk for pneumatic placement.
  .1 Surface Burning: Flame Spread Rating (FSR) of 0, and Smoke Development Classification (SDC) of 5 or less, in accordance with CAN/ULC S102.2.
  .2 Flammability: Non-combustible in accordance with CAN/ULC S114.
  .3 Smoulder Resistance: 15 percent loss of mass or less in accordance with CAN/ULC S129.
  .4 Thermal Transmittance (U-value): 0.0389 W/sq m K, maximum.
  .5 Installed Thickness: As indicated on Drawings.
  .6 Thermal Resistance (R Value): As indicated on Drawings.
.3 Ventilation Baffles: Formed plastic.

3 Execution

3.1 EXAMINATION

.1 Verify that substrate and adjacent materials are dry and ready to receive insulation.
.2 Verify that light fixtures have thermal cut-out device to restrict over-heating in soffit or ceiling spaces.
.3 Verify spaces are unobstructed to allow for proper placement of insulation.

3.2 INSTALLATION

.1 Install insulation and ventilation baffle in accordance with ASTM C1015 and manufacturer's instructions.
.2 Place insulation pneumatically to completely fill rafter spaces.
.3 Place insulation against baffles, and do not impede natural attic ventilation to soffit.
.4 Place against and behind mechanical and electrical services within the plane of insulation.
.5 Completely fill intended spaces leaving no gaps or voids.

3.3 CLEANING

.1 Remove loose insulation residue.

3.4 SCHEDULES

.1 Refer to drawings for locations.

END OF SECTION

1 General

1.1 DESCRIPTION OF WORK

.1 The work of this Section involves the provisions of a sheet vapour seals in the following locations:
  .1 At entire warm side of exterior wall construction.
  .2 Between window frames and framing for window openings.
  .3 Between door frames and framing for door openings.
  .4 Slip sheet at concrete foundation wall.
  .5 Under slab vapour retarder.
  .6 All other locations where shown on drawings.

1.2 RELATED REQUIREMENTS

.1 Section 07 21 16 - Blanket Insulation
.2 Section 07 27 00 - Air Barriers
.3 Section 07 92 00 - Joint Sealants.
.4 Section 09 21 16 - Gypsum Board Assemblies
.5 Section 31 23 00 - Excavation and Fill.

1.3 REFERENCES

.1 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-51.34-M86, Vapor Barrier, Polyethylene Sheet, for Use in Building Construction.

1.4 PRODUCT DATA

.1 Submit product data in accordance with Division 01 - General Requirements.
.2 Submit product data sheets for sheet vapour retarders. Include the following:
  .1 Product characteristics.
  .2 Performance criteria.
  .3 Limitations.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.
.4 Place materials defined as hazardous or toxic waste in designated containers.
.5 Use the least toxic sealants and adhesives necessary to comply with requirements of this section.
.6 Place used hazardous sealant tubes and adhesive containers in areas designated for hazardous materials.

2 Products

2.1 SHEET VAPOUR BARRIER

.1 Polyethylene film: 6mil thick above grade, 10mil thick below grade

2.2 ACCESSORIES

.1 Joint sealing tape: air resistant pressure sensitive adhesive tape, cloth fabric duct tape, 50 mm wide for lap joints and perimeter seals, 25 mm wide elsewhere.
.2 Sealant: EcoLogo certified, not to contain total of volatile organic compounds in excess of 5 % by weight, asbestos-free sealant, compatible with vapour retarder materials, recommended by

vapour retarder manufacturer and as specified in Section 07 92 00 - Joint Sealants.

.3 Staples: minimum 6 mm leg.

.4 Molded box vapour barrier: factory-molded polyethylene box for use with recessed electric switch and outlet device boxes.

3 Execution

3.1 INSTALLATION

.1 Ensure services are installed and inspected prior to installation of retarder.

.2 Install sheet vapour retarder on warm side of exterior wall assemblies prior to installation of gypsum board to form continuous retarder.

.3 Use sheets of largest practical size to minimize joints.

.4 Tie vapor retarder into roof membrane.

.5 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

3.2 EXTERIOR SURFACE OPENINGS

.1 Cut sheet vapour retarder to form openings and ensure material is lapped and sealed to all door and window frames.

3.3 PERIMETER SEALS

.1 Seal perimeter of sheet vapour barrier as follows:

- .1 Apply continuous bead of sealant to substrate at perimeter of sheets.
- .2 Lap sheet over sealant and press into sealant bead.
- .3 Install staples through lapped sheets at sealant bead into wood substrate.
- .4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.4 LAP JOINT SEALS

.1 Seal lap joints of sheet vapour barrier as follows:

- .1 Attach first sheet to substrate.
- .2 Apply continuous bead of sealant over solid backing at joint.
- .3 Lap adjoining sheet minimum 150 mm and press into sealant bead.
- .4 Install staples through lapped sheets at sealant bead into wood substrate.
- .5 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.5 ELECTRICAL BOXES

.1 Seal electrical switch and outlet device boxes that penetrate vapour barrier as follows:

- .1 Install molded box vapour barrier.
- .2 Apply sealant to seal edges of flange to main vapour barrier and seal wiring penetrations through box cover.

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 Materials and installation methods providing primary air vapour barrier materials and assemblies including tie ins to vapor barriers and all other terminations.
.2 Air/vapour barrier materials to provide continuous seal between components of building envelope and building penetrations, including all windows and doors.

1.2 RELATED REQUIREMENTS

.1 Section 04 05 23 - Masonry Accessories.
.2 Section 07 26 00 - Vapor Retarders.
.3 Section 07 92 00 - Joint Sealants.

1.3 QUALITY ASSURANCE

.1 Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program and requirements for materials.

1.4 QUALIFICATIONS

.1 Applicator: Company specializing in performing work of this section with minimum 3 years documented experience with installation of air/vapour barrier systems.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Division 01 - General Requirements.
.2 Deliver, store and handle materials in accordance with manufacturer(s written instructions.

1.6 SEQUENCING

.1 Sequence work to permit installation of materials in conjunction with related materials and seals.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 SHEET MATERIALS

.1 Air barrier membrane (Stapled):
    .1 Standard of Acceptance:
        .1 Tyvek, Spun bonded olefin sheet, taped joints.
.2 Through-wall flashing membrane (Self-Adhering): SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film, having the following physical properties:
    .1 Thickness: 1.0 mm.
    .2 Vapor permeance: < 2.5 ng/Pa•s•m² (< 0.04 perm) to ASTM E96;
    .3 Acceptable Materials:
        .1 Blueskin SA
        .2 Soprema - Sopraseal Stick 1100 T.
.3 Primer: By manufacturer of membrane, all membranes to be primed.

3 Execution

3.1 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept the Work of this section.
.2 Ensure all surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer(s requirements.
.3 Report any unsatisfactory conditions to the Consultant in writing.
.4 Do not start work until deficiencies have been corrected. Commencement of Work implies acceptance of conditions.

3.2 PREPARATION

.1 Remove loose or foreign matter which might impair adhesion of materials.
.2 Ensure all substrates are clean of oil or excess dust; all masonry joints struck flush, and open joints filled; and all concrete surfaces free of large voids, spalled areas or sharp protrusions.
.3 Ensure all substrates are free of surface moisture prior to application of self-adhesive membrane and primer.
.4 Ensure metal closures are free of sharp edges and burrs.
.5 Prime substrate surfaces to receive adhesive in accordance with manufacturer's instructions.

3.3 INSTALLATION

.1 Apply primer to all surfaces to receive membrane in a manner and at a rate recommended by manufacturer. Primed surfaces not covered by membrane during the same working day must be re-primed.
.2 Apply membrane starting at bottom of wall, lapping both ends and sides in accordance with manufacturer's instructions.
.3 Seal end of membrane to substrate at end of days work and around any projections through membrane using only sealant recommended by membrane manufacturer.
.4 Carry membrane around into all wall openings and seal at frames or other building components. Reinforce all corners with adhesive applied membrane using heated trowel to ensure joint tightness.
.5 Coordinate with installation of roofing vapour barrier to ensure continuity of air/vapour barrier membrane at roof/wall intersections.
.6 Where work of other trades is incomplete leave sufficient membrane to complete work of this Section to ensure continuity and integrity of air/vapour barrier.
.7 Repair damage to membrane at masonry connectors and ties and elsewhere as necessary.

3.4 PROTECTION OF WORK

.1 Do not permit adjacent work to damage work of this section.
.2 Ensure finished Work is protected from climatic conditions.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 62 00 - Sheet Metal Flashing and Trim.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB).
- .1 CAN/CGSB-37.4-M89, Fibrated, Cutback Asphalt, Lap Cement for Asphalt Roofing.
- .2 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
- .3 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
- .4 CAN/CGSB-51.34-M86, Vapor Barrier Polyethylene Sheet, for Use in Building Construction.

.2 Canadian Roofing Contractors' Association (CRCA).
- .1 CRCA Roofing Specification Manual - 1997.

.3 Canadian Standards Association (CSA International).
- .1 CAN/CSA-A123.1/A123.5-98, Asphalt Shingles Made From Organic Felt and Surfaced With Mineral Granules/Asphalt Shingles Made From Glass Felt and Surfaced With Mineral Granules.
- .2 CSA A123.2-M1979 (R2001), Asphalt-Coated Roofing Sheets.
- .3 CAN/CSA-A123.3-98, Asphalt Saturated Organic Roofing Felt.
- .4 CAN3-A123.51-M85 (R2001), Asphalt Shingle Application on Roof Slopes 1:3 and Steeper.
- .5 CAN3-A123.52-M85 (R2001), Asphalt Shingle Application on Roof Slopes 1:6 to Less Than 1:3.
- .6 CSA B111-1974 (R1998), Wire Nails, Spikes and Staples.

1.3 SUBMITTALS

.1 Submit product data in accordance with Division 01 - General Requirements.

.2 Submit product data sheets for asphalt shingles. Include:
- .1 Product characteristics.
- .2 Performance criteria.
- .3 Installation instructions.
- .4 Limitations.
- .5 Color and finish.

1.4 SAMPLES

.1 Submit duplicate samples in accordance with Division 01 - General Requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, handle, store and protect materials in accordance with Division 01 - General Requirements.

.2 Provide and maintain dry, off-ground weatherproof storage.

.3 Remove only in quantities required for same day use.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.

.2 Place in appropriate on-site bins in accordance with Waste Management Plan.

.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

.4 Place materials defined as hazardous or toxic in designated containers.

2 Products

2.1 MATERIALS

.1 Asphalt Shingles:
  .1 Standard of Acceptance:
    .1 BP, Mystique 42 fiberglass.
    .2 Colour: Slate Grey.
.2 Eave/valley protection:
  .1 Standard of Acceptance:
    .1 BP, Weathertex,
.3 Underlayment:
  .1 Standard of Acceptance:
    .1 BP, Prodeck, synthetic roof underlayment.
.4 Drip edge: Prefinished metal.
.5 Spot seal all shingles.

3 Execution

3.1 APPLICATION

.1 Do asphalt shingle work in accordance with CAN3-A123.51 except where specified otherwise.
.2 Install drip edge along eaves, overhanging 12 mm, with minimum 50 mm flange extending onto roof decking. Nail to deck at 400 mm on center.
.3 Install eave protection membrane in accordance with NBC 1995, 9.26.5. para. 1 and as indicated on drawings.
.4 Install valley flashing at all valleys, min 600 each side.
.5 Install asphalt felt underlayment over entire shingled roof area as per manufacturer's instructions.
.6 Install asphalt shingles in strict accordance with manufacturer's printed instructions.
.7 ALL SHINGLE TABS MUST BE SPOT SEALED WITH PLASTIC CEMENT.
.8 Install prefabricated vent flashings supplied by Section 07 62 00 - Sheet Metal Flashing and Trim. Seal between flashings and shingles to ensure watertight installation.
.9 Provide flashings at all other penetrations through roof and seal between flashings and shingles to ensure watertight installation
.10 Install bottom step flashing (soaker base flashing) interleaved between shingles at vertical junctions.
.11 Install asphalt shingles on roof slopes 1:3 and steeper in accordance with CAN3-A123.51
.12 Install asphalt shingles on roof slopes 1:6 to less than 1:3 in accordance with CAN3-A123.52

END OF SECTION

1 General

1.1 SUMMARY

.1 Vinyl siding.
.2 Vinyl soffits.
.3 Vinyl trim and accessories.

1.2 RELATED REQUIREMENTS

.1 Section 06 10 00 - Rough Carpentry.
.2 Section 07 26 00 - Vapor Retarders.
.3 Section 07 92 00 - Joint Sealants.

1.3 REFERENCES

.1 ASTM D 256 - Test Method for Determining the Pendulum Impact Resistance of Notched Specimens of Plastics.
.2 ASTM D 635 - Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supported Plastics in a Horizontal Position.
.3 ASTM D 638 - Test Method for Tensile Properties of Plastics.
.4 ASTM D 648 - Test Method for Deflection Temperature of Plastics Under Flexural Load.
.5 ASTM D 696 - Test Method for Coefficient of Linear Expansion of Plastics.
.6 ASTM D 1929 - Test Method for Ignition Properties of Plastics.
.7 ASTM D 2843 - Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
.8 ASTM D 3679 - Specification for Rigid Poly Vinyl Chloride (PVC) Siding.
.9 ASTM D 4226 - Test Methods for Impact Resistance of Rigid Poly Vinyl Chloride (PVC) Building Products.
.10 ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.
.11 ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

1.4 SUBMITTALS

.1 Submit under provisions of Division 01 - General Requirements.
.2 Product Data:
  .1 Manufacturer's data sheets on each product to be used, including:
    .1 Preparation instructions and recommendations.
    .2 Storage and handling requirements and recommendations.
    .3 Installation methods.
.3 Selection Samples:
  .1 For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
  .2 For each finish product specified, two samples, minimum size 150 mm square, representing actual product, color, and patterns.
.4 Manufacturer's Certificates:
  .1 Certify products meet or exceed specified requirements.
.5 Closeout Submittals:
  .1 Provide manufacturer's maintenance instructions that include recommendations for periodic cleaning and maintenance.

1.5 QUALITY ASSURANCE

.1 Manufacturer Qualifications:
  .1 Maintain rigorous production quality control standards to ensure that vinyl siding will perform as expected for its intended use.
  .2 Products meet or exceed the requirements of ICC and VSI and listed by ICC International Code Council and VSI Vinyl Siding Certification Programs.

.2 Installer Qualifications:
.1 Installer with not less than three years documented experience with products specified or who has passed the Vinyl Siding Institute's (VSI) Certified Installer Program.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Store products in manufacturer's unopened packaging until ready for installation.
.2 Pack siding and soffits two squares per carton and clearly mark each carton with manufacturer's name, siding style, color, identifying lot number, and VSI Certification Stamp.
.3 Store vinyl siding, soffits, and accessories in clean, dry area, out of direct sunlight.
.4 Handle material to prevent damage. Do not allow cartons to crease.

1.7 SEQUENCING

.1 Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.8 PROJECT CONDITIONS

.1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

.1 Provide manufacturer's lifetime non-prorated transferable limited warranty with Dura Color coverage.

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.
.4 Do not dispose of unused caulking materials into the sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

2 Products

2.1 MANUFACTURERS

.1 Acceptable material:
.1 Royal Building Products, www.royalbuildingproducts.com
.2 Kaycan, www.kaycan.com

2.2 PERFORMANCE

.1 Vinyl Siding General: Produced from polyvinyl chloride (PVC) compounds meeting ASTM D 3679 requirements for compound class number 2.
.2 Typical Physical Properties:
.1 IZOD Impact Strength: 2.4 ft-lb/in at 23 degrees C per ASTM D-256.
.2 Tensile Strength: Greater than 6000 PSI, per ASTM D-638.
.3 Modulus of Elasticity: Greater than 365,000 PSI, per ASTM D 638.
.4 Deflection Temperature Under Load: 77 degrees C @ 264 Psi per ASTM D 648.
.5 Coefficient of Linear Expansion: 3.07 105 in/in/degrees F, per ASTM E 831.
.6 Chemical Resistance: Excellent per ASTM D 543.
.7 Cell Classification: Class #1334434 per ASTM D 1784.
.8 Compound Class: Class #2 per ASTM D 3679.
.3 Siding/Extrudate Typical Physical Properties:

.1 Impact Resistance: 2.75 in-lb/mil at 23 degrees C when tested in accordance with ASTM D 4226.
.2 Impact Resistance: 1.90 in-lb/mil at 0 degrees C when tested in accordance with ASTM D 4226.
.3 Low Temperature Flexibility: Greater than 80, passed CAN/CGSB41-24-95.
.4 Shrinkage/reversion: Greater than 3.0 when tested in accordance with ASTM D 3679.
.5 Surface Distortion (oil can): Less than 150 degrees F when tested in accordance with ASTM D 3679.
.6 Nominal thickness: 1.17 mm when tested in accordance with CAN/CGSB41-24.
.7 Wall thickness: 0.046 inch when tested in accordance with ASTM D 3679.

.4 Fire Properties: Meets UBC 42-1:
.1 Flame Spread Index: 18 when tested in accordance with ASTM E 84.
.2 Fuel Contribution: 0 when tested in accordance with ASTM E 84.
.3 Smoke Developed Index: 510.2 when tested in accordance with ASTM E 84.
.4 Self-ignition temperature: 810 degrees F when tested in accordance with ASTM D 1929.
.5 Smoke Density Rating: 42.1 percent when tested in accordance with ASTM D 2843.
.6 Maximum smoke density: 56.0 percent when tested in accordance with ASTM D 2843.
.7 Total burn time: Less than 5 seconds when tested in accordance with ASTM D 635.
.8 Total burn time: Less than 5 seconds when tested in accordance with ASTM D 635.
.9 Extent of burning: Less than 5 mm when tested in accordance with ASTM D 635.

2.3 SIDING

.1 Profiles, colours. Refer to Material / Finish Schedules.

2.4 SOFFITS

.1 Profiles, colours. Refer to Material / Finish Schedule.

2.5 ACCESSORIES

.1 Standard Siding Accessories:
.1 Provide inside corners, outside corners, j-channels, finish trim, etc. as indicated on the Drawing or as required for the project.
.2 Consistent with shape, size, and properties shown on the Drawings and as required for complete installation.
.3 Produced from the same compound materials and with comparable properties as the siding.
.4 Color: Matching or color coordinated with siding.

.2 Standard Soffit Accessories:
.1 Provide frieze trim, T-Trim, 3/8 inch, Designer Crown J-channels, J-channels, etc. as indicated on the Drawing or as required for the project.
.2 Consistent with shape, size, and properties shown on the Drawings and as required for complete installation.
.3 Produced from the same compound materials and with comparable properties as the siding.
.4 Color: Matching or color coordinated with soffit.

3 Execution

3.1 EXAMINATION

.1 Do not begin installation until substrates have been properly prepared.
.2 Confirm that all critical dimensions are as specified on the drawings.
.3 If substrate preparation is the responsibility of another installer, notify Consultant of unsatisfactory preparation before proceeding.

3.2 PREPARATION

.1 Clean surfaces thoroughly prior to installation.
.2 Repair substrate flaws or defects before applying siding or soffits.
.3 Where necessary, fur surfaces to an even plane and free from obstructions before application.
.4 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

.1 Install siding and soffits in accordance with the latest edition of the manufacturer's Installation Instructions.
.2 Install vinyl siding, soffits, and accessories in accordance with best practice, with all joint members plumb and true.
.3 Securely attach siding using methods and materials recommended by siding/soffit manufacturer for wind load conditions at project site.
.4 Install vinyl siding and accessories with all joint members plumb and true.

3.4 FIELD QUALITY CONTROL

.1 After installation of siding and soffits, check entire surface for obvious flaws or defects.
.2 Replace and repair any problem areas, paying close attention to the substrate for causes of the problem.

3.5 CLEANING

.1 After application of siding and soffits, clean as necessary to remove all fingerprints and soiled areas.
.2 Upon completion of siding application, clean entire area, removing all scrap, packaging, and unused materials related to this work.

3.6 PROTECTION

.1 Protect installed products until completion of project.
.2 Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 Metal flashings and counter flashings.
.2 Fascias.
.3 Snow Guards.
.4 Gutters and Downspouts.

1.2 RELATED REQUIREMENTS

.1 Section 07 61 00 - Metal Roofing.

1.3 REFERENCES

.1 The Aluminum Association Inc. (AA)
  .1 Aluminum Sheet Metal Work in Building Construction-2000.
  .2 AA DAF45-97, Designation System for Aluminum Finishes.
.2 American Society for Testing and Materials (ASTM International)
  .1 ASTM A167-99, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  .2 ASTM A240/A240M-02, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
  .3 ASTM A591/A591M-98, Standard Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications.
  .4 ASTM A606-01, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.
  .5 ASTM A653/A653M-01a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  .6 ASTM A792/A792M-02, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
  .7 ASTM B32-00, Standard Specification for Solder Metal.
  .8 ASTM B370-98, Standard Specification for Copper Sheet and Strip for Building Construction.
  .9 ASTM D523-89(1999), Standard Test Method for Specular Gloss.
  .10 ASTM D822-01, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
.3 Canadian Roofing Contractors Association (CRCA)
  .1 Roofing Specifications Manual 1997.
.4 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
  .2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
  .3 CAN/CGSB-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.
.5 Canadian Standards Association (CSA International)
  .1 CSA A123.3-98, Asphalt Saturated Organic Roofing Felt.
  .2 CSA-A440-00/A440.1-00 - A440-00, Windows / Special Publication A440.1-00, User Selection Guide to CSA Standard A440-00, Windows.
  .3 CSA B111-1974(R1998), Wire Nails, Spikes and Staples.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 SHEET METAL MATERIALS

.1 Pre-Coated Galvanized Steel: ASTM A653/A653M, Z275 zinc coating designation; minimum 28 gauge core steel. Shop pre-coated with as selected coating; colour per material / finish schedule.

2.2 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.
.2 Plastic cement: to CAN/CGSB 37.5.
.3 Underlay for metal flashing: Membrane flashing by Section 07 27 00 - Air Barriers.
.4 Sealants: to CAN/;CGSB 19.13, one component. Acceptable Material:
  .1 Tremco A Spectrum 2"
  .2 Pecora 895 NST.
.5 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.
.6 Fasteners: of same material as sheet metal, to CSA B111, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.
.7 Washers: of same material as sheet metal, 1 mm thick with rubber or neoprene packings.
.8 Prefabricated flashing at pipes penetrating roofs: purpose-made, neoprene or spun aluminum to CRCA Specification FL/532, minimum 300mm above top of roof membrane.
.9 Touch-up paint: as recommended by prefinished material manufacturer.

2.3 FABRICATION

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details.
  .1 Brake form to profiles indicated and required to suit parapet configurations.
  .2 Form pieces in 2400 mm maximum lengths. Make allowance for expansion at joints.
  .3 Hem exposed edges on underside 12 mm. Miter and seal corners with sealant.
  .4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
  .5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.4 METAL FLASHINGS

.1 Form flashings, copings and fascias to profiles indicated.

2.5 PANS

.1 Form pans to receive roofing plastic from 20 ga thick steel aluminum sheet metal with minimum 75 mm upstand above finished roof and 100 mm continuous flanges with no open corners. Solder joints. Make pans minimum 50 mm wider than member passing through roof membrane.

2.6 REGLETS AND CAP FLASHINGS

.1 Form recessed reglets to be built-in concrete work for base flashings as detailed. Provide slotted fixing holes and steel/plastic washer fasteners. Cover face and ends with plastic tape.

2.7 EAVES TROUGHS AND DOWNPIPES

.1 Form eaves troughs / gutters minimum 150mm wide.
.2 Form downpipes / downspouts from size 75 mm x 75 mm.
.3 Provide goosenecks, outlets, strainer baskets and all necessary fastenings.

2.8 SPLASHPADS

.1 Precast concrete, purpose-made. Provide one at each downspout.

.1 Acceptable Material:
.1 Campbell's Concrete Model No. R4-001.

2.9 SCUPPERS

.1 Sizes and profiles as indicated.
.2 Provide necessary fastenings.

3 Execution

3.1 INSTALLATION

.1 Install sheet metal work as detailed.
.2 Use concealed fastenings except where approved before installation.
.3 Provide underlay under sheet metal. Secure in place and lap joints 100 mm.
.4 Counter flash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips, as detailed.
.5 Lock end joints and caulk with sealant.
.6 Install surface mounted reglets true and level, and caulk top of reglet with sealant.
.7 Insert metal flashing into reglets to form weather tight junction.
.8 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm. Lead wedge flashing securely into joint.
.9 Caulk flashing at reglet with sealant.
.10 Install pans, where shown and around items projecting through roof membrane.

3.2 EAVES TROUGHS AND DOWNPIPES

.1 Install eaves troughs and secure to building at 750 mm on center with eaves trough spikes through spacer ferrules. Slope eaves troughs to downpipes as indicated. Solder joints watertight.
.2 Install downpipes and provide goosenecks back to wall. Secure downpipes to wall with straps at 1800 mm on center; minimum two straps per downpipe. Connect downpipes to drainage system and seal joint with plastic cement.
.3 Install splash pans as indicated.

3.3 SCUPPERS

.1 Install scuppers as indicated.

END OF SECTION

This page intentionally left blank

1 General

1.1 SCOPE OF WORK

.1 Single qualified Trade to provide all firestopping for the entire project, included all mechanical & electrical penetrations, except as noted below.
.2 Fire stopping and smoke seals within mechanical assemblies (i.e. inside ducts, dampers) and electrical assemblies (i.e. inside cable trays) are specified in Divisions 21, 22, 23, 25, 26, 27 and 28 respectively.
.3 Refer to Section 09 91 00 - Painting for painting of rated wall assemblies.
.4 Tag each type of firestopping used.

1.2 REFERENCES

.1 Underwriter's Laboratories of Canada (ULC)
  .1 CAN/ULC-S115-Standard Method of Fire Tests of Firestop Systems.
  .2 NBC 3.1.9.1 Fire Stop Requirements
  .3 NBC 3.1.9.3 Fire Stop for Penetrations, Wires & Cables.

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Division 01 - General Requirements. .
.2 Submit shop drawings indicating:
  .1 ULC listed firestop drawing for each anticipated distinct fire separation penetration and joint. Each ULC system firestop drawing must indicate the actual penetrating products used on site and the required fire stop materials and their proper installation.
  .2 Technical information for each material used in ULC system firestop drawing above.
  .3 Construction details should accurately reflect actual job conditions.

1.4 PRODUCT DATA

.1 Submit product data in accordance with Division 01 - General Requirements.
.2 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation.
.3 Material Safety Data Sheets:
  .1 Submit MSDS for inclusion in Operation and Maintenance Manual.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 MATERIALS

.1 Use purpose designed products for application.
.2 Fire stopping and smoke seal systems: in accordance with CAN/ULC-S115.
  .1 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN/ULC-S115 and not to exceed opening sizes for which they are intended and conforming to special requirements specified in 3.5.
  .2 All penetrations of fire separations must be fire stopped as per CAN/ULC-S115 standard with F rating and similar for Fire Resistant Rating for closures.

.3 All penetrations of a firewall must be fire stopped per CAN/ULC-S115 standard with FT rating and similar for Fire Resistant Rating for the fire separation.

.4 Acceptable Material:

.1 Tremco Fyre-Shield.

.2 A/D Fire Barrier Sealant.

.3 3M Fire Barrier Products.

.4 Hilti Firestops Products.

.5 DAP Fire Stop Fire-Rated Silicone Sealant.

.6 NUCO Inc. firestopping products.

.3 Service penetration assemblies: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No.40 U19.

.4 Service penetration firestop components: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No.40 U19.13 and ULC Guide No.40 U19.15 under the Label Service of ULC.

.5 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.6 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.7 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.8 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.9 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.10 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.11 Sealants for vertical joints: non-sagging.

.12 At rated partitions use 1 outlet box per stud space or where more than 1 outlet box / stud spacer is required use putty pads behind or at inside face of box.

.13 Where rated assemblies are penetrated for drains use rated fire stopping.

3 Execution

3.1 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.2 INSTALLATION

.1 Install fire stopping and smoke seal material and components in strict accordance with ULC certification and manufacturer's written instructions.

.2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.4 Tool or trowel exposed surfaces to a neat finish.

.5 Remove excess compound promptly as work progresses and upon completion.

3.3 INSPECTION

.1 Notify Consultant when ready for inspection and prior to concealing or enclosing firestopping materials and service penetration assemblies.

3.4 SCHEDULE

.1 Firestop and smoke seal at all penetrations of or joints in fire resistive wall and floor assemblies, including but not limited to:

- .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls as shown on wall schedule.
- .2 Edge of floor slabs at curtain wall and precast concrete panels.
- .3 Top of fire-resistance rated masonry and gypsum board partitions.
- .4 Intersection of fire-resistance rated masonry and gypsum board partitions.
- .5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
- .6 Penetrations through fire-resistive floor slabs, ceilings and roofs.
- .7 Outlet boxes in rated walls more than 1 box / stud space.
- .8 Openings and sleeves installed for future use through fire separations.
- .9 Around mechanical and electrical assemblies penetrating fire separations.
- .10 Rigid ducts without fire damper: greater than 129 cm2: fire stopping to consist of bead of fire sealant between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

3.5 CLEAN UP

.1 Remove excess materials and debris and clean adjacent surfaces immediately after application.

.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 30 00 - Cast-In-Place Concrete.
.2 Section 04 22 00 - Concrete Unit Masonry.
.3 Section 07 60 00 - Flashing and Sheet Metal.
.4 Section 07 84 00 - Firestopping.
.5 Section 08 41 13 - Aluminum Framed Entrances and Storefronts
.6 Section 08 80 00 - Glazing.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
  .1 ASTM C 321 - Standard Test Method for Bond Strength of Chemical- Resistant Mortars.
  .2 ASTM C 834 - Standard Specification for Latex Sealants.
  .3 ASTM C 882 - Standard Test Method for Bond Strength of Epoxy-R Systems used with Concrete by Slant Shear.
  .4 ASTM C 919 - Standard Specification for use of Sealants in Acoustical Applications.
  .5 ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.
  .6 ASTM C 1330 - Standard Specification for Cylindrical Sealant Backing for use with Cold Liquid Applied Sealants.
  .7 Sealants and associated materials must conform with the latest version of standards and specifications referenced.
.2 Transport Canada (TC)
  .1 Transportation of Dangerous Goods Act (TDGA).
.3 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-19.21, Sealing and Bedding Compound Acoustical.
.4 Department of Justice Canada (Jus)
  .1 Canadian Environmental Protection Act, 1999 (CEPA).
.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

.1 Submit product data in accordance with Division 01 - General Requirements.
  .1 Caulking Compound.
  .2 Primers.
  .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
  .4 Installation instructions, surface preparation and product limitations.
.2 Manufacturer's Technical Data Guides and application procedures.
.3 Submit laboratory tests or data validating product compliance with performance criteria specified. Include SWRI validation certificate where required.
.4 Upon completion of the project the sealant applicator must submit copies of the Manufacturer's Weatherseal and the Warranty Applicator's Workmanship Warranty.
.5 Before proceeding with work or ordering of material submit the following to the Consultant for review and acceptance:
  .1 Manufacturer's product data for sealants to be used.
  .2 Manufacturer's recommended installation procedures.
.6 Material Safety Data Sheets:
    .1 Submit MSDS for inclusion in Operation and Maintenance Manual.

1.4 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company regularly engaged in manufacturing and marketing of products specified in this section.

.2 Installer Qualifications: Qualified to perform work specified by reason of experience or training provided by the product manufacturer.
.3 Installer must submit a reference list including a minimum of three projects of similar size and scope.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, handle, store and protect materials in accordance with Division 01 - General Requirements.
.2 Deliver products in original factory packaging bearing identification of product, manufacturer, and batch number. Provide Material Safety Data Sheets (MSDS) for each product.
.3 Store products in location protected from freezing, damage, construction activity, precipitation and direct sunlight in strict accordance with manufacturer's recommendations.
.4 Condition products to approximately 16 to 21°C, for use in accordance with manufacturer's recommendations.
.5 Handle all product with appropriate precautions and care as stated on Material Safety Data Sheet (MSDS).

1.6 PROJECT CONDITIONS

.1 Do not use products under conditions of precipitation or freezing weather. Use appropriate measures for protection and supplementary heating to ensure proper curing conditions in accordance with manufacturer's recommendations if application during inclement weather occurs.
.2 Ensure substrate is dry.
.3 Protect adjacent work from contamination due to mixing, handling and application.
.4 Joint-Width Conditions:
  .1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
.5 Joint-Substrate Conditions:
  .1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labeling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada.

1.8 WARRANTY

.1 Provide manufacturer's five (5) year standard material warranty.
.2 Include coverage for replacement of sealant materials which fail to achieve water tight seal, exhibit loss of adhesion or cohesion, or do not cure.
.3 Warranty Exclusions: Failure resulting from concrete shrinkage, structural cracks or defects, faulty construction, faulty design, faulty materials (other than sealant), misuse of structure, settlement or accident, fire or other casualty, or physical damage.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.
.4 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Provincial and Municipal regulations.

2 Products

2.1 MANUFACTURERS

.1 Acceptable material:
- .1 BASF Building Systems.
- .2 Pecora Corporation.
- .3 Tremco Sealant and Waterproofing.
- .4 Sika Canada Inc.
- .5 Dow Corning.

.2 Provide all joint materials of the same type form a single manufacturer.

2.2 MATERIALS

.1 Single Component, Non-Sag Polyurethane Sealant with plus or minus 25 percent movement capability for vertical joints; ASTM C 920, Type S, Grade NS, Class 35, uses NT, M, A, O & I.
- .1 Acceptable Materials:
  - .1 MasterSeal NP1 by BASF Building Systems.
  - .2 Pecora DynaTrol 1-XL by Pecora Corporation.
  - .3 Sikaflex 1a by Sika Canada Inc.
- .2 [Substrates: concrete, masonry, aluminum, wood, copper, stainless steel, galvanized steel and some stone. Expected service life: 7 - 12 years. Possible uses: Wall joints, window frames, precast joints, parapets etc.]

.2 Single component texturized polyurethane sealant with plus or minus 25 percent joint movement capability for horizontal or vertical joints, ASTM C 920, Type S, Grade NS, Class 25, uses NT, M, A, O.
- .1 Acceptable Materials:
  - .1 MasterSeal TX1 by BASF Building Systems.
  - .2 Vulkem 116 by Tremco Sealant & Waterproofing.
- .2 [Substrates: concrete, masonry, aluminum, wood, stucco, copper, stainless steel, galvanized steel and some stone. Expected service life: 7 - 12 years. Possible uses: Wall joints, HVAC, roofing, precast joints, parapets etc.]

.3 Single component low modulus high movement fast-curing silyl terminated polyether sealant with plus 100 and minus 50 percent joint movement capability; ASTM C 920, Type S, Grade NS, Class 50, uses NT, M, A, G, O; ASTM C 1382.
- .1 Acceptable Materials:
  - .1 MasterSeal NP 150 by BASF Building Systems.
- .2 [Substrates: concrete, masonry, aluminum, glass, stone, EIFS, wood. Expected service life: 20 years. Possible uses: Wall joints, caulking windows, window & door frames, wet glazing, sanitary applications etc.]

.4 Multi-component field tintable low modulus high movement fast-curing sealant with plus 100 and minus 50 percent joint movement capability; ASTM C 920, Type M, Grade NS, Class 50.
- .1 Acceptable Materials:
  - .1 MasterSeal 150 Tint Base by BASF Building Systems.
  - .2 Pecora 890FTS by Pecora Corporation.
- .2 [Substrates: concrete, masonry, aluminum, glass, stone, EIFS, wood. Expected service life: 20 years +. Possible uses: Wall joints, caulking windows, window & door frames, wet glazing, sanitary applications etc.]

.5 Field tintable low modulus high movement fast-curing textured sealant with plus and minus 50 percent joint movement capability; ASTM C 920, Type M, Grade NS, Class 50.
- .1 Acceptable Materials:
  - .1 Pecora 890FTS-TXTR by Pecora Corporation.
- .2 [Substrates: concrete, masonry, stone, EIFS. Expected service life: 20 years +. Possible uses: Wall joints, mortar joints.]

.6 Multi-component, Polyurethane Sealant with plus or minus 50 percent joint movement capability; ASTM C 920, Type M, Grade NS, Class 25, uses NT, T, M, A, O, G and I; UL

classified (fire resistance).

.1 Acceptable Materials:

.1 DynaTrol II by Pecora Corporation.

.2 MasterSeal NP2 by BASF Building Systems.

.3 Dymeric 240 by Tremco Sealant & Waterproofing.

.4 Sikaflex 2C NS by Sika Canada Inc.

.2 [Substrates: concrete, masonry, aluminum, vinyl siding, copper, stainless steel, galvanized steel, marble, granite and limestone. Expected service life: 7 - 12 years. Possible uses: Wall joints, window frames, structural components, etc.]

.7 Single component self-leveling polyurethane sealant with plus or minus 25 percent movement capability for horizontal joints; ASTM C 920, Type S, Grade P, Class 25 uses T&M.

.1 Acceptable Materials:

.1 Urexpan NR-201b by Pecora Corporation.

.2 MasterSeal SL1 by BASF Building Systems.

.3 Vulkem 45 by Tremco Sealant & Waterproofing.

.4 Sikaflex 1C SL by Sika Canada Inc.

.2 [Substrates: concrete & metal. Expected service life: 7 - 12 years. Possible uses: floor joints, sidewalks, driveways, decks, parking areas, etc.]

.8 Multi-component, Self-Leveling Polyurethane Sealant with plus or minus 25 percent movement capability for horizontal joints, ASTM C 920, Type M, Grade P, Class 25 uses NT. T, A, I & M.

.1 Acceptable Materials:

.1 Urexpan NR-200 by Pecora Corporation.

.2 MasterSeal SL2 by BASF Building Systems.

.3 Vulkem THC 900 by Tremco Sealant & Waterproofing.

.4 Sikaflex 2C SL by Sika Canada Inc.

.2 [Substrates: concrete, and metal. Expected service life: 7 - 12 years. Possible uses: floor joints, cantilever decks, driveways, decks, parking ramps, industrial floors, precast double T's, metal expansion joints etc.

.9 Single component neutral cure silicone sealant for non-structural glazing applications with plus / minus 50 percent joint movement capability; ASTM C 920, Type S, Grade NS, Class 50, Use NT, M, G and A.

.1 Acceptable Materials:

.1 Pecora 864NST or 895NST by Pecora Corporation.

.2 Dow Corning 795 by Dow Corning.

.3 Spectrum 2 by Tremco Sealant & Waterproofing.

.2 [Substrates: concrete, masonry, aluminum, glass & plastics. Expected service life: 20 years +. Possible uses: conventional glazing, window & door frames, window perimeters, curtain walls, expansion & control joints etc.

.10 Single component neutral cure silicone sealant for non-structural glazing applications with plus 100% minus 50% joint movement capability; ASTM C 920, Type S, Grade NS, Class 100/50, use T, NT, M, G, A and O. SWRI validated.

.1 Acceptable Materials:

.1 Pecora 890NST by Pecora Corporation.

.2 Spectrum 1 by Tremco Sealant & Waterproofing.

.3 Dow Corning 790 by Dow Corning.

.2 [Substrates: concrete, masonry, stone, ceramics, granite, wood, steel, aluminum and plastics. Expected service life: 20 years +. Possible uses: precast panels, curtain walls, mullions, expansion joints, EIFS, etc.

.11 Single component mildew resistant silicone sealant plus/minus 25% movement capability; ASTM C 920, Type S, Grade NS, Class 25, Use NT, G and A.

.1 Acceptable Materials:

.1 Pecora 898 by Pecora Corporation.

.2 Tremsil 200 by Tremco Sealant & Waterproofing.

.3 Dow Corning 786.

.2 [Substrates: glass, aluminum, tile and fiberglass. Possible uses: countertops, kitchen & bath areas, non-structural glazing, etc.

.12 Single component silicone structural adhesive with plus/minus 50% joint movement capability; ASTM C 920, Type S, Grade NS, Class 25, Use NT, G and A.
.1 Acceptable Materials:
.1 Dow Corning 995 by Dow Corning.
.2 Pecora 895NST by Pecora Corporation.
.2 [Substrates: glass, aluminum, anodized aluminum, paints. Structural glazing applications must be reviewed by Pecora Corp Technical Service Staff. Contact your local manufacturer's representative for more information. Possible uses: two sided or four sided structural glazing.]

.13 Single component synthetic rubber sealant purpose made for use in acoustical applications.
.1 Acceptable Materials:
.1 Tremco Acoustical Sealant.
.2 Pecora BA-98.

.14 Single component pick resistant sealant with plus/minus 25 percent joint movement capability; ASTM C 920, Type S, Grade NS, Class 25, uses NT, T, M, A, G and I.
.1 Acceptable Materials:
.1 Pecora 896HIS by Pecora Corporation.
.2 MasterSeal CR 195 by BASF Building Systems.
.2 [Substrates: concrete, masonry, granite, marble, brick, aluminum, wood, stainless steel and galvanized steel. Expected service life: 7 - 12 years. Possible uses: wall joints, prisons, stadiums, schools, universities, etc.]

.15 Poured flexible 100% solids epoxy joint filler; properties:
.1 Shore A Hardness: greater than 75.
.2 Shore D Hardness: greater than 30.
.3 Elongation: 75 percent.
.4 Tensile Strength: 4.5 MPa.
.5 Acceptable Materials:
.1 MasterSeal CR 190 by BASF Building Systems.
.2 Loadflex by Sika Canada Inc.
.3 Rezi-Weld Flex (W.R. Meadows).

.16 Gunned 100% solids epoxy joint filler. Two component gun-grade pick proof epoxy joint filler for sloped, vertical areas and security applications.
.1 Tensile Strength: 13.8 MPa
.2 Slant Shear Strength: 34.5 MPa.
.3 Bond Strength: 10.3 MPa.
.4 Acceptable Materials:
.1 Dynapoxy EP-1200 by Pecora Corporation.
.2 MasterEmaco ADH 327 by BASF Building Systems.

.17 Two-component self leveling, 100 percent solids Polyurea control joint filler.
.1 Shore A Hardness: 85 to 90.
.2 Tensile Strength: 1183 psi.
.3 Elongation: 240 percent.
.4 Acceptable Materials:
.1 MasterSeal CR 100 by BASF Building Systems.
.2 Sika Loadflex Polyurea by Sika Canada Inc.
.3 PenJoint 3004 (ASTC)

2.3 ACCESSORIES

.1 Primer: Type recommended by the sealant manufacturer and compatible with joint forming materials.

.2 Joint Cleaner: Non-corrosive and non-staining type recommended by sealant manufacturer and compatible with joint forming materials.

.3 Soft Backer Rod: non-gassing, reticulated closed-cell polyethylene rod designed for use with cold-applied joint sealants.
  .1 Comply with ASTM C 1330.
  .2 Size required for joint design.
.4 Closed-Cell Backer Rod: closed-cell polyethylene rod designed for use with cold-applied joint sealants for on-grade or below-grade applications.
  .1 Comply with ASTM C 1330.
  .2 Size required for joint design.
.5 Joint Filler: closed-cell polyethylene joint filler, designed for use in cold joints, construction joints or isolation joints wider than 1/4 inch (6mm).
  .1 Size required for joint design.
.6 Bond Breaker: Pressure-sensitive tape recommended by sealant manufacturer to suit application.

2.4 COLOR

.1 Sealant Colors: Selected by Consultant.
  .1 Manufacturer's standard color range.
  .2 Custom color matching submittal of job site substrate samples.

3 Execution

3.1 PROTECTION

.1 Protect installed Work of other trades from staining or contamination.

3.2 EXAMINATION

.1 Inspect all areas involved in work to establish extent of work, access and need for protection of surrounding construction.
.2 Conduct pre-application inspection of site verification with an authorized manufacturer's representative.
.3 Occupied areas: where high VOC materials are utilized, investigate occupants to determine the measures to be taken to accommodate them.

3.3 PREPARATION

.1 Remove loose materials and foreign matter which could impair adhesion of the sealant.
.2 Clean joint and saw cuts by grinding, sandblasting or wire brushing to expose a sound surface free of contamination and laitance.
.3 Ensure structurally sound surfaces are dry, clean, free of dirt, moisture, loose particles, oil, grease, asphalt, tar, paint, wax, rust, waterproofing, curing and parting compounds, membrane materials and other foreign matter.
.4 Where the possibility of sealants staining adjacent areas or materials exist, mask joints prior to application.
  .1 Do not remove masking tape before joints have been tooled and initial cure of joint filler has taken place.
  .2 Work stained due to failure of proper masking precautions will not be accepted.

3.4 INSTALLATION:

.1 Priming:
  .1 Prime all surfaces to receive sealant with recommended primer.
.2 Back-Up Material:
  .1 Install appropriate size backer rod, larger than joint where necessary according to manufacturer's recommendations.
  .2 Install polyethylene joint filler in joints wider than 1/4 inch (6mm) to back-up material per manufacturer's recommendations.
.3 Bond Breaker:

.1 Install bond-breaker strip in joint to be sealed on top of back-up material to prevent adhesion of sealant to back-up material; install per manufacturer's recommendations.

.4 Sealant:

.1 Prepare sealants that require mixing; follow manufacturer's recommended procedures, mixing thoroughly.

.2 Mix only as much material as can be applied within manufacturer's recommended procedures, mixing thoroughly.

.3 Apply materials in accordance with manufacturer's recommendations; take care to produce beads of proper width and depth, tool as recommended by manufacturer and immediately remove surplus sealant.

.4 Apply materials only within manufacturer's specified application life period. Discard sealant after application life is expired or if prescribed application period has elapsed.

3.5 CLEANING

.1 Remove uncured sealant with Reducer 990, xylene, toluene or MEK. Remove cured sealant by razor, scraping or mechanically.

.2 Remove all debris related to application of sealants from job site in accordance with all applicable regulations for hazardous waste disposal.

3.6 APPLICATION

.1 Sealant.

.1 Apply sealant in accordance with manufacturer's written instructions.

.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.3 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle.

.5 Use sufficient pressure to fill voids and joints solid.

.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.

.8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing.

.1 Cure sealants in accordance with sealant manufacturer's instructions.

.2 Do not cover up sealants until proper curing has taken place.

.3 Cleanup.

.1 Clean adjacent surfaces immediately and leave Work neat and clean.

.2 Remove excess and droppings, using recommended cleaners as work progresses.

.3 Remove masking tape after initial set of sealant.

END OF SECTION

This page intentionally left blank

1 General

1.1 WORK INCLUDED

.1 All hollow metal steel frames and glazed light frames as per Door & Frame Schedule, and as detailed on Drawings.

.2 Provide steel doors and frames including but not limited to following:

- .1 Hollow metal doors, swing flush type.
- .2 Fire rated.
- .3 Insulated exterior metal doors & thermally broken frames.
- .4 Hollow metal transom panels.
- .5 Hollow metal door frames.
- .6 Hollow metal window frames.
- .7 Hollow metal side lites.
- .8 Hollow metal frames and mullions for borrowed lights and glazed screens.
- .9 Glazing stops.
- .10 Preparation of hollow metal doors and frames for security system CSA approved wiring and/or conduit for electronic hardware. Include junction boxes and conduit for electronic hardware. Include system consisting of 15 conductors of 22 gauge wire complete with a modular quick connect wiring harness. Refer to Section 08 71 00 - Door Hardware for openings that require electrified hardware.

1.2 RELATED REQUIREMENTS

.1 Section 04 22 00 - Concrete Unit Masonry.
.2 Section 07 92 00 - Joint Sealants.
.3 Section 08 14 16 - Flush Wood Doors.
.4 Section 08 71 00 - Door Hardware.
.5 Section 08 80 00 - Glazing.
.6 Section 09 91 00 - Painting.
.7 Division 23 - Mechanical.
.8 Division 26 - Electrical: Wiring for electronic hardware.

1.3 REFERENCES

.1 Canadian Standards Association (CSA).

- .1 CSA A101-M1983, Thermal Insulation, Mineral Fibre, for Buildings.
- .2 CSA W59-M1989, Welded Steel Construction (Metal Arc Welding).
- .3 CSA-A440.S1, Canadian Supplement.
- .4 AAMA/WDMA/CSA 101/I.S.2/A-440.

.2 Canadian General Standards Board (CGSB).

- .1 CAN/CGSB-1.181-92, Ready-Mixed Organic Zinc-Rich Coating.
- .2 CGSB 51-GP-21M-78, Thermal Insulation, Urethane and Isocyanurate, Unfaced.
- .3 CGSB 41-GP-19M, Rigid Vinyl Extrusions for Windows and Doors.
- .4 CAN/CGSB-82.5-M88, Insulated Steel Doors.
- .5 CSA W59-03, Welded Steel Construction (Metal Arc Welding).
- .6 CAN4-S104-M80, Standard Method for Fire Tests of Door Assemblies.
- .7 CAN4-S105-M85, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.
- .8 CAN4-S106-M80, Standard Method for Fire Test of Window and Glass Block Assemblies.
- .9 CAN/ULC-S702-97, Standard for Mineral Fibre Thermal Insulation for Buildings.

.3 American Society for Testing and Materials (ASTM).

- .1 ASTM A 525M-91b, General Requirements for Steel Sheet Zinc-Coated (Galvanized) by the Hot-Dip Process Metric.
- .2 ASTM A 526M-90, Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.

.3 ASTM A 527M-90, Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality.
.4 ASTM A568M-07, Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.
.5 ASTM A924M-07, Specification for General Requirements for Steel Sheet, Metallic-Coated by Hot-Dip Process.
.6 ASTM C177-04, Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
.7 ASTM C518-04, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
.8 ASTM C578-07, Specification for Rigid, Cellular Polystyrene Thermal Insulation.
.9 ASTM C665-06, Specification for Mineral Fiber Insulation.
.10 ASTM C1289-07, Specification for faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
.11 ASTM D1622-03, Standard Test Method for Apparent Density of Rigid Cellular Plastics.
.12 ASTM E90-04, Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
.13 ASTM E413-04, Classification for Rating Sound Insulation.
.14 ASTM C305-06 - Practice for Mechanical Mixing of Hydraulic Cement Paste and Mortars of Plastic Consistency.
.15 ASTM C1107-07a - Standard Specification for Packaged Dry Hydraulic Cement Grout (Nonshrink).

.4 Underwriters' Laboratories of Canada (ULC).
.1 CAN4-S104M-M80, Fire Tests of Door Assemblies.
.2 CAN4-S105M-M85, Fire Door Frames.
.3 CAN/ULC-S702-97 - Standard for Mineral Fibre Thermal Insulation for Buildings.

.5 CAN/ULC-S702-97 - Standard for Mineral Fibre Thermal Insulation for Buildings.
.1 CSDMA, Commercial Steel Doors and Frames, 2006.
.2 CSDMA, Recommended Selection and Usage Guide for Commercial Steel Doors, 1990.

.6 National Fire Protection Association (NFPA).
.1 NFPA 252-08, Standard for Fire Tests of Door Assemblies.
.2 NFPA 257-07, Standard for Fire Tests of Window Assemblies and Glass Block Assemblies.
.3 NFPA 80-1999, Standard for Fire Doors and Fire Windows.
.4 UL List of Equipment and Materials, Volume 2.
.5 WH Certification Listings.

.7 ANSI:
.1 ANSI A115-05, Hardware Preparations for Steel Doors and Frames.
.2 ANSI A115-IG 94, Installation Guide for Doors and Hardware.
.3 ANSI A224.1-94, Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
.4 ANSI A250.4-01, Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.

1.4 DESIGN REQUIREMENTS

.1 Design exterior frame assembly to accommodate expansion and contraction when subjected to minimum and maximum surface temperature of -35°C to 35°C.
.2 Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.
.3 Labeled Fire-Rated Doors and Frames:
.1 Fire rated steel doors and frame products shall be provided for those openings as scheduled.

.2 Products shall bear the label of a recognized testing agency having factory inspection service, and shall be constructed as listed or classified for labeling.
.3 Doors provided for openings requiring fire rating only, or fire and temperature rise rating shall be tested in accordance with CAN4-S104.
.4 Frames, transom and sidelight assemblies provided for openings requiring fire rating, shall be tested in accordance with CAN4-S104.
.5 Window frames provided for openings requiring fire rating, shall be tested in accordance with CAN4-S106.
.6 Labeling shall be in accordance with ANSI/NFPA 80, the listing organization's policies and Follow-Up Service Procedures/Manuals.
.7 Fire rated door or frame component, not qualifying for labeling due to design, hardware or any other reason, shall be noted in the submittal documents, or prior to manufacture of product if hardware, glazing or other options affecting fire-rating are not available at time of submittal shop drawing preparation.

.4 Ensure core materials for exterior doors attains thermal resistance of R 5 when tested in accordance with ASTM C177 or ASTM C518.
.5 Provide thermally broken assemblies as indicated on Drawings and noted on Door Schedule tested in accordance with requirements of CAN/CGSB-82.5-M.
.6 Provide acoustic assemblies as indicated on Drawings and noted on Door Schedule tested as a fully operable unit in accordance with requirements of ASTM E90 and ASTM E413.
.7 Product quality shall meet standards set by (CSDMA) Canadian Steel Door and Frame Manufacturers Association.

1.5 SUBMITTALS

.1 Submit shop drawings in accordance with Division 01 - General Requirements.
.2 Product Data:
.1 Submit manufacturer's product specification, construction details, material, finish descriptions and dimensions of individual components.
.2 Submit manufacturer's literature, data sheets for each type of material provided under this Section for project.
.3 Data sheets shall provide all required information.
.4 Submit required copies of detailed instructions for inclusion in maintenance manual.
.5 Submit manufacturer's installation instructions.
.3 Material Safety Data Sheets:
.1 Submit MSDS for inclusion in Operation and Maintenance Manual.
.4 Shop Drawings:
.1 Show each type of frame, door, core, metal thicknesses and finishes, openings (glazed and/or louvered), fire ratings, location of exposed fasteners, cutouts, hardware blanking, reinforcing, tapping and drilling arrangements.
.2 Show large scale frame sections and anchoring details.
.3 Submit door and frame schedule identifying each unit.
.4 Ensure each unit bears legible identifying mark corresponding to that listed in Door and Frame Schedule.
.5 Fabrication shall not proceed without receipt of reviewed submittal drawings and reviewed hardware schedule.
.5 Test Reports:
.1 Submit following test reports:
.1 Steel door and frame assemblies supplied under this Section meet acceptance criteria of ANSI A224.1 and ANSI A250.4, Level "A".
.2 Insulated door cores supplied in exterior doors under this Section meet specified thermal resistance rating.
.3 Thermally broken frames meet or exceed CAN/CGSB-82.5-M.
.4 Acoustic door and frame assemblies provide the Sound Transmission Class (STC) and sound Transmission Loss (TL) values specified with the critical frequency range, as determined and scheduled by the Consultant.

.5 Submit in addition to fire label, certificate to substantiate design and construction of firerated screen assemblies, if required by Consultant or authorities having jurisdiction.

1.6 REQUIREMENTS OF REGULATORY AGENCIES

.1 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104M and NFPA 252 for ratings specified or indicated.

.2 Provide fire labelled frame products for those openings requiring fire protection ratings, as scheduled.

.3 Test products in strict conformance with CAN4-S104, ASTM E 152 or NFPA 252 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Be responsible for supply of products under this Section to site in timely manner, so as not to delay progress of other trades.

.2 Protect doors and frames during shipping and storage.

.3 Inspect all materials thoroughly upon receipt and report all discrepancies, deficiencies and/or damages immediately in writing to the Supplier. Note all damage on carrier's Bill of Lading.

.4 Make good immediately any damage done. Clean scratches and touch up with rust-inhibitive primer. Replace damaged work which cannot be repaired, restored or cleaned.

.5 Store in a dry, secure location, on planks or dunnage. Doors and frame shall be stored in a vertical position, spaced with blocking. Materials shall be covered to protect them from damage but is such a manner as to permit air circulation. Site storage and protection of materials shall be in accordance with NAAMM-HMMA 840.

1.8 OPENING SIZES

.1 Method of measuring sizes:

.1 Width - Width of openings shall be measured from inside to inside of frame jamb rabbets.

.2 Height - Heights of openings shall be measured from the level finished floor (exclusive of floor coverings to the head rabbet of the frame.

.3 Door sizes - Doors shall be sized so as to fit the above openings and allow 3 mm maximum clearance at jambs and head of frame. A clearance of 6 mm maximum shall be allowed between the bottom of the door and the finished floor (exclusive of floor coverings). These are considered to be nominal clearances, subject to ordinary commercial variations.

1.9 WARRANTY

.1 Warrant work of this Section for period of one (1) year against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to; buckling, opening of seams, bond failure and extensive colour fading.

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.

.2 Place in appropriate on-site bins in accordance with Waste Management Plan.

.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 ACCEPTABLE MATERIALS

.1 Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:
- .1 Ambico Limited; www.ambico.com
- .2 Apex Industries; www.apexindustries.com
- .3 Daybar Industries Limited; www.daybar.com
- .4 Fleming Door Products Limited; www.flemingdoor.com

2.2 MATERIALS

.1 Hot dipped galvanized steel sheet: to ASTM A 526M or ASTM A 527M coating designation to ASTM A 525M, ZF75, minimum base steel thickness in accordance with CSDFMA Table 1 - Thickness for Component Parts.

.2 Reinforcement channel: to CAN/CSA-G40.21, Type 44W, coating designation to ASTM A 525M, ZF75.

2.3 DOORS: CORE MATERIALS

.1 Honeycomb construction:
- .1 Structural small cell, 24.5 mm maximum kraft paper 'honeycomb', weight: 36.3 kg per ream minimum, density: 16.5 kg/m3 minimum sanded to required thickness.

.2 Polystyrene Core:
- .1 ASTM C578, Type 1, rigid extruded fire retardant, closed cell board, density 16 to 32 kg/cu m, thermal values R-6.0 minimum. All exterior doors.

.3 Stiffened: face sheets welded, honeycomb, insulated core.
- .1 Fibreglass: to CSA A101, semi-rigid Type 1A density 24 kg/m3.

2.4 DOORS: CONSTRUCTION

.1 Form each face sheet for exterior doors from 18 ga sheet steel.

.2 Form each face sheet for interior doors from 18 ga sheet steel.

2.5 DOORS: FABRICATION GENERAL

.1 Doors: swing type, flush, with provision for glass and/or louvre openings as indicated.

.2 Exterior doors: hollow steel styrene insulated construction. Interior doors: honeycomb construction.

.3 Fabricate doors with longitudinal edges tack welded. Seams: grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.

.4 Blank, reinforce, drill doors and tap for mortised, templated hardware and electronic hardware.

.5 Reinforce doors where required, for surface mounted hardware. Provide flush vinyl top caps to exterior doors.

.6 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in strict conformance with CAN4-S104, ASTM E 152 or NFPA 252 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

.7 Manufacturer's nameplates on doors are not permitted.

.8 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.

.9 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

2.6 ADHESIVES

.1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
.2 Polystyrene and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.
.3 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, sealant/adhesive.

2.7 PRIMERS

.1 Touch-up prime CAN/CGSB-1.181.

2.8 ACCESSORIES

.1 Door silencers: single stud rubber/neoprene type.
.2 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.
.3 Metallic paste filler: to manufacturer's standard.
.4 Sealant: Refer to Section 07 92 00 - Joint Sealants.
.5 Door bottom seal: Refer to Section 08 71 00 - Door Hardware.
.6 Glazing: Refer to Section 08 80 00 - Glazing
.7 Fire labels: metal riveted.
.8 Make provisions for glazing as indicated and provide necessary glazing stops.
    .1 Provide removable steel glazing beads for use with glazing tapes and compounds and secured with countersunk steel screws.
    .2 Design exterior glazing stops to be tamper proof.

2.9 FRAMES: WELDED TYPE

.1 Welding in accordance with CSA W59.
.2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.
.3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.
.4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.
.5 Securely attach floor anchors to inside of each jamb profile.
.6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.
.7 When required due to site access or due to shipping limitations, frame products for large openings shall be fabricated in sections, with splice joints for field assembly by others.

2.10 FRAMES: SIDELITES AND SCREENS FABRICATION GENERAL

.1 Fire-Rated Frames: Fabricate fire-rated frames in accordance with underwriter's requirements using material not less than the thickness specified herein unless a greater thickness is stipulated by the labelling authority.
.2 Fabricate frames in accordance with CSDMA specifications.
.3 Fabricate frames to profiles and maximum face sizes and indicated.
.4 Exterior Frames: 1.5 mm wiped zinc finish steel, welded thermally broken type construction.
.5 Interior frames: 1.5 mm welded type construction.
.6 Blank, reinforce, drill and tap frames for mortised, templated hardware, and electronic hardware using templates provided by finish hardware supplier.
.7 Protect mortised cut outs with steel guard boxes.
.8 Manufacturer's nameplates on frames and screens are not permitted.
.9 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.
.10 Insulate exterior frame components with polyurethane insulation.
.11 Cut mitres and joints accurately and weld continuously all joints and seams on the inside of frame profile.

.12 Grind welded corners and joints of flat plane, fill with metallic paste filler and sand to uniform smooth finish.
.13 Stiffen frames over 1200mm unsupported width with minimum 1.2mm formed steel channel, funnel thickness and width of frame, welded into head profile.
.14 Install 2 bumpers on strike jamb for each single door and 2 bumpers at head for pair of doors.
.15 Provide 2 spreader bars per door frame of 1.5mm materials. Welded at base of frame to ensure alignment during shipment.
.16 Borrowed light and screens size as noted on drawings, with removable stop for glazing of frame, on inside room side.

2.11 FRAMES: EXTERIOR THERMALLY BROKEN

.1 Fabricate thermally broken frames separating exterior parts from interior parts with continuous interlocking thermal break.
.2 Thermal break: rigid polyvinyl chloride extrusion conforming to CGSB 41-GP-19Ma.

2.12 FRAME AND SCREEN ANCHORAGE

.1 Frame Anchors:
  .1 Frame anchor shall be provided with anchorage appropriate wall and frame construction.
.2 Floor Anchors:
  .1 Where frame is installed prior to construction of adjacent wall, each jamb shall be provided with 1.52 mm (16 ga) steel floor anchors.
  .2 Each anchor shall be provided with 2 (two) holes for mounting to floor and shall be securely welded to inside of jamb profile.
.3 Wall Anchors:
  .1 Each wall anchor shall be located immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.
  .2 Provide 2 anchors for rebate opening heights up to and including 1500 mm and one (1) additional anchor for each additional 760 mm of height or fraction thereof, except as indicated below.
  .3 For frames in previously placed concrete, masonry or structural steel provide anchors located not more than 150 mm from top and bottom of each jamb and intermediate anchors at 660 mm on center maximum.
  .4 Frame installed in steel stud and drywall partitions shall be provided with 20 gauge steel snap-in or "Z" stud type anchors.
  .5 Supply frame anchors to gypsum board installers with directions for installing steel door frames in solid gypsum board partitions.
  .6 Frame for installation in new masonry walls shall be provided with steel adjustable wall anchors of the T-strap, stirrup or wire, 16 gauge minimum or 0.156 in. diameter wire.
    .1 Straps shall be not less than 50mm x 254mm in size, corrugated and/or perforated.
  .7 Jambs of frames in previously placed concrete, masonry or structural steel shall be punched and dimpled to accept machine bolt anchors, 6.4mm diameter, located not more than 150mm from the top and bottom of each jamb.
  .8 Anchor preparations and guides shall also be located immediately above or below the intermediate hinge reinforcing and directly opposite on the strike jamb.
  .9 Each preparation shall be provided with 16 gauge anchor bolt guides.
  .10 On sidelights or windows exceeding 3m in width, installed in stud partitions, channel extensions shall be provided from the top of the frame assembly to the underside of the structure above.
  .11 Extensions shall be fabricated from 2.66 mm (12 ga) steel formed channels, mounting angles and adjusting brackets, with mounting angles welded to the inside of frame head.
  .12 Formed adjusting brackets and fasteners shall be shipped loose.

.13 Channels shall be mechanically connected to mounting angles and adjusting brackets with supplied fasteners, on site, by Subcontractor responsible for installation.

.4 Fire Rated Door and Frame Assemblies:

.1 Conform to CAN4-S104-M, CAN4-S105-M, NFPA 80 and NFPA 252.

2.13 HARDWARE PREPARATION

.1 Doors and frames shall be prepared to receive hardware.

.2 Unless otherwise shown on the drawings, locate hardware in accordance with the Recommended Locations For Architectural Hardware as published by the Door and Hardware Institute.

.3 Prepare doors and frames to receive electrified hardware.

.4 Frame preparation shall include the application of shallow back boxes suitable for EMT termination at all device locations.

.5 Back boxes shall be of sufficient size allowing for wiring, connectors, and the device to be properly installed in the mortise.

.6 Door preparation shall include the installation of conduit or suitable wire raceway within door assemblies during fabrication.

2.14 FABRICATION

.1 Permit access by an approved inspection and testing company for purpose of inspecting at random doors under fabrication.

.2 Welding: CSA W59-M.

.3 Grind exposed welds smooth and flush. Fill open joints, seams and depressions with filler or by continuous brazing or welding. Grind smooth to true sharp arises and profiles and sand down to smooth, true, uniform finish.

.4 Hardware Requirements and Preparations:

.1 Door and frame shall be blanked, reinforced, drilled and tapped at factory for fully templated hardware only in accordance with approved hardware schedule and templates provided by hardware Supplier.

.2 Check hardware list for requirements.

.3 Door and frame shall be blanked and reinforced only for mortised hardware that is not fully templated.

.4 Where surface mounted hardware, anchor hinges, thrust pivots, pivot reinforced hinges or non templated hardware apply, frame shall be reinforced only, with drilling and tapping done by others in field.

.5 Templated holes 12.7mm diameter and larger shall be factory prepared except mounting and through bolts holes which shall by Subcontractor responsible for installation on site, at time of application.

.6 Templated holes less than 12.7mm diameter shall be factory prepared only when required for function of device (for knobs, levers, cylinders, thumb or turn pieces) or when these holes over-lap function holes.

.7 Hinge reinforcing shall be 3.42 mm (10 ga) steel minimum, high frequency type be provided.

.8 Reinforcing for continuous hinges shall be 2.66 mm (12 ga) minimum.

.9 Cylindrical lock, ASA strike and flush bolt reinforcing shall be 2.66 mm (12 ga) steel minimum.

.10 Mortise lock and surface mounted hardware reinforcing shall be 1.52 mm (16 ga) steel minimum.

.11 Provide all hardware mortises on perimeter frame members shall be grouted.

.12 In masonry or concrete partitions with 0.76 mm (22 ga) steel grout guards. Where electrified hardware is specified on approved Hardware Schedule, steel door and frame shall have CSA approved system consisting of CSA approved conduit and junction boxes.

.13 Refer to Section 08 71 00 -Door Hardware for openings that require electrified hardware unless indicated otherwise.

.5 Frames - General:
.1 Fabricate frames for doors, screens and borrowed lights to profiles indicated.
.2 Reinforce frame as required for surface mounted hardware.
.3 For door frames wider than 1500 mm, reinforce door frame head and jamb and mullions at junction of head.
.4 Prepare each door opening for single stud door silencers: 3 for single door openings placed opposite hinges: 2 for double door openings approximately 150 mm each side of centreline of head stop.

2.15 ACCEPTABLE MATERIALS - GROUT

.1 Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:
.1 ChemRex Inc.; www.chemrex.com
.2 CPD Construction Products; www.cpd.ca
.3 Euclid Admixture Canada Inc.; www.euclidchemical.com
.4 Sika Canada Inc.; www.sikacanada.com
.5 W.R. Meadows of Canada; www.wrmeadows.com
.2 Spot Grout:
.1 Proportion when used at metal door frames; 1 part hardwall plaster to not more than 2- 1/2 parts Perlite by weight, with enough water added for `hand pack' consistency.
.2 Acceptable Materials:
.1 Gyproc 90 by Georgia-Pacific Canada, Inc.
.2 Durabond 90 by CGC Inc.
.3 Continuous Grout:
.1 Non-shrink, non-metallic, cementitious grout, containing no chlorides, conforming to ASTM C1107 for Grade C type grouts.
.2 Acceptable Materials:
.1 "Sika Grout 212" by Sika Canada Inc.
.2 "CG-86 Construction Grout" by W.R. Meadows of Canada Ltd.
.3 "Set Grout" by ChemRex Inc.
.4 Batt Insulation:
.1 Preformed gall fibre or rockwool batt or roll insulation, conforming to CAN/ULC-S702.
.2 Acceptable Materials:
.1 "QuietZone Acoustical Batts" by Owens Corning Canada Inc.
.2 "Roxul AFB - Acoustical Fire Batts" by Roxul Inc.
.3 Of type, minimum thickness, width to suit metal framing spacing and other miscellaneous spacings as indicated on Drawings.
.5 Threshold Sealant:
.1 As recommended by installer in accordance with Section 07 92 00 - Joint Sealants.

3 Execution

3.1 INSTALLATION GENERAL

.1 Install labeled steel fire rated doors and frames to NFPA 80 except where specified otherwise.
.2 Install doors and frames to CSDMA Installation Guide.

3.2 FRAME INSTALLATION - GENERAL

.1 Set frames plumb, square, level and at correct elevation.
.2 Secure anchorages and connections to adjacent construction.
.3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width.
.4 Provide vertical support at center of head for openings over 1200 mm wide.
.5 Provide vertical support at center of head for openings over 1200 mm wide.
.6 Remove temporary spreaders after frames are built-in.
.7 Caulk perimeter of frames between frame and adjacent material.

.8 Maintain continuity of vapor barrier and air barrier.

3.3 DOOR INSTALLATION - GENERAL

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Door Hardware.
.2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
  .1 Hinge side: 1.0 mm.
  .2 Latch side and head: 1.5 mm.
  .3 Finished floor, top of carpet: 13 mm.
.3 Adjust operable parts for correct function.
.4 Install louvers.

3.4 GLAZING

.1 Install glazing for doors and in accordance with Section 08 80 00 - Glazing.

3.5 FIRE LABELED DOORS AND FRAMES

.1 Install fire labeled doors and frames in accordance with manufacturer's printed instructions and NFPA 80.
.2 Verify labeled doors and frames are placed in their designated openings.
.3 Review, inspect and certify where required by authorities having jurisdiction.

3.6 HOLLOW METAL DOORS

.1 Install hollow metal doors in accordance with manufacturer's instructions.
.2 Install in accordance with following edge clearances unless otherwise indicated:
  .1 Between doors and frames at head and jambs: 3 mm.
  .2 At door bottom: 19 mm maximum to unfinished floor, 6 mm maximum to finished floor unless indicated to be undercut.
  .3 Between meeting edges of pairs of doors: 3 mm.

3.7 HOLLOW METAL FRAMES

.1 Install hollow metal frames in accordance with manufacturer's instructions.
.2 Set frames plumb, square, level and at correct elevation, maintaining uniform door width and height.
.3 Secure anchorages and connections to adjacent construction.
.4 Brace frames rigidly in position while being built in.
.5 Provide vertical supports and horizontal spreaders to prevent deflection and warping.
.6 Allow for deflection to prevent structural loads from being transmitted to frame.
.7 Provide expanding foam insulation to completely fill pressed steel frames of exterior doors and adjacent cavities.
.8 Door Jamb Extensions:
  .1 Provide solid blocking and securement between all door frame extensions, metal stud and door frames at a minimum four locations per door jamb.

3.8 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation with zinc primer to CGSB 1-GP-181.
.2 Fill exposed frame anchors and with metallic paste filler and sand to a uniform smooth finish.

END OF SECTION

1 General

1.1 WORK INCLUDED

.1 Flush wood doors.

1.2 RELATED REQUIREMENTS

.1 Section 06 20 00 - Finish Carpentry.
.2 Section 08 11 13 - Hollow Metal Doors and Frames.
.3 Section 08 71 00 - Door Hardware.
.4 Section 08 80 00 - Glazing.
.5 Section 09 91 00 - Painting.
.6 Division 23 - Mechanical Grilles.

1.3 REFERENCES

.1 Architectural Woodwork Manufacturers Association of Canada (AWMAC).
  .1 Quality Standards for Architectural Woodwork 1998.
.2 Canadian General Standards Board (CGSB).
  .1 CAN/CGSB-71.19-M88, Adhesive, Contact, Sprayable.
  .2 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.
.3 Canadian Standards Association (CSA International).
  .1 CSA A440.2-98, Energy Performance of Windows and Other Fenestration Systems.
  .2 CSA-A440.S1, Canadian Supplement.
  .3 AAMA/WDMA/CSA 101/I.S.2/A-440.
  .4 CSA O115-M1982(R2001), Hardwood and Decorative Plywood.
  .5 CAN/CSA O132.2 Series-90(R1998), Wood Flush Doors.
  .6 CAN/CSA-O132.5-M1992(R1998), Stile and Rail Wood Doors.
  .7 CSA Certification Program for Windows and Doors 00.
.4 American National Standards Institute (ANSI):
  .1 A208.1 - Standard for Particleboard.
  .2 (ASTM): ASTM D 1761 - Screw Withdrawal Test Method.
.5 American Society for Testing and Materials (ASTM)
  .1 ASTM D 5456 - Standard Specification for Evaluation of Structural Composite Lumber Products.
  .2 (ASTM): ASTM D 1761 - Screw Withdrawal Test Method.
  .3 ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
  .4 ASTM E413 - Classification for Rating Sound Insulation.
  .5 ASTM E 1332 - Standard Classification for Determination of Outdoor-indoor Transmission Class.
  .6 ASTM E 2235 - Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods.
.6 American Society for Testing and Materials.
  .1 ASTM E 152-81a, Methods for Fire Tests of Door Assemblies.
.7 National Fire Protection Association (NFPA).
  .1 NFPA 80-1999, Standard for Fire Doors and Fire Windows.
  .2 NFPA 252-1999, Standard Method of Fire Tests of Door Assemblies.
.8 Underwriters' Laboratories of Canada (ULC).
  .1 CAN-4S104M-80(R1985), Fire Tests of Door Assemblies.
  .2 CAN4-S105M-85 (R1992), Fire Door Frames Meeting the Performance Required by CAN4-S104.
  .3 Underwriters' Laboratories (UL): UL 10B - Standard for Fire Test of Door Assemblies;
  .4 Underwriters Laboratories (UL): UL 10C - Standard for Positive Pressure Fire Test of Door Assemblies.

.5 Underwriters Laboratories Canada (ULC): CAN 4-S104 - Fire Test of Door Assemblies.

.9 Uniform Building Code (UBC):
- .1 UBC 7-2-1994 UBC Fire Test (Neutral Pressure).
- .2 UBC 7-2-1997 UBC Fire Test (Positive Pressure).

.10 ANSI:
- .1 ANSI/NEMA LD 3-05, High Pressure Decorative Laminates.
- .2 ANSI/NEMA LD 3.1-05, Application, Fabrication and Installation of High Pressure Decorative Laminates.

1.4 SUBMITTALS

.1 Make submittals in accordance with Division 01 - General Requirements.

.2 Manufacturer's data sheets on each type of door, including:
- .1 Preparation instructions and recommendations.
- .2 Storage and handling requirements and recommendations.
- .3 Installation methods.

.3 Material Safety Data Sheets:
- .1 Submit MSDS for adhesives for inclusion in Operation and Maintenance Manual.

.4 Shop Drawings:
- .1 Include details of the following items on shop drawings:
- .2 Door elevations, types, all sizes and fire ratings.
- .3 Glass location, opening size, thickness, and glazing trim.
- .4 Louver locations and opening size.
- .5 Face material and grade.
- .6 Edge material and thickness.
- .7 Fire ratings and type of door cores being supplied for rated openings.
- .8 Undercuts, hardware location and machining requirements.

1.5 QUALITY ASSURANCE

.1 Wood doors shall conform to the Quality Standards for Architectural Woodwork as published by the Architectural Woodwork Manufacturers Association of Canada (AWMAC) for the grade of door specified herein.

.2 Non-Fire-Rated Doors:
- .1 Provide doors that comply with AWI Section 1300 and WDMA 1.S. 1A.

.3 Regulatory Requirements:
- .1 Provide doors that comply with NEPA 80, NFPA 252, UL 10B or UL 10C, as applicable and as acceptable to authorities having jurisdiction, and that are listed and labeled by ITS-WH or a qualified testing agency.
- .2 Notify Consultant prior to fabrication if fire doors required cannot qualify for labeling due to design size hardware or other requirement.

.4 Oversize Fire Rated Wood Doors:
- .1 Manufacturer to provide a certificate stating that the doors conform to all standard construction requirements for tested and labeled fir door assemblies except as to size.
- .2 Notify Consultant prior to fabrication if fire doors required cannot qualify for labeling due to design, size, hardware or other requirement.

.5 Single Source Responsibility:
- .1 Provide doors from a single source to ensure uniformity in quality of appearance, face veneer, finish and construction.

.6 Hardware Installation Reference Standard:
- .1 Standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame manufacturer's Association (CSDFMA).

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Storage and Protection:
- .1 Store products in manufacturer's unopened packaging until ready for installation. Inspect for damage.
- .2 Storage and Protection: Comply with door manufacturer's written recommendations and requirements of AWI Section 1300 G-23 and WDMA standards.
- .3 Protect doors from dampness. Arrange for delivery after work causing abnormal humidity has been completed.
- .4 Store doors in well ventilated room, off floor, in accordance with manufacturer's recommendations.
- .5 Protect doors from scratches, handling marks and other damage. Wrap doors.
- .6 Store doors away from direct sunlight.

.2 Marking and Packaging:
- .1 Factory labels shall indicate door opening numbers and correspond with approved door schedule for size and door types.

.3 Maintain environmental conditions including temperature, humidity, and ventilation within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits. Inspect for damage prior to installation.

1.7 WARRANTY

.1 Provide manufacturer's standard warranty against defects in materials and workmanship for the following duration:
- .1 Warranty Period, Interior Doors: For the lifetime of the door.

.2 Defects include, but are not limited to, bubbling, delamination of faces or edges, warp, twist bow exceeding 6mm, and telegraphing of core.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.

.2 Place in appropriate on-site bins in accordance with Waste Management Plan.

.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 WOOD DOORS

.1 Ultra Heavy Duty, Anti-Warping construction for intensive use.

.2 Styles:
- .1 3mm thick veneer, longitudinally laminated by hot pressing with type 1 structural glue in compliance with ASTM D5456-93 (LVL) including a 22 mm piece of hardwood, matched with faces, total width 107mm.

.3 Top and Bottom Rails:
- .1 3 mm thick veneer, longitudinally laminated by hot pressing with type 1 structural glue, as per ASTM D5456-93, for total width of 85mm.

.4 Core:
- .1 Solid particleboard. Density of 28-32 lbs per cubic foot. Complies with CSA-0188 and ANSI A208-1 standards (LD-1 / LD-2).

.5 Faces:
- .1 Hardboard panel, refer to Material / Finish Schedule.

.6 Lock Block: Integrated

.7 Glue: Type1 PVA Cross-link (UFF).

.8 Styles & rails: to receive one (1) coat of clear sealer.

.9 Factory finish is required for all 6 sides (sealer 4 edges, plus laminate on 2 faces).

.10 Interior use.
.11 Warranty, Lifetime
.12 Clearances:
  .1 3mm top and both jambs, 19mm bottom.
.13 Acceptable Material:
  .1 Baillargeon Doors 8500
.14 Closet Doors Only
  .1 Acceptable Material:
    .1 Baillargeon 8100

2.2 WOOD DOORS - 45 MINUTE FIRE RESISTANT RATING

.1 Ultra Heavy Duty, Anti-Warping construction for intensive use.
.2 Styles:
  .1 Minimum 36.5mm high-density mineral and /or SCL and untreated hardwood compliant with W/H label requirements. Bonded to core.
.3 Top and Bottom Rails:
  .1 Minimum 58mm high density mineral or SCL compliant with W/H label requirements.
.4 Core:
  .1 Low combustible agri-fibre. Density of 34-38 lbs per cubic square foot.
.5 Faces:
  .1 Wood veneer, refer to Material / Finish Schedule.
  .2 Hardboard panel, refer to Material / Finish Schedule.
.6 Lock Block: Integrated
.7 Glue: Type1 PVA Cross-link (UFF).
.8 Styles & rails: Clear finish sealer BC-00-25, factory applied.
.9 Factory finish is required for all 6 sides (sealer 4 edges, plus laminate on 2 faces).
.10 Interior use.
.11 Warranty, Lifetime
.12 Clearances:
  .1 3mm top and both jambs, 19mm bottom.
.13 Acceptable Material:
  .1 Baillargeon Doors 8500 AF45

2.3 WOOD DOORS - 90 MINUTE FIRE RESISTANT RATING

.1 Ultra Heavy Duty, Anti-Warping construction for intensive use.
.2 Styles:
  .1 Minimum 19mm high density mineral and untreated hardwood, compliant with W/H label requirements.
.3 Top and Bottom Rails:
  .1 Minimum 35mm mineral or untreated hardwood compliant with W/H label requirements. Bonded to core.
.4 Core:
  .1 Non-combustible material.
.5 Faces:
  .1 Wood veneer, paint grade birch veneer, rotary cut, 2 ply plywood.
  .2 Hardboard panel, refer to Material / Finish Schedule.
.6 Lock Block: Integrated
.7 Glue: Type1 PVA Cross-link (UFF).
.8 Styles & rails: Clear finish sealer BC-00-25, factory applied.
.9 Factory finish is required for all 6 sides.
.10 Interior use.
.11 Warranty, Lifetime
.12 Clearances:
  .1 3mm top and both jambs, 13mm bottom.
.13 Acceptable Material:

.1 Baillargeon Doors 5045

2.4 GLAZING

.1 Interior Glass: Refer to Section 08 80 00 - Glazing.
.2 Stops:
.1 Finish to match door colour, by Section 09 91 00 - Painting.

2.5 FABRICATION

.1 Fabricate doors and panels in accordance with CSA 0132.2 to ULC requirements where fire-rated doors are indicated.
.2 Prepare doors for glass and provide hardwood birch species glazing stops and stickings with mitred corners.
.3 Prepare doors for louvers (door grilles).
.4 Bevel vertical edges of single acting doors 3 mm on lock side.
.5 Radius vertical edges of double acting doors to be 60mm radius.
.6 Shop prepare doors for hardware installation. Templates to be supplied by Finish Hardware Supplier.
.7 Fabricate to AWMAC standards.

3 Execution

3.1 EXAMINATION

.1 Do not begin installation until adjacent construction has been properly prepared.

3.2 PREPARATION

.1 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 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.

3.4 INSTALLATION

.1 Unwrap and protect doors in accordance with CAN/CSA-O132.2 Series, Appendix A.
.2 Install labeled fire rated doors to NFPA 80.
.3 Install doors and hardware in accordance with manufacturer's printed instructions and CAN/CSA-O132.2 Series, Appendix A.
.4 Adjust hardware for correct function.
.5 Install glazing in accordance with Section 08 80 00 - Glazing.
.6 Install louvers.
.7 Secure transom and side panels by means of stops.
.8 Install all hardware in accordance with templates and manufacturer's instructions.
.9 Install all push/pull plates on doors with outer edge 75 mm from edge of door, except where glazing does not permit.
.10 Provide proper protection of all hardware items until Owner accepts project as complete.

3.5 WOOD DOORS

.1 Install plastic laminated wood doors in accordance with manufacturer's instructions.
.2 Install in accordance with following edge clearances unless otherwise indicated:
.1 Between doors and frames: at head and jambs: 3 mm.
.2 At door bottom: 9 mm maximum unless doors are indicated to be undercut.
.3 Between meeting edges of pairs of doors: 3 mm.
.4 Cut, drill and prepare doors to template to receive hardware.

3.6 ADJUSTMENT

.1 Re-adjust doors and hardware just prior to completion of building to function freely and properly.

.2 Adjust hardware for proper door function and latching, and for smooth operation without excessive force for excessive clearance.

3.7 UNDERCUT DOORS

.1 Provide special door undercuts if indicated on door schedule.

3.8 CLEANING

.1 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.2 Remove traces of primer, caulking; clean doors and frames.

.3 Clean glass and glazing materials with approved non-abrasive cleaner.

.4 On completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

1 General

1.1 WORK INCLUDED

.1 Provide labour, materials and other services to complete the fabrication and installation of the pre-finished aluminum doors and frames, including all materials and components required for the operation of any doors included, in the manner, direction and performance shown on the architectural drawings and specified herein.

1.2 RELATED REQUIREMENTS

.1 Section 05 50 00 - Metal Fabrications.
.2 Section 06 10 00 - Rough Carpentry.
.3 Section 07 92 00 - Joint Sealants.
.4 Section 08 71 00 - Door Hardware.
.5 Section 08 80 00 - Glazing.
.6 Section 26 05 20 - Wire and Box Connectors.
.7 Section 26 27 26 - Wiring Devices.

1.3 REFERENCES

.1 Aluminum Association (AA).
  .1 DAF 45-03, Designation System for Aluminum Finishes.
.2 American Architectural Manufacturers Association (AAMA).
  .1 AAMA 609-93, Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.
.3 American Society for Testing and Materials International, (ASTM).
  .1 ASTM E330 02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
.4 Canadian General Standards Board (CGSB).
  .1 CGSB 1.40 97, Primer, Structural Steel, Oil Alkyd Type.
  .2 CAN/CGSB 12.1 M90, Tempered or Laminated Safety Glass.
  .3 CAN/CGSB 12.20 M89. Structural Design of Glass for Buildings.
.5 Canadian Standards Association (CSA International).
  .1 CAN/CSA G40.20/G40.21 98, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  .2 CAN/CSA G164 M92, Hot Dip Galvanizing of Irregularly Shaped Articles.

1.4 SYSTEM DESCRIPTION

.1 Design Criteria.
  .1 Design frames and doors in exterior walls to:
    .1 Expansion and contraction within service temperature range of - 35 to 35 degrees C.
    .2 Limit deflection of mullions to maximum 1/175th of clear span when tested to ASTM E330 under wind load of 1.2 kpa
    .3 Movement within system.
    .4 Movement between system and perimeter framing components or substrate.
.2 Size glass thickness and glass unit dimensions to limits in accordance with CAN/CGSB-12.20.
.3 Tie in to exterior wall air barrier and vapor barrier to provide continuous air barrier and vapour retarder through door system. Primarily in line with inside pane of glass and heel bead of glazing compound.

1.5 SUBMITTALS

.1 Submit shop details and erection drawings in accordance with Division 01 - General Requirements.

.2 Product Data:

- .1 Submit manufacturer's printed product literature, specifications and data sheets.
- .2 Submit two copies of WHMIS MSDS Material Safety Data Sheets. Indicate VOC's for caulking materials during application and curing.

.3 Manufacturer's Instructions:

- .1 Submit manufacturer's installation instructions.

.4 Manufacturer's Field Reports:

- .1 Submit two copies of manufacturers field reports.

.5 Shop Drawings:

- .1 Each shop drawing submitted shall bear stamp and signature of qualified professional engineer registered or licensed to practice in the Province of Prince Edward Island, Canada.
- .2 Indicate materials and profiles and provide full-size, scaled details of components for each type of door and frame. Indicate:
  - .1 Interior trim and exterior junctions with adjacent construction.
    - .1 Junctions between combination units.
    - .2 Elevations of units.
    - .3 Core thicknesses of components.
    - .4 Type and location of exposed finishes, method of anchorage, number of anchors, supports, reinforcement, and accessories.
    - .5 Location of caulking.
    - .6 Each type of door system including location.
    - .7 Arrangement of hardware and required clearances.
    - .8 Submit catalogue details for each type of door and frame illustrating profiles, dimensions and methods of assembly.

1.6 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for cleaning and maintenance of aluminum finishes for incorporation into manual specified in Division 01 - General Requirements.

1.7 QUALITY ASSURANCE

.1 Certificates: Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements in accordance with Division 01 - General Requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Storage and Protection:

- .1 Apply temporary protective coating to finished surfaces. Do not use coatings that will become hard to remove or leave residue.
- .2 Leave protective covering in place until final cleaning of building.

1.9 WARRANTY

.1 The work of this division shall be guaranteed against defects in materials and workmanship for a period of 1 year following the date of substantial completion.

1.10 MAINTENANCE DATA

.1 Provide Maintenance data for cleaning and maintenance of aluminum finishes for incorporation into maintenance manual specified in Division 01 - General Requirements.

1.11 PROTECTION

.1 Apply temporary protective coating to finished surfaces. Remove coating after erection and as indicated by Consultant. Do not use coatings that will become hard to remove or leave residue.

1.12 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 MATERIALS

.1 Aluminum extrusions: Aluminum Association alloy AA6063 T6 anodizing quality.
.2 Sheet aluminum: Aluminum Association alloy AA5005 H34 anodizing quality.
.3 Steel reinforcement: to CAN/CSA G40.20/G40.21, grade 300 W.
.4 Fasteners: stainless steel.
.5 Weatherstrip:
  .1 Thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.
  .2 Meeting stiles on pairs of doors shall be equipped with an adjustable astragal using wool pile with polymeric fin, replaceable plastic.
.6 Door bumpers: black neoprene.
.7 Door bottom seal: operable and automatic door seal of anodized extruded aluminum frame and vinyl weather seal, recessed in door bottom automatic retract mechanism when door is open.
.8 Isolation coating: epoxy resin solution.
.9 Glazing materials: Refer to Section 08 80 00 - Glazing.
.10 Sealants: See Section 07 92 00 - Joint Sealants.
.11 Threshold: Extruded aluminum, one piece per door opening (or pair), with ribbed surface thermally broken.
.12 Continuous Hinge.
.13 Sill Sweep Strips: EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners.

2.2 ALUMINUM FINISHES

.1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.
  .1 Permanodic anodized finish.
  .2 Factory applied thermosetting fluoropolymer coating AAMA 605.2
.2 Appearance and properties of anodized finishes designated by the Aluminum Association as Architectural Class 1, Architectural Class 2, and Protective and Decorative.
.3 Colour: Refer to Material / Finish Schedule.

2.3 ALUMINUM DOORS - THERMALLY BROKEN

.1 Construct doors of porthole extrusions with minimum wall thickness of 3 mm.
.2 Door stiles nominal 141.3 mm wide plus or minus 6 mm.
.3 Top rail nominal 141.3 mm wide plus or minus 6 mm.
.4 Bottom rail nominal 179.4 mm wide plus or minus 6 mm.
.5 Center rail nominal 179.4 mm wide plus or minus 6 mm.
.6 Door thickness: 57.2mm.

.7 Reinforce mechanically joined corners of doors to produce sturdy door unit.
.8 Glazing stops: interlocking snap in type for dry glazing. Exterior stops: tamper proof type.
.9 Provide thermally broken doors for exterior.
.10 Hardware: Refer to Section 08 71 00 - Door Hardware.
.11 Standard of Acceptance:
  .1 Kawneer 560 Insulclad.
  .2 Alumicore 7700 Thermaporte.

2.4 SIDELIGHTS

.1 Construct sidelights of porthole extrusions with minimum wall thickness of 3 mm and top, jamb and bottom rails to match doors.
.2 Reinforce mechanically joined corners of doors to produce sturdy door unit.
.3 Glazing stops: interlocking snap in type for dry glazing. Exterior stops: tamper proof type.
.4 Provide thermally broken sections for exterior.

2.5 ALUMINUM FRAMES - THERMALLY BROKEN

.1 Construct thermally broken, insulated frames of aluminum extrusions with minimum wall thickness of 4.8 mm.
.2 Frame members 63.5mm x 160.3mm.
.3 Acceptable Material:
  .1 Alumicor Ltd., ThermaWall 2600 Series.
  .2 Kawneer, 7500 Wall System.

2.6 STEEL FINISHES

.1 Finish steel clips and reinforcing steel with zinc coating to CSA G164.

2.7 HARDWARE

.1 Refer to Section 08 71 00 - Door Hardware.
.2 Door Signs:
  .1 Sign Material: Self adhesive type for mounting on glass.
  .2 Provide "AUTOMATIC-CAUTION-DOOR" and "ATTENTION! PORTE AUTOMATIQUE" sign on both sides of power operated swing doors serving two-way traffic. Yellow circle with black letters except the word "CAUTION" to be yellow letters on black background. Design and mounting location to CAN/CGSB-69.26-96. At each door with power operator.
  .3 Provide international pictogram sign for disabled persons on door leaf.

2.8 GLAZING

.1 Refer to Section 08 80 00 - Glazing for exterior glazing requirements.

2.9 FABRICATION GENERAL

  .1 Doors and framing to be by same manufacturer.
  .2 Fabricate doors and frames to profiles and maximum face sizes as shown. Provide minimum 25 mm bite for insulating glazed units.
  .3 Provide structural steel reinforcement as required for adequate strength, stiffness and connections.
  .4 Accurately fit intersecting members to flush hairline, weathertight joints and mechanically interlock together.
  .5 Conceal fastenings.
  .6 Accurately form cut-outs, recesses, mortising or milling required for finishing hardware in accordance with templates supplied and adequately reinforce with aluminum or galvanized steel plates.
  .7 Isolate aluminum from direct contact with dissimilar metals, concrete and masonry.

.8 Provide weatherstripping of a type which will permit replacement without special tools.
.9 Construct doors to sizes indicated on schedule, using porthole extrusions.
.10 Reinforce and plug weld corners using heavy extruded aluminum corner keys to ensure maximum strength at these critical stress points.
.11 Provide glazing stops of interlocking snap-in type for dry glazing.

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 Set frames plumb, square, level at correct elevation in alignment with adjacent work.
.2 Anchor securely.
.3 Install doors and hardware in accordance with hardware templates and manufacturer's instructions.
.4 Adjust operable parts for correct function.
.5 Make allowances for deflection of structure to ensure that structural loads are not transmitted to frames.

3.3 GLAZING

.1 Glaze aluminum doors and frames in accordance with Section 08 80 00 - Glazing.

3.4 CAULKING

.1 Seal joints to provide weather tight seal at outside and air, vapour seal at inside.
.2 Apply sealant in accordance with Section 07 92 00 - Joint Sealants. Conceal sealant within the aluminum work except where exposed use is permitted by Consultant.

3.5 FIELD QUALITY CONTROL

.1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.

3.6 CLEANING

.1 Perform cleaning of aluminum components in accordance with AAMA 609.1 - Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.
.2 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
.3 Clean aluminum with damp rag and approved non-abrasive cleaner.
.4 Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames.
.5 Clean glass and glazing materials with approved non-abrasive cleaner.
.6 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 92 00 - Joint Sealants.
.2 Section 07 21 16 - Blanket Insulation.
.3 Section 07 21 19 - Foamed-in-Place Insulation.
.4 Section 07 26 00 - Vapor Retarders.

1.2 REFERENCES

.1 Aluminum Association (AA), Designation System for Aluminum Finishes (2000).
.2 NAFS North American Fenestration standard Specification for Windows, Doors and Skylights - 2008.
.3 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-79.1-M91, Insect Screens.
.4 Canadian Standards Association (CSA) International
  .1 CSA-A440.S1, Canadian Supplement.
  .2 AAMA/WDMA/CSA 101/I.S.2/A-440.
  .3 CAN/CSA-Z91-M90(R2000), Safety Code for Window Cleaning Operations.

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Division 01 - General Requirements.
.2 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes fasteners, and caulking. Indicate location of manufacturer's nameplates.
.3 Indicate tie-in of air barrier and vapor barrier to window frame and sealing of air barrier at frame.

1.4 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for windows for incorporation into manual specified in Division 01 - General Requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 MATERIALS

.1 Materials: to CSA-A440/A440.1 supplemented as follows:
.2 All vinyl windows by same manufacturer.
.3 Sash: extruded vinyl, minimum wall thickness 1.65mm.
.4 Main frame: extruded vinyl, minimum wall thickness 1.65mm.
.5 Glass: sealed insulated glass units, glass thickness as required to meet wind load resistance.
.6 Screens: to CAN/CGSB-79.1, plastic-coated fiberglass screen cloth in prefinished aluminum frame.
  .1 Insect screening mesh: count 18 x 14.
  .2 Fasteners: tamper proof.
  .3 Screen frames: steel color to match window frames.
  .4 Mount screen frames for interior replacement.

.7 Accessories:
.1 Provide metal straps on all four sides of window for securing frame in opening.

2.2 WINDOW TYPE AND CLASSIFICATION

.1 Classification rating: to CSA-A440/A440.1.
.1 Air tightness: A3.
.2 Water tightness: B3.
.3 Wind load resistance: C3.
.4 Condensation resistance: Temperature Index, I 55.7 (ventilators).
.5 Forced Entry: F1.
.6 Insect Screens: S1.
.7 Glazing: G1.
.2 Standard of Acceptance:
.1 Kohltech Windows
.1 Vinyl: sizes per Drawings
.2 Brick mould: 7/8" with nailing flange, Picture Narrow Profile (PN).
.3 Grilles: None.
.4 Interior Accessories: Screens & 3/4" integral return for window liners, complete with rotary handle & locking hardware.
.5 Glazing: Sealed Insulating Glass, Double Pane, Energlas LSG, SHGC 0.28, VLT 0.51, R4.1 center of glazing

2.3 FABRICATION

.1 Fabricate in accordance with CSA-A440/A440.1 supplemented as follows:
.1 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.
.2 Face dimensions detailed are maximum permissible sizes.
.3 Brace frames to maintain squareness and rigidity during shipment and installation.
.4 Finish steel clips and reinforcement with shop coat primer to CAN/CGSB-1.40 g/m2 zinc coating to CAN/CSA-G164.

2.4 VINYL FINISHES

.1 Vinyl finishes: in accordance with CSA-A440/A440.1, including appendices, supplemented as follows:
.1 Colour: white inside, Refer to Material / Finish Schedule for the exterior colour.

2.5 GLAZING

.1 Glaze windows in accordance with CSA-A440/A440.1.
.2 Factory glaze windows.

2.6 AIR BARRIER AND VAPOUR RETARDER

.1 Equip window frames with factory installed air barrier material for sealing to building air barrier as follows:
.1 Material: identical to, or compatible with, building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.
.2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier from interior.

3 Execution

3.1 WINDOW INSTALLATION

.1 Install in accordance with CSA-A440/A440.1 and in accordance with manufacturers written instructions.

3.2 CAULKING

.1 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.

.2 Apply sealant in accordance with Section 07 92 10 - Joint Sealing. Conceal sealant within window units except where exposed use is permitted by Consultant.

3.3 CLEANING

.1 Clean window frames and glass.

.2 Remove labels and visible markings.

END OF SECTION

This page intentionally left blank

1 General

1.1 SUMMARY

.1 Supply and deliver all finish hardware as specified in hardware sets for doors listed on door schedule. Hardware shall include all fasteners and devices necessary for the proper installation of hardware.

1.2 RELATED REQUIREMENTS

.1 Section 08 11 13 - Hollow Metal Doors and Frames.
.2 Section 08 14 16 - Flush Wood Doors.
.3 Section 08 41 13 - Aluminum-Framed Entrance and Storefronts.
.4 Division 26 - Electrical wiring.

1.3 REFERENCES

.1 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).
  .1 CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frames Manufacturer's Association.
.2 Canadian General Standards Board (CGSB).
  .1 CAN/CGSB 69.17 M86(R1993), Bored and reassembled Locks and Latches.
  .2 CAN/CGSB 69.18 M90/ANSI/BHMA A156.1 1981, Butts and Hinges.
  .3 CAN/CGSB 69.19 93/ANSI/BHMA A156.3 1984, Exit Devices.
  .4 CAN/CGSB 69.20 M90/ANSI/BHMA A156.4 1986, Door Controls (Closers).
  .5 CAN/CGSB 69.21 M90/ANSI/BHMA A156.5 1984, Auxiliary Locks and Associated Products.
  .6 CAN/CGSB 69.22 M90/ANSI/BHMA A156.6 1986, Architectural Door Trim.
  .7 CAN/CGSB 69.24 M90/ANSI/BHMA A156.8 1982, Door Controls Overhead Holders.
  .8 CAN/CGSB 69.26 96/ANSI/BHMA A156.10 1991, Power operated Pedestrian Doors.
  .9 CAN/CGSB 69.28 M90/ANSI/BHMA A156.12 1986, Interconnected Locks and Latches.
  .10 CAN/CGSB 69.29 93/ANSI/BHMA A156.13 1987, Mortise Locks and Latches.
  .11 CAN/CGSB 69.30 93/ANSI/BHMA A156.14 1991, Sliding and Folding Door Hardware.
  .12 CAN/CGSB 69.31 M89/ANSI/BHMA A156.15 1981, Closer/Holder Release Device.
  .13 CAN/CGSB 69.32 M90/ANSI/BHMA A156.16 1981, Auxiliary Hardware.
  .14 CAN/CGSB 69.33 M90/ANSI/BHMA A156.17 1987, Self closing Hinges and Pivots.
  .15 CAN/CGSB 69.34 93/ANSI/BHMA A156.18 1987, Materials and Finishes.
  .16 CAN/CGSB 69.35 M89/ANSI/BHMA A156.19 1984, Power Assist and Low Energy Power Operated Doors.
  .17 CAN/CGSB 69.36 M90/ANSI/BHMA A156.20 1984, Strap and Tee Hinges and Hasps.
.3 All hardware shall comply with requirements of the National Building Code (2015).
.4 Door and Hardware Institute - Recommended locations for Architectural Hardware for Standard Steel Doors and Frames
.5 Door and Hardware Institute - Recommended locations for Architectural Hardware for Flush Wood Doors
.6 NFPA 80-Standard for Fire Doors and Windows, 1999 Edition
.7 Door and Hardware Institute - Sequence Format for Hardware Schedule
.8 Door and Hardware Institute - Key Systems and Nomenclature
.9 Door and Hardware Institute - Abbreviations and Symbols used in Architectural Door and Hardware Schedules and Specifications
.10 Door and Hardware Institute – Installation Guide for Doors and Hardware

1.4 PRODUCTS SUPPLIED BUT NOT INSTALLED IN THIS SECTION

.1 Power supplies, compressor/control boxes, junction boxes installed by Division 26.

1.5 REQUIREMENTS OF REGULATORY AGENCIES

.1 Use ULC listed and labeled hardware for doors in fire separations and where noted on Door Schedule (located at the end of this document in the Schedules section).

1.6 SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Division 01 - General Requirements.

.2 Hardware List:
- .1 Submit Finish Hardware Schedule electronically for approval.
- .2 Schedule shall be written in accordance with DHI Sequence and Format for vertical hardware schedule publication.
- .3 Schedule shall reference item and door number to hardware set specified.
- .4 Door index to be included referencing the door number to scheduled item number.
- .5 Submit electronic copies of keying schedules for approval.
- .6 Schedule shall be written in accordance with DHI Handbook Keying Schedule Systems and Nomenclature. Coordinate all keying in writing.

.3 Keying Schedule:
- .1 After a keying meeting between representatives of the Owner, Architect and hardware supplier furnish a keying schedule listing the levels of keying as well as an explanation of the key system's function, the key symbols used and the door numbers controlled. Utilize “Door and Hardware Institute - Key Systems and Nomenclature” as a guideline for nomenclature, definitions, and approach for selecting the optimal keying system. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.

.4 Wiring Diagrams
- .1 Co-ordinate with related trades, meet with the owner and security provider and submit a written description of the functional use (mode of operation) of electrical hardware products specified. Include operation for ingress, egress, fire alarm, and after hours use where applicable. Include door and frame elevations showing the location of each item of electrical hardware to be installed, mode of operation including a diagram showing number and size of conductors. Indicate on elevation drawing items provided by related trades, include for back boxes, and 120V power sources. Provide point to point drawings showing terminal connections necessary for a complete installation.

.5 Manufacturer's Instructions:
- .1 Submit manufacturer's installation instructions.
- .2 Provide template drawings as requested.

.6 Closeout Submittals
- .1 Provide operation and maintenance data for door closers, lockets, door holders electrified hardware and fire exit hardware for incorporation into manual specified in Division 01 - General Requirements.

1.7 QUALITY ASSURANCE

.1 Hardware supplier must have on staff an Architectural Hardware Consultant or person of equivalent qualification and experience. Hardware supplier must have been in hardware supply for a minimum of two (2) years, have supplied similar type projects, and have adequate facilities to service project.

.2 Alternates

.1 Only approved products specified are accepted. Make alternate requests in accordance with Division 1. Include product data and indicate benefit to the project.

.3 Supplier Qualifications

.1 Successful hardware distributor to have a minimum of five (5) years' experience in the door and hardware industry. Distributor to have on staff an Architectural Hardware Consultant (A.H.C.) whose name will be listed on the hardware schedule title page submittal and will be responsible for scheduling, detailing, (see Reference 1.5.4) ordering and co-ordination of the finishing hardware for this project. If so requested by the Architect and or installer this individual will be required to visit the jobsite for any installation problems that may occur.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Trade Contractor to provide clean, dry locked room for storage of hardware on shelving.

.2 Each hardware item shall be delivered to site in manufacturers original packaging. Each item shall be labeled with door and item number to correspond with hardware schedule.

.1 Mark cartons with heading number, door number, and key-set symbol where applicable in original packaging provided by the manufacturer. Pack packaged hardware in suitable wrappings and containers to protect it from damage during shipping and storage.

.2 Enclose accessories, fastening devices and other loose items with each applicable item of hardware.

.3 All hardware will be delivered to one receiving are on site.

1.9 WARRANTY

.1 Provide warranties by the accepted manufacturers:

Hardware Item	Length of Warranty
Mortise Hinges	1year
Locks (ALX, ND Series)	10 years
Door Closers – Mechanical 4040XP series	30 years
Door Operators - Electro Mechanical	1 year
Overhead Stops/Holders	1 year
Floor/Wall stops	1 year
Electric Strikes	5 years

1.10 MAINTENANCE & DEMONSTRATION

.1 After the building is occupied arrange an appointment with the maintenance staff from the facility for instruction of proper use, servicing, adjusting and lubrication of hardware furnished. Submit to the consultant a list of attendees and meeting date.

.2 Extra Materials

.1 Provide the following items in proper manufacturer's cartons once the job has been completed:

.1 Five (5) of each installation tool used for locks/passage/privacy, type of door closers, and exit devices.

1.11 WASTE DISPOSAL AND MANAGEMENT

.1 Collect and separate for disposal waste material generated by this Section.

.2 Place in appropriate on-site bins in accordance with Waste Management Plan.

.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 MANUFACTURERS

.1 Acceptable Material: Specified in Hardware Sets.

2.2 FINISH

.1 Finish for this project in general shall be 626 (Satin Chrome). Exceptions are as noted in hardware packages.

2.3 KEYING

.1 All cylinders construction, master keyed.
.2 Provide three (3) master keys for each MK or GMK group.
.3 Stamp keying code numbers on keys and cores.

2.4 FASTENINGS

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.
.2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
.3 Exposed fastening devices to match finish of hardware.
.4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.
.5 Use fasteners compatible with material through which they pass.

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.
.2 Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
.3 Recommend mounting heights shall be in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturer's Association.
.4 Furnish manufacturers' instructions for proper installation of each hardware component.

3.2 INSTALLATION

.1 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association.
.2 Where door stop contacts door pulls, mount stop to strike bottom of pull.
.3 Install key control cabinet.
.4 Use only manufacturer's supplied fasteners. Failure to comply may void manufacturer's warranties and applicable licensed labels. Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.
.5 Remove construction cores when directed by Consultant; install permanent cores and check operation of locks.

3.3 ADJUSTING

.1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety, weather tight closure and to provide tight fit at contact points with frames.

3.4 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.

.3 Remove protective material from hardware items where present.

3.5 PROTECTION

.1 Provide proper protection of all hardware items until Owner accepts project as complete.

3.6 HARDWARE SCHEDULE

.1 HARDWARE GROUP NO. 01

Doors: 104.1, 118.1

Provide each SGL door(s) with the following:

3	EA	HINGE	5BB1 4.5 X 4	652	IVE
1	EA	STOREROOM LOCK	ALX80PD LAT	626	SCH
1	EA	SURFACE CLOSER	1461 RW/PA	689	LCN
1	EA	WALL STOP	WS406/407	630	IVE
1	EA	GASKETING	188SBK x door width x (2) door height	BK	ZER

DOOR IS ALWAYS LOCKED ALWAYS NEED A KEY TO GET IN. FREE EGRESS AT ALL TIMES

.2 HARDWARE GROUP NO. 02

Doors: 106.1

Provide each SGL door(s) with the following:

1	EA	PRIVACY SET	J40S SOL	626	SCH
1	EA	WALL STOP	WS406/407	630	IVE

.3 HARDWARE GROUP NO. 03

Doors: 117.1

Provide each SGL door(s) with the following:

1	EA	PASSAGE SET	J10 SOL	626	SCH
1	EA	WALL STOP	WS406/407	630	IVE
1	EA	GASKETING	188SBK x door width x (2) door height	BK	ZER

DOOR IS NOT LOCKABLE
HINGES BY DOOR MANUFACTURER

.4 HARDWARE GROUP NO. 04

Doors: 105.1, 108.1, 109.1, 112.1, 113.1, 116.1

Provide each SGL door(s) with the following:

1	EA	ENTRY LOCK	J54 SOL	626	SCH
1	EA	WALL STOP	WS406/407	630	IVE

HINGES BY DOOR MANUFACTURER
DOOR CAN BE LOCKED BY KEY ON EXTERIOR TRIM, FREE EGRESS AT ALL TIMES

.5 HARDWARE GROUP NO. 05

Doors: 100.1

Provide each SGL door(s) with the following:

1	EA	CONT. HINGE	112XY	628	IVE
1	EA	CONT. HINGE	112XY EPT	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	FLUSH BOLT	1870	628	ADA
1	EA	PADDLE	4590	628	ADA
1	EA	DEADLATCH	4510	628	ADA
3	EA	SFIC MORTISE CYL.	80-302	626	SCH
1	EA	ELECTRIC STRIKE	6211AL FSE	630	VON
2	SET	90 DEG OFFSET PULL	PR 8190HD 10" BTB MNTG	630	IVE
2	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4040XP LONG	689	LCN
1	EA	AUTO OPERATOR	9542 MS	ANCL	LCN
1	EA	MTG PLT	4040XP-18G	689	LCN
1	EA	BLADE STOP SPACER	4040XP-61	689	LCN
2	EA	ACTUATOR, TOUCH	8310-836T	630	LCN
2	EA	DOOR SWEEP	8193AA x door width	AA	ZER
1	EA	THRESHOLD	545 x door width	A	ZER
1	EA	KEY SWITCH	653-04	626	SCE

DOORS ARE ALWAYS LOCKED.

CARD READER, CREDENTIAL AND CONTROLLER BY OTHERS

MODE OF OPERATION:

WHEN DOORS ARE LOCKED A PERSON CAN ENTER WITH KEY OR BY PRESENTING THEIR CREDENTIAL TO THE READER WHICH WILL RETRACT KEEPER ON ELECTRIC STRIKE AND ALLOW THE DOOR TO BE PULLED OPEN. OR A PERSON CAN PRESENT THEIR CREDENTIAL TO THE READER AND PRESS THE ACTUATOR BUTTON WHICH WILL RETRACT KEEPER ON ELECTRIC STRIKE AND ALLOW THE DOOR TO AUTOMATICALLY OPEN. FREE EGRESS AT ALL TIMES

.6 HARDWARE GROUP NO. 06

Doors: 100.2

Provide each SGL door(s) with the following:

6	EA	HINGE	5BB1 4.5 X 4	652	IVE
2	EA	PUSH/PULL BAR	9190HD-10″	630	SCH
2	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP LONG	689	LCN
1	EA	AUTO OPERATOR	9542 MS	ANCL	LCN
1	EA	MTG PLT	4040XP-18G	689	LCN
1	EA	BLADE STOP SPACER	4040XP-61	689	LCN
2	EA	ACTUATOR, TOUCH	8310-836T	630	LCN
2	EA	DOOR SWEEP	8193AA x door width	AA	ZER

DOOR CAN NOT BE LOCKED

MODE OF OPERATION:
A PERSON CAN ENTER BY PUSHING ON THE PUSH BAR OR BY PRESSING THE ACTUATOR BUTTON WHICH WILL AUTOMATICALLY OPEN THE DOORS FOR A PERIOD OF TIME.

.7 HARDWARE GROUP NO. 07

Doors: 101.2

Provide each SGL door(s) with the following:

3	EA	HINGE	5BB1 4.5 X 4	652	IVE
1	EA	PASSAGE SET	ND10S SPA	626	SCH
1	EA	SURFACE CLOSER	1461 RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	EA	WALL STOP	WS406/407	630	IVE
1	EA	GASKETING	188SBK x door width (2) door height	BK	ZER
1	EA	DOOR SWEEP	8193AA x door width	AA	ZER

.8 HARDWARE GROUP NO. 08

Doors: 101.1, 103.1

Provide each SGL door(s) with the following:

3	EA	HINGE	5BB1 4.5 X 4 NRP	630	IVE
1	EA	PANIC HARDWARE	22-EO	SP28	VON
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP LONG	689	LCN
1	EA	MTG PLT	4040XP-18G	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	EA	DOOR SWEEP	8193AA x door width	AA	ZER
1	SET	GASKETING	8303AA-S x door width (2) door height	AA	ZER
1	EA	THRESHOLD	545A- x door width	A	ZER

DOOR IS EXIT ONLY NO EXTERIOR TRIM

.9 HARDWARE GROUP NO. 09

Doors: 107.1, 107.2, 114.1, 114.2

Provide each SGL door(s) with the following:

1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8302 10" 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	1261 CUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE

HINGES BY DOOR MANUFACTURER

.10 HARDWARE GROUP NO. 10

Doors: 110.1

Provide each SGL door(s) with the following:

1	EA	ENTRANCE LOCK	J54 SPA	626	SCH
1	EA	WALL STOP	WS406/407	630	IVE
1	EA	GASKETING	188SBK x door width x (2) door height	BK	ZER

HINGES BY DOOR MANUFACTURER

.11 HARDWARE GROUP NO. 11

Doors: 111.1

Provide each SGL door(s) with the following:

1	EA	PASSAGE SET	J10S SPA	626	SCH
1	EA	WALL STOP	WS406/407	630	IVE

HINGES BY DOOR MANUFACTURER

.12 HARDWARE GROUP NO. 12

Doors: 115.1

Provide each SGL door(s) with the following:

1	EA	POCKET DOOR KIT FOR SINGLE DOORS	TYPE C-W		KNC
1	EA	SLIDING DOOR PRIVACY	C-30	626	KNC

CONFIRM DIMENSION OF WALL TO ENSURE CORRECT POCKET DOOR FRAME WILL FIT.

END OF SECTION

1 General

1.1 DESCRIPTION OF WORK

.1 The work of this Section comprises the provision of all equipment, labour and materials necessary for the supply and installation of all interior and exterior glass and glazing as follows:
- .1 Glazing for interior hollow metal doors.
- .2 Glazing for interior flush wood doors.
- .3 Glazing for interior hollow metal windows (borrowed lights).
- .4 Aluminum frames and glass at sliding glass inserts in interior hollow metal window frames (borrowed lights).
- .5 Glazing for exterior windows, exterior aluminum doors, sidelights and storefronts.
- .6 Glazing for interior aluminum doors and windows.
- .7 Glazing at architectural woodwork.
- .8 Borrowed lights and screens with fire rated glass.
- .9 Window film.
- .10 Re-glazing for existing thermally broken insulated courtyard window units.
- .11 Miscellaneous specialty glass, gaskets, tapes and glazing materials.

1.2 RELATED SECTIONS

.1 Section 06 41 00 - Architectural Wood Casework.
.2 Section 08 11 13 - Hollow Metal Doors and Frames
.3 Section 08 14 16 - Flush Wood Doors

1.3 REFERENCES

.1 American National Standards Institute (ANSI).
- .1 ANSI/ASTM E330-02, Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.2 American Society for Testing and Materials International, (ASTM).
- .1 ASTM C542-94(1999), Specification for Lock-Strip Gaskets.
- .2 ASTM D1003-00, Test Method for Haze and Luminous Transmittance of Plastics.
- .3 ASTM D2240-02b, Test Method for Rubber Property - Durometer Hardness.
- .4 ASTM E84-01, Test Method for Surface Burning Characteristics of Building Materials.
- .5 ASTM F1233-98, Test Method for Security Glazing Materials and Systems.
- .6 ASTM C509-06, Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
- .7 ASTM C510-05a, Standard Test Method for Staining and Colour Change of Single or Multicomponents Joint Sealants.
- .8 ASTM C794-06, Standard Test Method for Adhesion in Peel of Elastomeric Joint Sealants.
- .9 ASTM C864-05, Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
- .10 ASTM C920-05, Standard Specification for Elastomeric Joint Sealants.
- .11 ASTM C1036-06, Standard Specification for Flat Glass.
- .12 ASTM C1048-04, Standard Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.
- .13 ASTM C1115-06, Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories.
- .14 ASTM C1349-04, Specification for Architectural Float Glass Clad Polycarbonate.
- .15 ASTM C1376-03, Specification for Pyrolytic and Vacuum Deposition Coatings on Glass.
- .16 ASTM E1300-07e1, Practice of Determining Load Resistance of Glass in Buildings.

.3 Canadian General Standards Board (CGSB).
- .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.

.2 CAN/CGSB-12.2-M91, Flat, Clear Sheet Glass.
.3 CAN/CGSB-12.3-M91, Flat, Clear Float Glass.
.4 CAN/CGSB-12.4-M91, Heat Absorbing Glass.
.5 CAN/CGSB-12.8-97, Insulating Glass Units.
.6 CAN/CGSB-12.10-M76, Glass, Light and Heat Reflecting.
.7 CAN/CGSB-12.11-M90, Wired Safety Glass.
.8 CAN/CGSB-12.12-M90, Plastic Safety Glazing.
.9 CAN/CGSB-12.13-M91, Patterned Glass.
.10 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.
.11 CAN/CGSB-19.13-M87, Sealing Compound, One-Component, Elastomeric, Chemical Curing.
.12 CAN/CGSB-19.24-M90, Multicomponent, Chemical-Curing Sealing Compound.
.13 CAN4-S104-M80, Fire Test of Door Assemblies.
.14 CAN4-S106-M80, Fire Test of Windows and Glass Assembles.

.4 Canadian Standards Association (CSA International).
.1 CSA A440.4, Energy Performance Evaluation of Windows and Sliding Glass Doors.
.2 CSA Certification Program for Windows and Doors 2000.

.5 Flat Glass Manufacturers Association (FGMA).
.1 FGMA Glazing Manual - 1997.

.6 Laminators Safety Glass Association (LSGA).
.1 LSGA Laminated Glass Design Guide 2000.

.7 NFPA
.1 NFPA 80-99, Standard for Fire Doors and Fire Windows.
.2 ULC, Underwriters Laboratories of Canada Building Materials and Systems Directory, Fire Resistance Directory, Current Edition including Supplements to date.

1.4 DEFINITIONS

.1 Pattern Glass: One type of glass having pattern impressed on 1 or both sides for decorative purpose. Sometimes called “rolled”, “figured”, or “Obscure” glass.

.2 Etched: Surface treatment for flat glass obtained by spraying glass with hard particles or treating with acid wash to roughen 1 or both surfaces of glass. Effect is to increase obscurity and diffusion.

.3 United Inches: Total of 1 width and 1 height of glass panels in inches.

1.5 SYSTEM DESCRIPTION

.1 Design Requirements:
.1 Design glass and glazing to CAN/CGSB-12.20-M.
.2 Provide accessories, closures and trims required and necessary to complete work.

.2 Performance Requirements:
.1 Ensure solvents and/or other volatile elements in glazing system do not affect properties and performance of materials used for edge seal and sealant glass bond.
.2 Ensure materials used for edge seals are compatible with other materials they come in contact within glazing system. If required, perform compatibility tests to ASTM C510, ASTM C794 and ASTM C1087, or others as applicable.
.3 Use sealants and other materials in glazing system which are unaffected by long term UV light exposure.

1.6 SUBMITTALS

.1 Submit Product Data, Samples, Manufacturer's printed product literature, specifications and data sheet in accordance with Division 01 - General Requirements.

.2 Product Data:
.1 Submit manufacturer's printed product literature, specifications and data sheets.

.3 Material Safety Data Sheets:
.1 Submit MSDS for inclusion in Operation and Maintenance Manual.

.4 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

.5 Closeout Submittals:

.1 Provide maintenance data including cleaning instructions for incorporation into manual specified in Division 01 - General Requirements.

1.7 QUALITY ASSURANCE

.1 Certificates: provide product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.2 Pre-installation Meetings: attend pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

.3 Provide maintenance data including cleaning instructions for incorporation into manual specified in Division 01 - General Requirements.

.4 Perform work in accordance with FGMA Glazing Manual, IGMAC and Laminators Safety Glass Association - Standards Manual for glazing installation methods.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver glass and associated materials to site in original crates and containers with manufacturer's name and brand distinctly marked thereon and with glass labelled as to types. Do not remove labels on glass until after work is accepted by Consultant.

.2 Store materials within the building, in a clean, dry location, acceptable or as designated by Consultant. Fully protect materials from damage of any kind until ready for use.

1.9 PROJECT CONDITIONS

.1 Environmental Requirements: No glazing done when temperature is less than 7°C or sash or frames are wet, damp or frosted.

.2 Protect work of other trades from damage resulting from work of this Section.

.3 Identify glazed openings immediately following glass installation. Use coloured tapes or flags suspended near, but not in contact with glass. Attach to frames or surround with suitable non-staining strippable adhesives or tapes.

1.10 WARRANTY

.1 Warrant factory sealed insulating units for period of 10 years against defects and/or deficiencies in accordance with General Conditions of the Contract.

.2 Warrant that factory sealed insulating units be free from material obstruction of vision as result of dust or film formation on internal glass surfaces by any cause, under normal conditions anticipated under this Project, other extrinsic glass breakage, but including breakage due to thermal shock and temperature differential due to inherent glass or glazing fault.

1.11 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.

.2 Place in appropriate on-site bins in accordance with Waste Management Plan.

.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 ACCEPTABLE MATERIALS

.1 Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:

.1 AGC Flat Glass North America, Ltd.; www.na.agc-flatglass.com.

.2 Ace Security Laminates; www.acesecuritylaminates.com.

.3 Barber Glass Industries; www.barberglass.com.

.4 GE Silicones; www.gesilicones.com.
.5 Guardian Industries Corp.; www.guardian.com.
.6 PPG Canada Inc.; www.ppgglass.com.
.7 Pilkington Special Glass Limited; www.pilkington.com.
.8 Prelco Inc.; www.prelco.com.
.9 Schott North America Inc.; www.us.schott.com.
.10 Viracon Inc.; www.viracon.com.
.11 Tremco Canada; www.tremcosealants.com.
.12 Trulite Industries Limited; www.trulite.com.

2.2 MATERIALS: FLAT GLASS

.1 Glass: Free from bubbles, waves, discolouration and other defects and of following types for locations indicated on Drawings or noted on Door Schedule. Ensure glass bears manufacturer's label indicating quality. Leave labels in place until final cleaning.
.2 Single Glazed Glass Types:
  .1 Float Glass: Conforming to CAN/CGSB-12.3-M, clear transparent float glass, minimum 6 mm.
  .2 Tempered Glass:
    .1 Minimum 6 mm.
    .2 Conforming to ASTM C1048, CAN/CGSB-12.1-M, Type 2 tempered, Class B float glass, Category II.
    .3 Perform heat strengthening using horizontal tong free method; surface compression not less than 7500 psi.
  .3 Tempered Laminated Glass:
    .1 Minimum 6 mm.
    .2 Two layers of fully tempered safety glass conforming to ANSI Z97.1, ASTM C1048 and CAN/CGSB-12.1-M, Type 2, Class B, Category II laminated together under heat and pressure with clear PVB interlayer of 0.8 mm thick between them to create single unit.
    .3 Perform heat strengthening using horizontal tong free method; surface compression less than (7500 psi).
  .4 Clear, ceramic, wireless safety glass: to CAN4-S104, CAN4-S-106, ASTM-E-152, ASTM-E-163, of 5 mm thickness, with polished surfaces.
    .1 Acceptable Material:
    .2 Premium Firelite.
.3 Structural Glazing Sealant:
  .1 One component silicone base sealant, chemical curing conforming to CAN/CGSB-19.13-M, Classification MCG-2-25-A-N and ASTM C1184 unless otherwise approved and/or directed.
  .2 Suitable for metal, concrete and glass, non- sagging for vertical joints, capable to resist 25% movement with total loss of bond as specified in Standard, suitable for glazing, resists UV through glass, normal temperature, minimum application temperature 5 deg C.
  .3 Sealant shall be UV resistant, ozone resistant, non-bleeding, non-staining and capable of supporting their own weight, structural glass units and all specified or referenced loads to meet design criteria and in conformance of OBC requirements.
  .4 Cutting back or silicone based spandrel opacification at structural glazing shall not be permitted.
  .5 Acceptable Material for shop glazing:
    .1 "Proglaze II Multi Component" by Tremco Canada;
    .2 "Ultraglaze 4400" (where recommended by manufacturer) by GE Silicones;
    .3 "DC-983" by Dow Corning Canada.
  .6 Acceptable Material for field glazing:
    .1 "Spectrum® 2 or Proglaze SG" by Tremco Canada;
    .2 "Ultraglaze 4400" or "Ultraglaze 4000" by GE Silicones;

.3 "DC-795" by Dow Corning Canada.

.7 Sealant for Heel Bead Airseal at Windows:

.1 Acceptable Material:

.1 One component, medium modulus silicone sealant.

.2 "SilGlaze II SCS2800" by GE Silicones.

.3 "Tremsil 600" by Tremco Canada.

.4 Window Film:

.1 Translucent opacity, transparent synthetic liner, clear pressure sensitive adhesive.

.2 Film shall have cutouts to suit design and be located as indicated on Drawings.

.3 Provide "3M Scotchcal ElectroCut Special Effects Film" by 3M; www.3m.com in colour "7725-314 Dusted Crystal".

.5 Glazing, Sealing Compounds and Accessories:

.1 Ensure glazing, sealing compounds and accessories are compatible with all contact surfaces of frames, other accessories used in glazing system and contact surfaces of compounds used on insulated glass units.

.2 Wood or other organic materials are not acceptable for use in glazing systems including spacer blocks.

.3 Glazing Compound:

.1 Non-hardening modified oil type.

.2 Colour to match adjacent surfaces unless indicated otherwise.

.4 Sealant Compound: One component type, elastomeric chemical curing, CAN/CGSB-19.13-M, Class G-2-25-A-N. Colour to match adjacent surfaces unless indicated otherwise.

.5 Sealant Compound:

.1 CAN/CGSB-19.24-M, multi-component chemical curing, Type 2, Class A.

.2 Colour to match adjacent surfaces.

.6 Sealant Compound:

.1 One component, silicone base solvent curing.

.2 Colour to match adjacent surfaces.

.7 Elastomeric Joint Sealants: ASTM C920.

.8 Sealant for Interior Glass-to-Glass Butt Glazing Installation:

.1 Translucent 1 part silicone sealant conforming to U.S. Federal Specification TT-S-001543 (Silicone Building Sealant) and TT-S-0230, CAN/CGSB-19.13-M and ASTM C920, (One Component Building Sealant).

.2 "Tremsil 200" by Tremco Canada;

.3 "DC 999" by Dow Corning Canada.

.6 Sealant for Use With Plastic Polymer Glazing:

.1 One component silicone base sealant, chemical curing conforming to CAN/CGSB-19.13- M, Classification MGC-2-25-A-N or BN unless otherwise directed.

.2 Acceptable Material;

.1 "LexSil SPS 2900 Primerless Silicone.

.2 Plastic Sealant" by GE Silicones

.3 "Spectrum I" by Tremco Canada.

.7 Cellular Gaskets for Compression Glazing:

.1 ASTM C509 cellular, elastomeric, preformed, black.

.2 Closed cell neoprene or EPDM extrusions including molded corners where applicable by Cellular Rubber Extrusions Tremco Canada.

.8 Dense Gaskets for Compression Glazing:

.1 ASTM C864, Option II or ASTM C1115, Type C, dense neoprene or EPDM extrusions, 60 and 70 Durometer density including molded corners where applicable.

.2 Poly-Wej Gaskets Tremco Canada.

.9 Glazing Splines:

.1 Neoprene or EPDM manufacturer's standard dry glazing splines to suit aluminum extrusions.

.2 Colour to match adjacent surfaces unless indicated otherwise

.10 Glazing Points and Wire Spring Clips:

.1 Corrosion resistant, manufacturer's standards.

.11 Edge Blocking, Setting Blocks, Later Shims, Gaskets and Tapes:

.1 Edge Blocking for Glass:

.1 60 - 70 Durometer neoprene, silicone or EPDM, channel shaped, 100 mm - 150 mm long.

.2 Setting Blocks:

.1 7 mm x 100 mm EPDM or extruded 80-90 Durometer neoprene; at insulating glass, use EPDM only. At fire-rated glazed doors and partitions, use similar sized fire-rated silicone GE "Gel 516" or asbestos cement blocks.

.2 Width; 1.6 mm to 3 mm less than design glazing pocket width.

.3 For 4 sided structural glazing, use silicone compatible rubber or silicone.

.3 Lateral Shims:

.1 Neoprene, silicone or EPDM, 40 - 60 Durometer, 100 mm long or as required.

.4 Non-Compression Glazing Tape for Interior Aluminum Screen Glazing:

.1 Preformed, 100% solids, cross linked butyl rubber, polyisobutylene, hardness 65 Durometer, unaffected by UV through glass.

.2 Tape shall be sufficiently wide and thick as to completely cover bite area of glazing unit when the unit is pushed into place.

.3 Acceptable Material shall be "Tremco 440 Tape" by Tremco Canada.

.5 Compression Glazing Gaskets for Interior Aluminum Screen Glazing:

.1 EPDM, neoprene, thermoplastic or other acceptable material with Shore A Durometer of 35, ± 5.

.2 Dual Durometer gaskets of a specific acceptable type are also acceptable.

.3 Ensure material has sufficient thickness or be of a configuration to allow 25% compression when installed, have a minimum 2000 psi (1500 psi for silicone) tensile strength, resistance to permanent set of 30% maximum, minimum elongation at break of 300% (700% for silicone) and resistance to ozone showing no cracks. "VISIONstrip®" by Tremco Canada.

.4 Acceptable material: Armet, Dow Corning and PTI.

.6 Compression Glazing Tape:

.1 Preformed, ribbon-shaped, non-skinning, 100% solids, non-oxidizing polyisobutylene: butyl, paper release, EPDM shim with continuous synthetic rubber spacer rod of 60 Durometer hardness.

.2 Ensure tape is sufficiently wide and thick to completely cover bite area of glazing unit when unit is pushed into place.

.3 Acceptable material: Polyshim II Tape" by Tremco Canada.

.12 Primer Sealers and Cleaners: To glass and plastic glazing manufacturer's standards.

2.3 MATERIALS: SEALED INSULATING GLASS

.1 Insulating glass units: At all exterior doors, exterior sidelights and exterior windows.

.2 Double glazed units: to CAN2-12.8M76(R1979) with outer pane of minimum 6mm thick, high performance glass, 12mm air space and inner pane of minimum 6mm thick, high performance, glass with 0.10 low emissivity coating on surface 3, argon gas filled interspace and insulating silicone-foam edge spacer. Metal edge spacers not acceptable.

.3 Tempered glass to be provided at all interior and exterior aluminum doors and side lights. Tempered glass at both inner and outer pane.

.4 Tempered glass to be provided at all interior and exterior glazed units where the glass is within 1500mm of floor level.

.5 Acceptable Material:

.1 PPG, Solarban 60 Solar Control Low-E glass, VLT 70, SHGC 0.39.

2.4 ACCESSORIES

.1 Qualified products: only compounds listed on the CGSB Qualified Products list are acceptable for use on this project.

.2 Glazing compound: oil base, to CAN/CGSB-19.6, Type 1, color to match adjacent metal.
.3 Sealant compound: one component acrylic base, to CGSB 19-GP-5M, gun grade, color to match adjacent material.
.4 Sealant compound: two-component polysulphide base, to CAN2-19.24, gun grade, color to match adjacent metal.
.5 Glazing splines: E.P.D.M. or neoprene. Manufacturer's standard dry glazing splines to suit aluminum extrusions, black color.
.6 Glazing points and wire spring clips: corrosion resistant, manufacturer's standard.
.7 Cap bead: one component silicone, neutral cure, CGSB 19-GP-23, gun grade, color white.
.1 Acceptable material:
.1 Tremco "Spectrum 2".
.2 Sonneborn "Omniseal".
.8 Setting blocks: Neoprene, 80-90 Shore A durometer hardness to ASTM D2240, length of 25 mm for each square meter of glazing.
.9 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.
.10 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; size as required; black/ bronze color.
.11 Glazing clips: manufacturer's standard type.
.12 Glazing points and wire spring clips: corrosion resistant, manufacturer's standard.
.13 Lock-strip gaskets: to ASTM C542.
.14 Cap bead: one component silicone, neutral cure, to CGSB 19-GP-23, gun grade, color white.
Acceptable material:
.1 Trecmo "Spectrum 2"
.2 Sonneborn "Omniseal"
.15 Primer-sealers and cleaners: to glass manufacturer's standard.

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 FABRICATION

.1 Label each light of glass and/or plastic glazing with registered name of Product and weight and quality of glass and/or plastic glazing.
.2 Check dimensions on job site before cutting materials.
.3 Ensure minimum bite or lap of glass and/or plastic glazing on stops and rabbets as recommended by glass and/or plastic glazing manufacturer.

3.3 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.

3.4 PREPARATION

.1 Thoroughly clean glass rebates and glass of dust, dirt, mortar and other foreign materials prior to glazing. Remove oils and grease with non-staining solvents such as Xycol or Methyl Ethyl Ketone solutions.

3.5 WORKMANSHIP

.1 Remove protective coatings and clean contact surfaces with solvent and wipe dry.
.2 Apply primer-sealer to contact surfaces.
.3 Place setting blocks as per manufacturer's instructions
.4 Install glass, rest on setting blocks, ensure full contact and adhesion at perimeter.
.5 Install removable stops, without displacing tape or sealant.
.6 Provide edge clearance of 3 mm minimum.
.7 Insert spacer shims to center glass in space. Place shims at 600 mm oc and keep 6 mm below sight line.
.8 Apply cap bead of sealant at full perimeter of exterior, at all aluminum window glazing.
.9 Apply sealant to uniform and level line, flush with sight line and tooled or wiped with, solvent to smooth appearance.
.10 Do not cut or abrade tempered, heat treated, or coated glass.

3.6 INSTALLATION: INTERIOR GLAZING

.1 If required, thoroughly mix glazing compound as recommended by manufacturer. Thinning of glazing compound will not be permitted.
.2 Carefully remove glazing stops and replace after glazing. Take care to prevent damage to stops.
.3 Doors, Screens, Sidelites and Interior Windows:
    .1 Place setting blocks on sill at 1/4 points from each corner unless otherwise directed by glazing manufacturer.
    .2 Place continuous glazing gaskets on edges of glass.
    .3 Centre and space each piece of glass with spacers located and installed according to manufacturer's directions.
    .4 Place glass so no voids occur between glass and glazing material, and glazing stops.
    .5 Secure glass in place with stops, secured in place with screws.
.4 Glazing Sealant:
    .1 Apply glazing sealant to clean, dry, grease and oil free surfaces. Provide exposed glazing sealant smooth, free from ridges, wrinkles, air pockets and embedded foreign materials.
    .2 Prime surfaces if required by glazing sealant manufacturer.
    .3 Trim glazing sealant flush with tops of stops and glazing channels.
    .4 Remove excess glazing sealant or droppings which would set up or become difficult to remove from finished surfaces. Remove excessive sealant immediately. Do not use chemicals, scrapers, or other tools which would affect finished surfaces.
.5 Interior Glazing:
    .1 Fire Rated Hollow Metal Doors and Screens:
        .1 Set glass in fire rated metals doors and screens on continuous setting block with 3 mm gap between glazing stop glass and embed in glazing compound in accordance with NFPA 80 and OBC requirements. Strike and point exposed joints between metal and glass or Install glass in accordance to ULC tested proprietary methods of installation.
    .2 Combination Method-Tape/Sealant:
        .1 Cut glazing tape to proper length and Install against permanent stop projecting 1.5 mm above sightline.
        .2 Fill gap between glass and applied stop with sealant to depth equal to bite of frame on glass to uniform and level line.
        .3 Trim off excess tape to sightline.
    .3 Two Sided Butt - Joint Glazing:
        .1 2 side glazing at head and sill use wet, dry, or wet/dry glazing systems.
        .2 Position glazing so that vertical edges are spaced slightly apart and seal with silicone sealant.
        .3 Grind vertical joint with slight kerf and polish for aesthetics.

.6 Window Film:
- .1 Install window film in accordance with manufacturer's printed instructions by experienced film applicators as recommended by glass film manufacturer.
- .2 Ensure glass surfaces are clean and ambient temperature is between 16 deg C and 38 deg C.
- .3 Whenever 2 or more pieces of same colour translucent film are seamed together as a continuous band of colour, they shall be matched to assure uniform reflected daytime colour and transmitted night appearance.

3.7 ALUMINUM DOORS, TRANSOMS LIGHTS AND SIDELIGHTS

.1 All doors and transoms lights to be glazed with 25mm insulating units, in accordance with the requirements of this Section, to door manufacturer's standard glazing installation practice unless noted otherwise on drawings.

3.8 ALUMINUM WINDOWS

.1 All windows to be glazed with 25mm thickness insulating units in accordance with the requirements in this Section, to window manufacturer's standard glazing installation practice.
- .1 Provide cap bead of sealant at all four (4) sides, at exterior of each unit.

.2 All doors transoms and side lights to be glazed with 25 mm insulating units, in accordance with the requirements of this Section, to door manufacturer's standard glazing installation practice unless noted otherwise on drawings.

.3 All partitions and borrowed lights, to be glazed with 6 mm thickness clear wired safety glass, in accordance with the requirements of this Section.

.4 All partitions and borrowed lights, to be glazed with 6 mm thickness clear, laminated safety glass, in accordance with the requirements of this Section.

.5 Where indicated on drawings, frames to be glazed with wired safety glass in accordance with the requirements of this Section.

.6 All fire-rated hollow metal doors to be glazed with 6 mm thickness clear, wired safety glass, in accordance with the requirements of this Section.

.7 Use insulated glass units for all exterior doors in heated spaces.

.8 All non-fire rated hollow metal doors to be glazed with 6 mm thickness clear laminated or tempered safety glass in accordance with the requirements of this Section.

.9 Where indicated on drawings, Doors to be glazed with wired safety glass in accordance with the requirements of this Section.

.10 Use tempered insulated glass doors for all exterior doors.

3.9 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Remove traces of primer, caulking.

.3 Remove glazing materials from finish surfaces.

.4 Remove labels after work is complete.

.5 Clean glass using approved non-abrasive cleaner in accordance with manufacturer's instructions.

.6 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.10 PROTECTION OF FINISHED WORK

.1 Provide and maintain necessary protection of completed work against damage.

.2 Do not mark or attach anything directly to exposed glass and framing surfaces.

.3 If welding is to take place above or near completed glazing work, protect glass with plywood or other suitable means to reduce likelihood of weld spatter damaging glass surfaces.

.4 Protect glass from other trades, workers, tools and other similar materials.

.5 Replace cracked, broken, or defective glass at no additional cost to the Owner and to Consultant's satisfaction.

.6 Identification of Glazing: Mark glass lites with temporary, easily removable, large safety markings, immediately after glass installation. Maintain safety markings until final clean-up.

END OF SECTION

1 General

1.1 WORK INCLUDED

.1 All drywall work shown or implied on drawings and/or specifications. The work includes but is not necessarily limited to the following:

- .1 Supply and installation of gypsum wallboard to all stud partitions, ceilings and bulkheads, as indicated on the drawings.
- .2 Supply and installation of exterior gypsum board sheathing.
- .3 Supply and installation of fiberglass thermal insulation and acoustic blankets in walls and ceiling, as indicated on the drawings.
- .4 Supply and installation of gypsum wallboard on strapping.
- .5 Allow openings for equipment installed in drywall construction by others.
- .6 Supply and installation of gypsum board column enclosure.
- .7 Installation of access panels in gypsum wallboard partitions and ceilings as supplied by Mechanical and Electrical trades.
- .8 Provide supplementary steel supports for ceilings, as required.
- .9 Supply and installation of gypsum board directly applied to masonry and concrete surfaces.
- .10 Supply and installation of corner beads, casing beads, trim, control joints and corner reinforcement.
- .11 Supply and installation of taping and filling.
- .12 Supply and installation of acoustic caulking to acoustically insulated gypsum board partitions.
- .13 Supply and installation of fire rated wall assemblies.
- .14 Supply and installation of access hatches, panels and door frames supplied by other trades.

1.2 RELATED REQUIREMENTS

.1 Section 05 50 00 - Metal Fabrications.
.2 Section 07 21 16 - Blanket Insulation.
.3 Section 07 26 00 - Vapor Retarders.
.4 Section 08 11 13 - Steel Doors and Frames.
.5 Section 09 91 00 - Painting.
.6 Division 23 - Mechanical - Supply of access doors.
.7 Division 26 - Electrical - Supply of access doors.

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

- .1 ASTM C36/C36M-01, Specification for Gypsum Wallboard.
- .2 ASTM C79/C79M-01, Standard Specification for Treated Core and Non-treated Core Gypsum Sheathing Board.
- .3 ASTM C442/C442M-01, Specification for Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board.
- .4 ASTM C475-01, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- .5 ASTM C514-01, Specification for Nails for the Application of Gypsum Board.
- .6 ASTM C557-99, Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
- .7 ASTM 1396, Specification for Water-Resistant Gypsum Backing Board.
- .8 ASTM C840-01, Specification for Application and Finishing of Gypsum Board.
- .9 ASTM C931/C931M-01, Specification for Exterior Gypsum Soffit Board.
- .10 ASTM C954-00, 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.

.11 ASTM C1002-01, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
.12 ASTM C1047-99, Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
.13 ASTM C1280-99, Specification for Application of Gypsum Sheathing Board.
.14 ASTM C1177-01, Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
.15 ASTM C1178/C1178M-01, Specification for Glass Mat Water-Resistant Gypsum Backing Board.

.2 Association of the Wall and Ceilings Industries International (AWEI)

.3 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-51.34-M86(R1988), Vapor Barrier, Polyethylene Sheet for Use in Building Construction.
.2 CAN/CGSB-71.25-M88, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.

.4 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S102-1988(R2000), Surface Burning Characteristics of Building Materials and Assemblies.

1.4 DEFINITIONS

.1 Drywall = Gypsum Board = Gypsum Wall Board = GB = GWB

1.5 SYSTEM DESCRIPTION

.1 Design Requirements:
.1 Obtain services of professional engineer with experience in type of work of comparable complexity and scope, licensed to practice in Province of Prince Edward Island to design, review and Provide professional services for work of this Section.
.2 Design ceiling suspension system in accordance with manufacturer's printed directions and conforming to ASTM C754 requirements. Do not suspend any items from structural steel deck. Do not support work of this Section from, nor make attachments to, ducts, pipes, conduits or support framing of other trades.
.3 Design exposed to view ceiling suspension system for 'floating ceiling' and take extra care to ensure that hanger rods are vertically plumb, evenly and neatly spaced and neatly tied with tie wire free of any kinks complete with fascia trim. Install fascia trim in accordance with manufacturer's recommendations.
.4 Design suspended ceiling system for adequate support of electrical fixtures as required by current bulletin of Electrical Inspection Authority.
.5 Design suspension system to support weight of mechanical and electrical items such as air grilles, lighting fixtures, drapery track, drapes and with adequate support to allow rotation / relocation of light fixtures.
.6 Design exterior soffit and ceiling system where applicable to withstand positive and negative wind loads effect to suit Project design requirements.
.7 Design sub-framing as necessary to accommodate, and to circumvent, conflicts and interferences where ducts or other equipment prevent regular spacing of hangers.
.8 Design metal stud reinforcements from hollow structural steel, stud, angle and steel plate sections, galvanized sheet steel minimum 1.214 mm (designation thickness 43 mils/minimum base steel thickness 1.087 mm (colour yellow / 18 ga) where required to support of manufactured components without limitations items such as washroom accessories, expansion control covers and similar items. Design weld connections ensuring rigid and secure installation capable of offering resistance to minimum 227 kg pull force. Consider galvanized items in moist areas. Do not design using wood blocking for this purpose.
.9 Design fire rated construction including ceiling, partition or fire protective membranes and furring to approved ULC design or other design acceptable to authorities having

jurisdiction, to provide design fire rating indicated and/or required. Submit written evidence of acceptable test design.

.10 Provide sound rated construction having STC rating indicated and tested in accordance with ASTM E90.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Maintain temperature minimum 10°C, maximum 21°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 Ensure relative humidity in building is acceptable to material suppliers prior to commencement of installation.

.3 Apply board and joint treatment to dry, frost free surfaces.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site with manufacturer's original labels intact. Do not remove wrappings until ready for use.

.2 No outside storage permitted. Store in clean, dry area, off ground. Provide adequate ventilation to avoid excess moisture, surface relative humidity and mould or fungal growth. Remove immediately any board showing signs of mould, mildew or fungal growth.

.3 Stack gypsum board flat on level and dry surface without overhanging boards. Prevent sagging and damage to edges, ends and surfaces. Protect bagged products from moisture or wetting.

1.8 SUBMITTALS

.1 Make submittal in accordance with Division 01 - General Requirements.

.2 Product Data:

.1 Submit manufacturer's literature, data sheets for each type of material provided under this Section for Project. Data sheets shall provide all required information. Submit manufacturer's installation instructions.

.3 Material Safety Data Sheets:

.1 Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants, patching and leveling compound, solid polymer and as designated later by Consultant.

.4 Shop Drawings:

.1 Submit Shop Drawings showing design, construction, sound attenuating construction, adjacent construction, locations of access panels, elevations, finishes and relevant details of furring, enclosures and partitions which require fire rating.

.5 Certificates:

.1 Submit certification from structural engineer registered in Province of Prince Edward Island, who shall affix his/her seal and signature to certificate, stating that installed suspended ceiling system is capable of supporting its own weight and weight of lighting, grilles and other mechanical and electrical fixtures required by Mechanical and Electrical Divisions.

.2 Obtain approval of electrical utility authorities having jurisdiction for support of light fixtures, by ceiling grid and supports, to satisfy requirements of electrical inspection authority having jurisdiction. Adjust grid, fixing devices and support hangers as required to obtain approval.

.3 Samples:

.1 When requested, submit samples in accordance with Division 01 - General Requirements.

.6 Quality Assurance:

.1 Applicator Qualifications: Provide work of this Section executed by competent installers with minimum of 5 years experience in application of Products, systems and assemblies specified.

.2 Comply with ASTM C840 for application and finishing gypsum board and manufacturer's written information.
.3 Comply with following guide recommendations unless specified otherwise:
.1 Applications Guide CGC folder SA-130;
.2 Fire Resistant Assemblies CGC folder SA-100;
.3 Acoustical Assemblies CGC folder SA-200;
.4 Abuse-Resistant Assemblies CGC folder SA-929;
.5 Moisture Resistant Assemblies CGC folder SA-934;
.6 Gypsum Fire Wall Systems CGC folder SA-925.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 MANUFACTURERS

.1 Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:
.1 Bailey Metal Products Ltd.; www.bmp-group.com.
.2 CertainTeed Gypsum Canada Inc.; www.certainteed.com
.3 CGC Inc.; www.cgcinc.com
.4 Georgia-Pacific Canada, Inc.; www.gpgypsum.com
.5 Acadia Drywall Supplies Ltd; www.acadiadrywall.com
.6 Gordon Incorporated; www.gordongrid.com
.7 Roll Formed Specialty; www.rollformed.com
.8 Cabot Gypsum.

2.2 ACCEPTABLE MATERIALS

.1 Fire Rated Gypsum Board (where identified):
.1 Fire Rated Gypsum Board having Testing Agency Fire Rating Identification Stamp on Each Sheet
.2 ASTM C1396M, Type X, 15.9 mm thick gypsum board 1200 mm wide, maximum practical length and tapered edge as required by each fire resistance assembly.
.3 Acceptable Material:
.1 CGC Gyproc Firecode C.
.2 Georgia Pacific Gyproc Fireguard Type X.
.3 CertainTeed Fi-Rock Type X.
.4 Temple-Inland Gypsum Board Fire-Resistant Type X.
.2 Standard Gypsum Board:
.1 To ASTM C 3696. 15.9 mm thick, 1219 mm wide x maximum practical length, Ends square cut, edges tapered.
.2 Acceptable Materials:
.1 CGC Inc.
.2 CertainTeed Gypsum Canada.
.3 G-P Gypsum.
.4 Temple Island.
.5 Cabot Gypsum.
.3 Moisture Resistant Gypsum Board:
.1 Use Type X where rating requires ASTM C 1658 regular, 15.9 mm thick, 1219 mm wide x maximum practical length. Use in rooms containing a shower (except where shown to receive cementitious backer board), all washrooms, shower rooms,

tubroom, soiled utility and behind sinks (450 mm from center line of fixture, both directions to above ceiling.

.2 Sink area at janitor closets (1219 mm both directions from center line of sink to above ceiling).

.3 Acceptable Materials:

.1 Georgia Pacific DensArmor Plus.
.2 Georgia Pacific DenShield Tile Backer.
.3 CertainTeed ProRoc Moisture and Mold Resistant Board.
.4 CertainTeed M2 Tech.
.5 GreenGlass Interior Gypsum Board by Temple-Inland.
.6 Fiberock Aqua Tough by CGC.
.7 Sheetrock Mold Tough, by CGC.

.4 Tile and Seamless Wall Coating Backer:

.1 Use behind all ceramic tile wall finishes.
.2 Conform to ASTM C1178M and ASTM C1396M, paperless, glass mat reinforced, water resistant treated core gypsum board.
.3 Rating of 10,' no mold growth' as tested for 4 weeks according to ASTM D3273.
.4 Permeance of
.5 Acceptable Materials:

.1 DensShield Tile BackerTM by Georgia-Pacific Canada, Inc.
.2 Green Glass Tile Backer by Temple-Inland.
.3 Sheetrock Mold Tough, by CGC.

.5 Cementitious Backer Board:

.1 Use at locations noted.
.2 Glass mesh mortar unit to ANSI A11/.9, 12.7 mm thick, 914 mm width, round tapered edges.
.3 Acceptable Materials:

.1 Canadian Gypsum Durock Tile Backer Board;
.2 Domtar DonCrete Cementitious Tile Backer Board;
.3 Laticrete International Inc. Wonderboard;
.4 Louisiana-Pacific Canada Ltd. Gypsheathing.
.5 National Gypsum Perma Base Cement Board.

.6 Impact Resistant Gypsum Board:

.1 Multipurpose board, core of fibre-reinforced gypsum and perlite between layers of fibre- reinforced gypsum with fibreglass mesh reinforcement embedded; 12.7 mm or 15.9 mm thickness equivalent to Type X gypsum board when tested in accordance with ASTM E119 and CAN/ULCS101-M.
.2 To CAN/CAS-A82.27, 16 mm thick, 1219 mm wide x maximum practical lengths to be used where indicated on finish schedule and:

.1 All corridors to 1219mm Above Finished Floor.
.2 All janitor closets to 1219mm Above Finished Floor (except sink area) to be moisture resistant.
.3 All soiled utility rooms to 1219mm Above Finished Floor (except sink areas) to be moisture resistant.

.3 Acceptable Materials:

.1 Sheetrock Mold Tough VHI Firecode X manufactured by CGC.
.2 Air Renew Extreme Impact Gypsum Board as manufactured by CertainTeed,
.3 ToughRock Fireguard Type X Abuse Guard Gypsum Board as manufactured by Dens Armour Plus,
.4 ComfortGuard IR by Temple-Inland

.7 Drywall Furring Channels:

.1 0.5 mm (25 gauge) core thickness galvanized steel channels for screw attachment of gypsum board.

.8 Resilient Drywall Furring Channels:

.1 0.5 mm (25 gauge) base steel thickness galvanized steel for resilient attachment of gypsum board.

.9 Nails:
- .1 To ASTM C 514.

.10 Steel drill screws:
- .1 To ASTM C 1002.

.11 Polyethylene:
- .1 To CAN/CGSB-51.34, 10 mil.

.12 Insulating Strip:
- .1 Rubberized, moisture resistant, 3 mm thick closed cell neoprene strip, 13 mm wide, with self sticking permanent adhesive on one face, lengths as required.

.13 Plywood:
- .1 19 mm Douglas Fir Shop Grade.

.14 Laminating compound:
- .1 To CSA A82-31 asbestos free.

.15 Joint Compound:
- .1 Special setting type compound: chemically setting, sandable, to ASTM C475.
- .2 Acceptable Material:
  - .1 Canadian Gypsum Company Sheetrock 90.
  - .2 CertainTeed ProRoc Moisture and Mould resistant 90 Setting Compound with M2Tech.
  - .3 Acadia Drywall Sandable 90.

.16 Taping compound:
- .1 Pre-mixed, to ASTM C475.
- .2 Acceptable Materials:
  - .1 Canadian Gypsum Company All Purpose Ready-to-Use Joint Compound.
  - .2 CertainTeed ProRoc Moisture and Mould resistant 90 Setting Compound with M2Tech.
  - .3 Acadia Drywall Platinum Lite.

.17 Tape:
- .1 50mm wide x 0.25mm thick, perforated paper, with chamfered edges.

.18 Bonding Adhesive:
- .1 Type for purpose intended and as recommended and approved by manufacturer (Lepage PL 200 or PL 400).

.19 Metal Accessories:
- .1 Corner Beads Minimum 0.40mm, Z180 zinc coated sheet steel to ASTM A525; beaded angle; flanges 32mm for 16mm board.
- .2 Casing Beads: Minimum 0.40mm, Z180 zinc coated sheet steel to ASTM A525; "L" type; beaded angle or casing with one (1) side knurled for joint filling; suitable for 15.9mm wallboard, as specified.
- .3 Casing Beads, corner beads, control joints and edge trim: to ASTMC 1047, Zinc metal, zinc-coated by hot-dip process zinc-coated by electrolytic process aluminum coated phosphatized, 0.5mm base thickness, perforated flanges, one piece length per location.
- .4 Flexible Casing Beads:
  - .1 0.531 mm (designation thickness 18mils/minimum base steel thickness 0.455 mm /25 ga) steel, wipe coated, angle shaped in size to fit over edge of gypsum board, to suit curved applications.
- .5 Control joint strip: Roll formed from galvanized steel sheet, with a tape-protected recess, 6mm wide x 41mm deep.

.20 Access Doors and Panels:
- .1 Supplied as part of Division 21, 22 23 and 26 for installation as part of this Section.
- .2 Sized to suit requirements of other Sections, but minimum size 406 mm x 406 mm with drywall bead frame and key operated cylinder lock.
- .3 Provide closed cell neoprene gaskets to provide air tight fit.
- .4 Fire rated access panels shall conform to requirements of authorities having jurisdiction under law and shall be labeled.

.21 Water:

.1 Fresh clean potable water, free from deleterious matter, acids or alkalies.

.22 Fire Wall Identification:
- .1 Paint to be ICI Dulux 14030 Interior Acrylic Low sheen eggshell.

.23 Acoustical/Fire Insulation:
- .1 Refer to Section 07 21 16 - Blanket Insulation.

.24 Sound Control Materials:
- .1 Sound Attenuation Batts: Refer to and conform to requirements of Section 07 21 16 - Blanket Insulation to meet design requirements.
- .2 Strip Impalement Clips:
  - .1 25 mm wide strip of Insul-Hold by Insul-Hold Canada Ltd., fabricated from 0.531 mm (designation thickness 18mils / minimum base steel thickness 0.455 mm (25 ga) galvanized sheet metal in 30 m rolls with punch-out insulation securement arrows. Alternatively, use special studs with punch-out impalement strips.
- .3 Acoustic Sealant: ASTM C834 and ASTM C920, Class 25, Non-hardening.
  - .1 "QuietZone Acoustic Sealant" by Owens-Corning Canada Inc.
  - .2 "Tremco Acoustical Sealant" by Tremco Ltd.
- .4 Elastomeric Sealant:
  - .1 As recommended by manufacturer of fibre-reinforced gypsum sheathing board.
- .5 Gaskets:
  - .1 Closed cell neoprene, 3 mm thick x 64 mm wide.
- .6 Asphalt Felt:
  - .1 CSA A123.3; No. 15 Type.

.25 Sealants:
- .1 In accordance with Section 07 92 00 - Joint Sealants.

.26 Suspension System for Ceilings:
- .1 Standard of Acceptance: Armstrong - Drywall suspension system.

3 Execution

3.1 PARTITION TYPES

.1 Refer to Drawings for partition types.

.2 Provide partitions complete to underside of structure, unless otherwise indicated on Drawings.

3.2 EXAMINATION

.1 Examine substrate for compliance with applicable requirements, installation tolerances and other conditions affecting installation of fibre-reinforced gypsum board or sheathing. Do not proceed until unsatisfactory conditions have been corrected. Beginning of installation shall indicate acceptance of substrate conditions.

3.3 INSTALLATION

.1 Give minimum 48 hours notice for Consultant's inspection of internal wall insulation, vapour barriers and services prior to concealing with gypsum board.

.2 Carry out work using skilled tradesmen carefully supervised by competent foremen.

.3 Take all measurements accurately.

.4 Comply with ASTM C754 and with ASTM C840 requirements that apply to framing installation. Install framing, blocking and furring in accordance with ASTM C645, ASTM C1280.

.5 Maintain wallboard panels minimum 6 mm and maximum 13 mm above floor to prevent moisture transfer.

.6 Extend panels to underside of deck or structure and at fire rated and sound control partitions.

.7 Do taping and filling of concealed surfaces above ceiling line.

.8 Keep end joints away from prominent locations and central portions of ceilings.

.9 Locate vertical joints at least 300 mm from jamb lines of openings.

.10 Space screws for regular wallboard at 300 mm oc along board edges and in board field on walls and ceilings; at fire-rated assemblies, reduce spacings to comply with labelling authorities assembly listings.

.11 For other specialty boards screw spacing shall be in accordance with manufacturer's recommendations.

.12 Drive screws with power screw-gun and set with countersunk heads slightly below surface of board.

.13 Do not secure gypsum board by installing screws into aluminum or steel window and door frames.

.14 At partitions except shaft walls, apply 1 continuous 6 mm bead of acoustical sealant to each side of partition where gypsum board meets dissimilar materials.

.15 Where 2 layers of gypsum board per face are required, apply bead of sealant at perimeter of base layer only.

.16 Apply sealant beads at perimeter of all other services and like objects which penetrate wallboard in accordance with manufacturer's directions.

.17 Install access panels in locations to be determined by coordination with Trades installing mechanical, electrical and other building services.

.18 Consultant reserves right to relocate access panels up to 3600 mm from locations shown on Drawings due to site conditions, providing ample warning is given prior to installation.

.19 Install in accordance with manufacturer's instructions.

.20 Provide access panels in locations and sizes required by other Sections.

.21 Coordinate with other Sections for locations and sizes. Install in accordance with manufacturer's instructions.

.22 At impact resistant gypsum board Provide 0.914 mm (designation thickness 33mils/minimum base steel thickness 0.836 mm (colour - White/20 ga) metal studs. Provide control joints 9000 mm on centre maximum and at both sides of door jambs.

.23 Access Doors and Panels:

- .1 Install access doors and panels where required as part of work of this Section in walls, bulkheads, ceilings and soffits.
- .2 Cooperate and coordinate delivery of access doors and panels supplied as part of work of Divisions 21, 22. 23. 24 and 26.
- .3 Install access doors and panels supplied as part of work of Divisions 21, 22. 23. 24 and 26 in walls, bulkheads, ceilings and soffits.

.24 Gypsum Board Application:

- .1 Provide gypsum board in accordance with manufacturer's written installation instructions and finish to requirements of ASTM C840. Ensure moisture resistant gypsum board is installed on any wall/partition containing a plumbing fixture (i.e. water closets, sinks, tubs, etc.).
- .2 Provide metal trim casing bead at junctions with dissimilar materials.
- .3 Provide reveals at junctions with dissimilar materials and where indicated.
- .4 Provide curved uniform surfaces by wetting or dampening board or scoring back gypsum board and form to profiles indicated Provide additional screws and framing members to maintain design curve.
- .5 Apply joint compound and trowel smooth to provide continuous, smooth radius free from flat spots, facets and trowel marks.
- .6 Allow gypsum boards to dry thoroughly before handling.
- .7 Provide finished work plumb, level and true, free from perceptible waves or ridges and square with adjoining work.
- .8 Cut and fit gypsum board to accommodate or fit around other parts of Work.
- .9 Provide work of this Section accurately and neatly.
- .10 Butt gypsum board sheets together in moderate contact.
- .11 Do not force into place.
- .12 Place tapered or wrapped edges next to 1 another.
- .13 Provide gypsum board perpendicular to framing and in lengths that will span ceilings and walls without creating end (butt) joints.

.14 If butt joints do occur stagger and locate them as far from centre of walls and ceilings as possible.
.15 Accurately fit exposed butt joints together and make edges smooth.
.16 Support ends and edges on framing.
.17 Fasten gypsum board to furring and studs with screws. Space screws at 200 mm oc at board edges and 300 mm oc on board field. Ensure perimeter screws are not less than 9 mm nor more than 13 mm from edges and ends are opposite screws on adjacent boards.
.18 Gypsum Board - Single Layer:
.1 Ceilings:
.1 Apply gypsum board to metal furring with screws. Erect board with long dimension parallel to supports. Locate end joints over supporting members.
.2 Space screws at 200 mm oc.
.2 Partitions:
.1 Apply gypsum board to metal studs with screws. Erect board with long dimension parallel to supports. Locate end joints over supporting members. Locate vertical joints at least 300 mm from jamb lines of openings. Space screws at 200 mm oc at board edges and 300 mm oc on board field.
.3 Ceiling and Partition Fasteners:
.1 Ensure perimeter screws are not less than 9 mm nor more than 13 mm from edges and ends are opposite screws on adjacent boards. Drive screws with power screw gun and set with countersunk head slightly below surface of board.
.4 Joints: Finish all joints unless specified otherwise.
.19 Gypsum Board - Double Layer:
.1 Lay out work to minimize end joints on face layer; to offset parallel joints between face and base layers by at least 250 mm and to apply face layer at right angles to base layer.
.2 Base Layer: Base layer shall be same as face layer, or backing board, and applied at right angles to framing members. Secure base layer with screws spaced 300 mm oc to each member. Ensure perimeter screws are not more than 13 mm from edges and ends are opposite screws on adjacent boards. Ensure surface of erected base layer is straight, plumb or level and without protrusions before face layer is applied.
.3 Face Layer: Apply face layer at right angles to base layer with adhesive. Apply adhesive with notched spreader to leave 9 mm x 13 mm ribbons, 38 mm apart over entire back side of face layer. Erect board immediately after spreading adhesive. Supplement adhesive with screw fasteners. Provide temporary support for board until adhesive bond has fully developed. As alternative to adhesive specified, joint cement mixed with water in accordance with manufacturer's directions may be used. Allow joint cement and water mixture to stand 30 minutes before using.
.4 Joints: Finish joints in face layers only, unless otherwise required to achieve fire resistant ratings indicated, as hereinafter specified. Setting compound for fire rated construction shall conform to requirements of authorities having jurisdiction to obtain fire rating shown on Drawings.
.25 Gypsum Board Laminated to Concrete and/or Concrete Block Masonry:
.1 Gypsum Board Laminated to Concrete and/or Concrete Block Masonry:
.2 Mix laminating adhesive in accordance with manufacturer's directions.
.3 Allow to stand 30 minutes before using.
.4 Apply adhesive with notched trowel to leave 9 mm x 13 mm ribbons, 32 mm apart over entire back side of face layer.
.5 Erect gypsum board immediately after spreading adhesive.
.6 Use moderate pressure to develop full adhesive contact with substrate.

.7 Temporarily secure gypsum board in place with concrete nails or bracing.
.8 Ensure joints are accurately aligned.
.9 Avoid impact or movement of boards until adhesive sets firmly.
.10 Remove temporary support when adhesive has set.
.11 Do not treat joints of laminated gypsum board for at least 24 hrs after lamination.

.26 Exterior Sheathing:
.1 Provide exterior sheathing in accordance with manufacturer's instructions.
.2 Minimum Fastening Requirements:
.1 Perimeter Edge of Each Board: 200 mm oc max.
.2 Intermediate Supports: 300 mm oc max.
.3 Provide exterior sheathing neatly with tight butt joints and without gaps and holes.
.4 Bear edges of exterior sheathing fully onto structural framing.
.5 Do not crush exterior sheathing edges.
.6 Secure exterior sheathing to exposed leg of inner track of telescopic 2-piece top track.
.7 Provide ready to receive air/vapour barrier membrane.

.27 Interior Ceilings:
.1 Comply with recommendations of CGC Drywall Steel-Framed Systems Folder 09250-SA 923.
.2 Provide hanger wires spaced at maximum 1200 mm oc along carrying channels and within 150 mm of ends of carrying channel runs.
.3 Secure hanger wires to inserts in structure above.
.4 Provide carrying channels maximum 1200 mm oc and within 150 mm of walls.
.5 Secure with hanger wire saddle-tied along channels.
.6 Provide 25 mm clearance between runners and walls.
.7 Provide splicers behind joints. Level channels to a maximum tolerance of 3 mm over 3600 mm.
.8 Provide metal furring channels at right angles to carrying channels at maximum 600 mm oc and within 150 mm of walls.
.9 Provide 25 mm clearance between furring ends and abutting walls.
.10 Attach furring channels to carrying channels with saddle-tie of double strand tie wire.
.11 Provide additional cross-reinforcing at bulkheads and at other openings.
.12 Provide additional reinforcement for ceiling mounted miscellaneous accessories and signage.
.13 Provide ceiling gypsum board, smooth and level.

.28 Metal Trim and Accessories:
.1 Provide metal trim casing beads at reveals; at ceiling-wall intersections and partition perimeters; and at intersection of dissimilar constructions such as gypsum board to concrete.
.2 Provide metal trim casing beads where gypsum board abuts against a surface having no trim concealing junction.
.3 Provide ceiling fascia suspension trims at perimeter of "floating" suspended gypsum board ceilings as indicated on the Drawings.
.4 Provide a 13 mm separation gasket between metal trim casing beads and window frames or other cold surfaces, where such framing abuts exterior door or window frame.
.5 Tape shall be either full width or 1 strip 9 mm wide on each side of framing member.
.6 Provide casing bead where gypsum board abuts materials other than itself and acoustic tile ceilings including at exterior door and window frames, where juncture is not concealed with trim; or elsewhere where indicated on Drawings.
.7 Unless indicated otherwise, use tape 3 mm narrower than casing bead to provide recess at exposed side. Compress tape by 25%.
.8 Unless indicated otherwise, use tape 3 mm narrower than casing bead to provide recess at exposed side. Compress tape by 25%.
.9 Provide prefinished metal angle trim supports and Provide light pockets and eggcrate grilles and/or louvres in accordance with manufacturer's instructions.

.10 Install light pockets and eggcrate grilles and/or louvre units square, straight and in 1 piece where possible or with inconspicuous joints at long runs.

.29 Control Joints:

.1 Provide pre-fabricated, pre-manufactured control joints and/or prepared to suit site conditions control joints and in accordance with manufacturer's instructions and in accordance with ASTM C840.

.2 Set in gypsum facing board, supporting control joints with studs or furring channels on both sides of joint.

.3 Ensure double studs with discontinuous tracks and double suspended ceiling furring channels have been installed prior to commencing board and bead application at control joints.

.4 Provide control joints at following locations:

.1 Support construction changes.

.2 Partition, ceiling or furring runs exceed 9000 mm.

.5 Provide control joints full height floor to ceiling or door header to ceiling in partitions and furring runs.

.6 Provide control joints from wall to wall in ceiling areas.

.7 Provide continuous polyethylene dust barrier behind and across control joints.

.8 Obtain Consultant's acceptance of exact location of control joints.

.30 Sound Control:

.1 Where indicated on Drawings, provide sound rated partitions and ceiling in locations indicated to meet required minimum Sound Transmission Class STC rating.

.2 Gypsum board shall be applied on both sides of sound-proofed partitions.

.3 Follow manufacturer's details and recommendations.

.4 Provide sound attenuation insulation to completely fill height of stud cavities.

.5 Tightly butt ends and sides of blankets within cavities.

.6 Cut blankets to fit small spaces.

.7 Carefully fit blankets behind electrical outlets, bracing, fixture attachments and mechanical and electrical services.

.8 Staple blankets to back of gypsum board as recommended by gypsum board manufacturer.

.9 At sound attenuating suspended ceiling and enclosures having spring isolator hangers, terminate ceiling or enclosure at adjacent construction by providing continuous isolator strip and sealed joint.

.31 Sealant:

.1 Conform to ASTM C919 for use of sealants in sound attenuation partitions.

.2 Apply acoustical sealant around partition cutouts including, but not limited to, electrical outlets and boxes, plumbing and duct outlets, and other miscellaneous wall and floor penetrations or gaps.

.3 Apply acoustical sealant to every air gap, such as gaps around perimeter of wall, between wall panels and around any penetrations made for plumbing or electrical wiring. Seal off any piping, electrical output boxes, and duct work with acoustical treatments. Treat junction boxes with acoustic putty, treat piping and duct work either with fiberglass duct liner or damping material or both.

.4 Treat frame with gasket material (weather-strip) and install security flap on bottom of door to seal it off.

.5 Apply minimum 13 mm diameter bead of acoustic sealant continuously around periphery of each face of partition to seal gypsum board/structure junction where partitions abut fixed building components in accordance with recommendations of "CGC Drywall/Steel Framed Systems, Folder SA923 09250".

.32 Joint Treatment - Gypsum Board:

.1 Verify board is firm against framing members and screw heads are properly depressed.

.2 Mix joint compound or ready-to-use compounds according to manufacturer's directions. Use pure, unadulterated, clean water for mixing.

.3 Permit mixed material to stand 30 minutes before using.

.4 Do not mix more material than can be used within 1 hour.
.5 Do not use set or hardened compound.
.6 Clean tools and equipment after mixing each batch.
.7 Tape and fill joints and corners in accordance with gypsum board manufacturer's printed instructions.
.8 Fill either manually, using hand tools of trade, or by a mechanical taping and filling machine of proven efficiency.
.9 Remove plastic tape from control joints after finishing with joint compound.
.10 After final coats of filler have dried at least 24 hours, sand surface lightly with No. 00 sandpaper to leave it smooth, ready for decoration.
.11 Provide finished work smooth, seamless, plumb and true, flush and with square plumb neat corners.
.12 Levels of Finish: Provide following levels of finish in accordance with ASTM C840:
  .1 Level 0: No taping, finishing or accessories required for temporary construction or areas where final decoration is not required.
  .2 Level 1: Use this level in plenum areas above ceilings, attics, areas where assembly would generally be concealed or in building service corridors and other areas.
  .3 Level 2: Use this level where water resistant gypsum backing board (ASTM C630M) is used as substrate for tile; may be used in garages, warehouse storage, or other similar areas where surface appearance is not of primary concern.
  .4 Level 3: Use this level in appearance areas which are to receive heavy or medium texture spray or hand applied finishes before final painting or where heavy grade wall coverings are to be applied as final decoration.
  .5 Level 4: Use this level where light textures or wall coverings including paint are to be applied.
  .6 Level 5: Use this level to provide a uniform surface and minimize possibility of joint telegraphing and of fasteners showing through final decoration. Use this Level of finish when using gloss, semi-gloss or enamel paint finish or when working in a critical (severe) lighting areas including but not limited to walls and ceiling areas near windows, skylights, long hallways and atriums with large surface areas exposed to artificial and natural light. Refer to ASTM C840 for additional locations for Level 5 applications.
  .7 Exposed Moisture Resistant Gypsum Board Joint Finish: All joints and interior angles shall have fiberglass tape embedded in setting 90 joint compound and 2 separate coats of joint compound applied over all flat joints and 1 separate coat of joint compound applied over interior angles. Cover fasteners heads and accessories with three (3) separate coats of joint compound. Ensure surface is smooth and free of tool marks and ridges.

3.4 FIRE RATED PARTITIONS

.1 Ensure materials for fire rated construction conform to requirements of Authorities Having Jurisdiction to obtain fire rating shown on Drawings.
.2 Where dissimilar components are built into fire rated assemblies ensure continuity of fire separation by boxing in elements with gypsum board and framing to suit Authorities Having Jurisdiction.
.3 Work in cooperation with Section providing firestopping work.
.4 Provide fire rated enclosures, separations and assemblies as indicated on Drawings conforming to requirements of Authorities Having Jurisdiction.
.5 Where required, secure sound attenuation blanket insulation between studs as specified in Article on Sound Control Partitions.

3.5 CUTTING AND PATCHING

.1 Cooperate and coordinate with other Sections to obtain satisfactory gypsum board finish work. Do all cutting, patching and make good as required by installation of work of other Sections.

3.6 CLEANING

.1 Clean off beads, casings, joint cement droppings and similar items and remove surplus materials and rubbish on completion and as directed.

3.7 FIRE WALL IDENTIFICATION

.1 Following installation of gypsum board and painting.
.2 Provide identification on fire walls.
.3 Using three (3) stencils cut out to read "Smoke Sealed", "1-Hour Fire Rated" and "2-Hour Fire Rated" in 75mm high letters.
.4 Using stencil and spray can of paint to transfer the information to the appropriate walls above the ceiling level at 3000 mm o/c on both sides of wall.

END OF SECTION

This page intentionally left blank

1 General

1.1 SUMMARY

.1 Provide acoustic tile ceilings including but not limited to following:
  .1 Ceiling Suspension Systems.

1.2 RELATED REQUIREMENTS

.1 Section 09 21 16 - Gypsum Board Assemblies: Suspension systems for gypsum board ceilings.
.2 Section 09 51 00 - Acoustical Ceilings.
.3 Division 23 - HVAC, trim for recessed mechanical fixtures.
.4 Section 26 50 00 - Lighting.

1.3 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
  .1 ASTM C423-02a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
  .2 ASTM E1264-98, Standard Classification for Acoustical Ceiling Products.
  .3 ASTM E1477-98a(2003), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
  .4 ASTM C635M-07 Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
  .5 ASTM C636M-06, Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
  .6 ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
  .7 ASTM E1264 Standard Classification for Acoustical Ceiling Products.
.2 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-51.34-M86, Vapor Barrier, Polyethylene Sheet, for Use in Building Construction and Amendment No. 1 1988.
  .2 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.
  .3 CAN/ULC-S101-07, Standard Methods of Fire Endurance Tests of Building Construction and Materials.
  .4 CAN/ULC-S102-07, Surface Burning Characteristics of Building Materials and Assemblies.
  .5 CAN/ULC S114-05, Standard Method of Test for Determination of Non-Combustibility in Building Materials.
  .6 CAN/ULC-S702-97, Standard for Mineral Fibre Thermal Insulation for Buildings
.3 Underwriter's Laboratories of Canada (ULC)
  .1 CAN/ULC-S102-2003, Surface Burning Characteristics of Building Materials and Assemblies.
.4 Ceilings and Interior Systems Construction Association (CISCA):
  .1 CISCA Code of Practices.

1.4 DESIGN REQUIREMENTS

.1 Design all systems for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority. Systems are not designed to carry the weight of electrical equipment.
.2 Suspension Systems:
  .1 Maximum deflection: 1/360th of span to ASTM C635 deflection test.
  .2 Design ceilings to resist safely and effectively all loads and effects of loads in accordance with part 4.0 of the National Building Code.
  .3 Design ceiling suspension systems in accordance with ASTM C636, ASTM C754 and manufacturer's printed directions.

.4 Design hanger anchor and entire suspension system static loading not to exceed 25% of their ultimate capacity including lighting fixture dead loads.
.5 Design suspension system to support weight of mechanical and electrical items such as air handling boots and lighting fixtures, and with adequate support to allow rotation/relocation of light fixtures.
.6 Acoustic panel system is not designed to carry the weight of mechanical and electrical equipment.
.7 Design sub framing as necessary to accommodate, to circumvent, and to avoid conflicts and interferences where ducts or equipment prevent regular spacing of hangers.

.3 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.

1.5 SUBMITTALS

.1 Make all submittals in accordance with Division 01 - General Requirements.
.2 Shop Drawings:
.1 Submit suspension and acoustic panel systems layouts - include bulkheads, hangers, supports, carriers, and panel sizes, locations patterns and termination at walls.
.2 Indicate insert and hanger spacing and fastening details, location of mechanical and electrical components, splicing method, and details of changes in level and junctions with dissimilar materials.
.3 Ceiling system to show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes, acoustical unit installation.
.4 Submit conditions at abutting, intersecting, and penetrating construction.
.5 Submit dimensioned locations of lighting fixtures, diffusers, sprinkler heads, P.A. system speakers, and other items that pierce the ceiling plane.
.3 Product Data:
.1 Submit manufacturer's technical literature and installation instructions describing components, materials and finishes.
.4 Material Safety Data Sheets:
.1 Submit MSDS for inclusion in Operation and Maintenance Manual.
.5 Certificates:
.1 Submit written certification stating that suspended ceiling systems are designed for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.
.2 Submit certificate attesting installed acoustical ceiling systems meet fire resistance ratings required for this project.
.3 Submit independent test data and certificate confirming system meets or exceeds specified STC rating.
.4 Submit independent test data and design tables for each type of insert to be employed on this project for hanger supports.

1.6 REGULATORY REQUIREMENTS

.1 Fire-resistance rated suspension system: certified by a Canadian Certification Organization accredited by Standards Council of Canada.

1.7 EXTRA MATERIALS

.1 Provide extra materials of acoustic units in accordance with Division 01 - General Requirements.
.2 Provide extra suspension system materials in unopened clearly marked cartons of 12 pieces each of 1220mm long tees and 610mm long tees.
.3 Extra materials to be from same production run as installed materials.
.4 Deliver to site, upon completion of the Work of this Section.
.5 Store where directed by Consultant

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 MATERIALS

.1 Intermediate Grid System. Unless otherwise indicated, ceiling suspension products shall be manufactured to minimum requirements of ASTM C635, for Heavy Duty, modified as required to suit grid design shown.
.2 Exposed Grid System:
  .1 Factory finished satin white on hot dipped galvanized cold rolled steel.
  .2 Acceptable Material: Refer to Material / Finish Schedule.
.3 Basic Steel Material and Finish:
  .1 Commercial quality cold rolled steel 0.179" (26 ga) minimum thickness, and heavier gauge for Heavy Duty as necessary, galvanized to zinc coating designation Z275.
  .2 Exposed surfaces of metal Products shall be factory finished in non-yellowing, low sheen satin white enamel to Consultant's acceptance to match whiteness in panels.
  .3 Provide 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.
  .4 Provide slip-on trim mouldings or metal mouldings with baked enamel finish, as standard with grid manufacturer, to trim around light fixtures.
.4 Accessories for Suspension System:
  .1 Complete with splices, clips, and perimeter moulding, of manufacturer's standard and aluminum types to suit the applicable conditions unless special conditions and access areas are shown or specified.
  .2 In high humidity areas provide galvanized suspension system.
.5 Hangers:
  .1 Minimum 0.104" (12 ga) overall thickness galvanized steel wire to zinc coating designation Z275, meeting "Heavy-duty" classification of ASTM C635.
.6 Main Tees:
  .1 3.66 m long, 23.8 mm face width double web design, rectangular bulb at top of web, 38 mm web height.
  .2 Expansion cut-outs in main tees controlling buckling caused by heat expansion.
.7 Main Tee Splices:
  .1 Designed to lock lengths of main tees together so that joined lengths of tee function structurally as single unit with tee faces at joint perfectly aligned and presenting tight seam.
.8 Cross Tees:
  .1 1220 mm long, 25 mm web height structural cross-section, design same as main tees, designed to connect at main tees forming positive lock without play, loss or gain in grid dimensions with offset over-ride of face flange over main tee flange to provide flush joint.
  .2 Provide 38 mm web height of cross-tee for fire rated assemblies.
.9 Edge Moulding Around Ceiling Perimeters:
  .1 Materials and finish to match tees.
.10 Metal Closures and Trim:
  .1 Bonderized and with factory-applied white baked enamel finish.
  .2 Provide anchors as standard with manufacturer.
.11 Suspended GWB Ceiling System:

.1 Where "GWB" is indicated under ceiling material on finish schedule.
.2 Acceptable Material:
  .1 CGC - Drywall suspension system.
  .2 Armstrong - Drywall suspension system.

3 Execution

3.1 INSTALLATION

.1 Installation: in accordance with ASTM C636 except where specified otherwise.
.2 Install suspension system to manufacturer's instructions and Certification Organizations tested design requirements.
.3 Do not erect ceiling suspension system until work above ceiling has been inspected by Consultant.
.4 Secure hangers to overhead structure using attachment methods as indicated.
.5 Install hangers spaced at maximum 1200 mm centers and within 150 mm from ends of main tees.
.6 Lay out center line of ceiling both ways, to provide balanced borders at room perimeter.
.7 Ensure suspension system is coordinated with location of related components.
.8 Install wall molding to provide correct ceiling height.
.9 Completed suspension system to support super-imposed loads, such as lighting fixtures and speakers.
.10 Support at light fixtures with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
.11 Interlock cross member to main runner to provide rigid assembly.
.12 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.
.13 Install access splines to provide 10 percent ceiling access.
.14 Finished ceiling system to be square with adjoining walls and level within 1:1000.
.15 Expansion joints.
  .1 Erect two main runners parallel, 25 mm apart, on building expansion joint line. Lay in strip of acoustic tile/board, painted black, 25% narrower than space between 2 T bars.
  .2 Supply and install "Z" shaped metal trim pieces at each side of expansion joint.
  .3 Design to accommodate plus or minus 25 mm movement and maintain visual closure.
  .4 Finish metal components to match adjacent exposed metal trim.
  .5 Provide backing plates behind butt joints.

3.2 CLEANING

.1 Touch up scratches, abrasions, voids and other defects in painted surfaces.

END OF SECTION

1 General

1.1 DESCRIPTION OF WORK

.1 The work of this Section comprises the furnishings of all labour, equipment and materials necessary for the supply and installation of the Tile as indicated on the Drawings and Schedules, which includes but is NOT necessarily limited to:
  .1 Wall Tile
  .2 Floor Tile

.2 Work Included: Provide tile including but not limited to following:
  .1 Grouting control joints in floor slab under tile.
  .2 Waterproof membrane.
  .3 Anti-fracture membrane.
  .4 Leveling bed.
  .5 Thin set mortar bed.
  .6 Floor tile, base, trims and fittings.
  .7 Wall tile and trims.
  .8 Installation systems, mortars and grouts.
  .9 Sealing tile control joints and other accessories.
  .10 Sealing penetrations through wall and floor tile.

1.2 RELATED REQUIREMENTS

.1 Section 03 30 00 - Cast-in-Place Concrete.
.2 Section 07 92 00 - Joint Sealants.
.3 Section 09 21 16 - Gypsum Board Assemblies.
.4 Section 10 28 13 - Toilet Accessories.

1.3 REFERENCES

.1 American National Standards Institute (ANSI)/Ceramic Tile Institute (CTI)
  .1 ANSI A108.1-99, Specification for the Installation of Ceramic Tile (Includes ANSI A108.1A-C, 108.4-.13, A118.1-.10, ANSI A136.1).
  .2 CTI A118.3-92, Specification for Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive (included in ANSI A108.1).
  .3 CTI A118.4-92, Specification for Latex Portland Cement Mortar (included in ANSI A108.1).
  .4 CTI A118.5-92, Specification for Chemical Resistant Furan Resin Mortars and Grouts for Tile Installation (included in ANSI A108.1).
  .5 CTI A118.6-92, Specification for Ceramic Tile Grouts (included in ANSI A108.1).
  .6 ANSI A108.1-05, Installation of ceramic tile with Portland cement mortar.
  .7 ANSI A108.4-99(R2005), Installation of ceramic tile with organic adhesives.
  .8 ANSI A108.5, Installation of ceramic tile with dry-set Portland cement/latex Portland cement mortar.
  .9 ANSI A108.6-99(R2005), Installation of ceramic tile with chemical resistant, water cleanable tile setting/grouting epoxy.
  .10 ANSI A108.9-99(R2005), Installation of ceramic tile with modified epoxy emulsion mortar/ grout.
  .11 ANSI A108.10-99(R2005), Installation of grout in tile work
  .12 ANSI A108.11-99(R2005), Installation of cementitious backer unit.
  .13 ANSI A108.12-99(R2005), Installation of ceramic tile with EGP (Exterior Glue Plywood) Latex Portland Cement Mortar.
  .14 ANSI A108.13-05, Installation of load bearing, bonded, waterproofing membranes for thin set ceramic tile and dimension stone.
  .15 ANSI A118.3-99(R2005), Specification for Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive.

.16 ANSI A118.4-99(R2005), Specification for Latex-Portland Cement Mortar.
.17 ANSI A118.5-99(R2005), Specification for Furan Mortars and Grout.
.18 ANSI A118.6-99(R2005), Specification for Ceramic Tile Grouts.
.19 ANSI A118.7-99(R2005), Polymer modified cement grouts for tile Installation.
.20 ANSI A108.9-99(R2005), Cementitious backer unit.
.21 ANSI A118.10-99(R2005), Specification for Load Bearing, Bonded Waterproof Membrane for Thin-set Ceramic Tile and Dimension Stone Installation.
.22 ANSI A118.11-99(R2005), Standard for EGP (Exterior Glue Plywood) Latex Portland Cement Mortar.
.23 ANSI A136.1-99(R2005), Specification for Organic Adhesives for the Installation of Ceramic Tile.
.24 ANSI A137.1, Recommended Standard Specification for Ceramic Tile.

.2 American Society for Testing and Materials (ASTM International) International
.1 ASTM C144-99, Specification for Aggregate for Masonry Mortar.
.2 ASTM C 207-91(1997), Specification for Hydrated Lime for Masonry Purposes.
.3 ASTM C979-99, Specification for Pigments for Integrally Colored Concrete.
.4 ASTM A185M-07, Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
.5 ASTM C144-04, Specification for Aggregate for Masonry Mortar.
.6 ASTM C207-06, Specification for Hydrated Lime for Masonry Purposes.
.7 ASTM C373-88(06), Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products.
.8 ASTM C503-08, Specification for Marble Dimension Stone (Exterior)
.9 ASTM C627-93(99), Evaluating ceramic tile installation systems.
.10 ASTM C648-04, Specification for Standard Test Method for Breaking Strength of Ceramic Tile.
.11 ASTM C650-04, Test Method for Resistance of Ceramic Tile to Chemical Substances.
.12 ASTM C847-06, Specification for Metal Lath.
.13 ASTM C1027-99(04), Determining visible abrasion resistance of glazed ceramic tile.
.14 ASTM C1028-07, Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.

.3 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-51.34-M86(R1988), Vapor Barrier, Polyethylene Sheet for Use in Building Construction.
.2 CGSB 71-GP-22M-78, Adhesive, Organic, for Installation of Ceramic Wall Tile.
.3 CAN/CGSB-75.1-M88, Tile, Ceramic.
.4 CAN/CGSB-25.20-95, Surface Sealer for Floors.
.5 CGSB 71-GP-22M, Adhesive, Organic, for Installation of Ceramic Wall Tile.
.6 CGSB 71-GP-29M, Adhesive, Elastomeric, for Installation of Quarry Tiles.
.7 CGSB 71-GP-30M, Adhesive, Epoxy and Modified Mortar Systems for Installation of Quarry Tiles.
.8 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
.9 CAN/CGSB-75.1-M88, Tile, Ceramic.

.4 Canadian Standards Association (CSA International)
.1 TTMAC - Terrazzo Tile & Marble Association of Canada - Specification Guide 09 30 00; Tile Installation Manual 2006 - 2007

1.4 DEFINITIONS

.1 Ceramic Tile: Ceramic surfacing unit relatively thin in relation to facial area, made from clay or mixture of clay and ceramic materials, fired at temperature sufficiently high enough to produce specific physical properties and characteristics conforming to Standards specified herein above

.2 Porcelain Tile: Porcelain tile manufactured in various thickness and sizes having matt or unglazed or high polish finish is ceramic tile that is generally made by dust pressed method from a composition which results in tile that is dense, impervious, fine grained, smooth and textured with sharply formed face. Water absorption conforming to ASTM C373.

1.5 SUBMITTALS

.1 Make submittals in accordance with Division 01 - General Requirements.
.2 Manufacturer's Instructions:
  .1 Provide to indicate special handling criteria, installation sequence, cleaning procedures.
.3 Material Safety Data Sheets:
  .1 Submit MSDS for inclusion in Operation and Maintenance Manual.
.4 Shop Drawings:
  .1 In addition to minimum requirements indicate following:
    .1 Details of construction.
    .2 Joint layouts.
    .3 Dimensions.
    .4 Patterns and makings where applicable.
.5 Maintenance Instructions:
  .1 Submit maintenance instructions in accordance with Section 01 78 00 - Closeout Submittals. Provide Owner with required copies of TTMAC Maintenance Guide.
  .2 Include specific warnings of any maintenance practice or materials which may damage or disfigure tile work.
  .3 Include cleaning methods, cleaning solutions recommended, stain removal methods, polishes and waxes recommended.

1.6 QUALITY ASSURANCE

.1 Qualifications:
  .1 Provide Product of company specializing in manufacture of tile, mosaics, pavers, trim units and thresholds with minimum experience of 5 years. Provide test reports if requested to substantiate that Products supplied on this Project will be of consistent quality in appearance and physical properties.
  .2 Execute work of this Section using a company who is a member in good standing with TTMAC and has minimum 5 years successful experience in application of Products, systems and assemblies specified. Perform tile work using skilled mechanics trained and experienced in work of this complexity. Install waterproofing system using an applicator approved by system manufacturer.
  .3 Use proprietary Products in full compliance with manufacturer's recommendations. As far as possible obtain Product from single manufacturer ensuring single source responsibility for consistent quality in appearance and physical properties, compatibility with adjacent components while maintaining quality.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Comply with material manufacturer’s ordering instructions and lead time requirements to avoid delays.
.2 Coordinate deliveries to comply with construction progress schedule and arrange for above ground, under cover storage before materials are delivered to site.
.3 Store packaged materials in original containers with seals unbroken complete with labels in accordance with manufacturer’s instructions.
  .1 Prevent damage to materials and Products during handling and storage.
  .2 Keep delivered material dry and free from stains inside weatherproof structure or otherwise protected from freezing and elements.
  .3 Store cementitious material off damp surfaces.
  .4 Protect organic and epoxy adhesives, additives, mortar mixes and grouts from freezing, moisture and excessive heat during transportation and storage. Maintain

temperatures in storage area between 15 deg C and 20 deg C.

1.8 EXTRA MATERIAL

.1 Provide maintenance materials in accordance with Division 01 - General Requirements.
.2 Provide minimum 2% of each type and color of tile required for project for maintenance use.
.3 Deliver extra stock to Owner as soon as permanent, locking storage facilities are available. Place extra stock in designated storage area where directed.

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Safety:
  .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of materials.
.2 Ventilation:
  .1 Provided continuously during and after installation. Run system 24 hours per day during installation; provide continuous ventilation for 7 days after completion of installation.
.3 Temperature:
  .1 Maintain air temperature and structural base temperature at tile installation area above 12 °C for 48 h before, during, and 48 h after, installation.
  .2 Do not install tiles at temperatures less than 12 °C or above 38 °C.
.4 Do not apply epoxy mortar and grouts at temperatures below 15 °C or above 25 °C.

1.10 WARRANTY

.1 Warrant work of this Section for a period of 3 years against defects, excessive wear, and loss of adhesion including replacement of defective tile work, materials, labour costs for demolition of defective work, accessories, and installation systems at Owner's convenience.
.2 Defective work includes without limitation, tiles broken in normal use due to deficiencies in setting bed, loose tiles or grout and similar defects which can be attributed to poor performance of work or defective materials.
.3 Warrant waterproofing work of this Section against defects of workmanship and materials, and against any actual leakage, for a period of 5 years.
.4 Leakage due to structural failure of concrete shall be excepted.
.5 Cracks arising from normal shrinkage and/or expansion of concrete shall not be considered as structural failure.
.6 Hairline cracks which result from these causes shall be considered normal and warranty shall not be voided as a result of these minor defects.

1.11 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 SITE PREPARED SANDED CEMENT MORTAR MIXTURE

.1 TILE - GENERAL
.2 Tile:
  .1 Conforming to ANSI A137.1, CAN/CGSB-75.1-M.
  .2 Provide tile trims and accessories such as bullnoses, copings, caps, cove base, nosings, corner pieces, and other special units as specified, indicated, and required.
  .3 Without limitations and unless noted otherwise, Provide tile trim and accessories for each type of tile including:

.1 Rounded and squared finished edges.
.2 Inside and outside corners.
.3 Cove bases, outer and inner.
.4 Sanitary caps and corners.

.4 Provide tile with minimum following characteristics:
.1 Water Absorption: ASTM C373 -
.2 Breaking Strength: ASTM C648 - > 250 lbs.
.3 Abrasion Resistance: ISO 10545-7 - Class Four Heavy Traffic.
.4 Scratch Hardness: MOH's - 7.
.5 Chemical Resistance: ASTM C650 - Resistant.
.6 Coefficient of Friction: ASTM C1028 - Wet: 0.60; Dry: 0.80.

2.2 TILE

.1 Refer to Material / Finish Schedule.

2.3 TRIM SHAPES

.1 Conform to applicable requirements of adjoining floor and wall tile.
.2 Use slip resistant trim shapes for horizontal surfaces of showers, overflow ledges, recessed steps, shower curbs, drying area curbs, and stools.
.3 Use trim shapes sizes conforming to size of adjoining field wall tile, including existing spaces, unless specified otherwise.
.4 Internal and External Corners: Provide trim shapes as follows where indicated.
.1 Coved shapes for internal corners.
.2 Special shapes for:
.1 Base to floor internal corners to provide integral coved vertical and horizontal joint (Shower only).
.2 Base to floor external corners to provide bullnose vertical edge with integral coved horizontal joint. Use as stop at bottom of openings having bullnose return to wall (Shower only).
.3 Wall top edge internal corners to provide integral coved vertical joint.

2.4 GROUT

.1 Ready to use grout with color-coated quartz, confirming to ANSI A118.3.
.2 Acceptable material: Refer to finishes list.

2.5 MORTARS AND ADHESIVE:

.1 Mortar and Adhesive
.1 Polymer modified dryset mortar to ASTM C627-10.
.2 Mix to manufacturers requirements.
.3 Acceptable Material:
.1 Flextile 56 SR Premium Polymer - Modified, SAG-Resistant Mortar.
.2 Mapei Ultraflex LFT.
.3 TEC Ultimate Large Tile Mortar.

2.6 SITE PREPARED SANDED CEMENT MORTAR MIXTURE

.1 Mortar Bed:
.1 A mixture of cement, sand and water (latex additive may be included) installed to thickness as required to provide an even substrate on which to apply tile.
.2 Use mortar to correct irregularities in subsurface planes and slope accurately as required to meet design requirements.
.3 Reinforce mortar beds on floors with 50 mm x 50 mm x 1.6 mm gauge galvanized or stainless steel square wire mesh and walls on expanded metal lath weighing not less than 1.4 kq/m2.
.4 Apply scratch coat where expanded metal lath is used before mortar bed is applied.
.5 Conform to admixture manufacturer's recommendations for Products and mixtures.

.2 Cement:
  .1 CSA A3000 grey or white Portland cement; white for grout.
.3 Sand:
  .1 CSA A179, ASTM C144 or CSA A23.1, sharp, screened mortar sand free from organic and deleterious materials.
.4 Water:
  .1 Potable and free of minerals detrimental to mortar and grout mixes.
.5 Lime:
  .1 ASTM C207, Type S, hydrated lime.
.6 Acrylic Latex Additive Formulated for use in cement mortar beds:
  .1 Acceptable Material:
    .1 Flextile #43 by Flextile Ltd.
    .2 Planicrete AC by Mapei Inc.
.7 Quick setting, self-leveling underlayment, mortar screed for interior concrete floor preparation, repair and leveling from 10 mm to 38 mm thickness or for building slopes and metal reinforced floating screeds up to 50 mm thickness over polyethylene cleavage membrane.
  .1 Acceptable Material:
    .1 Ultraplan Easy, High-Hydrated Cement Technology HCT underlayment and repair mix by Mapei Inc.
    .2 Flex-Flo Plus by Flextile Ltd.
.8 Accessories:
  .1 Reinforcing Mesh:
    .1 Non corrosive, 50 mm x 50 mm x 16 ASW gauge or 1.5 mm diameter galvanized steel welded wire mesh complying with CSA G30.5 or ASTM A185 or ASTM A821.
  .2 Reinforcing Metal Lath:
    .1 ASTM C847.
  .3 Cleavage Membrane:
    .1 CAN/CGSB-51.34-M, 0.10 mm (4 mil) thick polyethylene film or CSA A123.3, Type 1, asphalt saturated roofing felt.

2.7 WATERPROOFING, CRACK SUPPRESSION AND ANTI-FRACTURE MEMBRANE SYSTEM

.1 Extra heavy duty, cold applied, seamless, load bearing, non-toxic, non-flammable, non-hazardous during storage, mixing, application and when cured, conforming to ANSI A118.10, for installation of tile and quarry tile for areas such as bathrooms, plazas, showers, kitchens, fountains, swimming pools and balconies.
.2 Reinforcing fabric shall be non-woven, rot-proof fabric specially for use with waterproofing membrane.
.3 All system materials shall be non-toxic, non-flammable and non- hazardous during storage, mixing, application and when cured.
.4 Waterproofing, crack suppression and anti fracture membrane shall meet following physical requirements:
  .1 Water Permeability at 91.2 kPa (30 ft hydro/0.9 atoms): Nil.
  .2 Elongation at break in accordance with ASTM D-751: 40%.
  .3 Service Temperature: -28 deg C to +137 deg C.
  .4 Tensile breaking strength: 20.4 Mpa.
  .5 Thickness: 0.5 mm (20 mils).
  .6 Bonding strength to concrete: 2.4 Mpa.
  .7 Acceptable Material:
    .1 Flextile WP-980 Waterproof & Crack Isolation Membrane with Reinforcing Fabric by Flextile Ltd.
    .2 Laticrete 9235 waterproof membrane system with Laticrete's fiberglass cloth reinforcement.
    .3 Mapelastic PRP 315 by Mapei Inc.
    .4 Uncoupling membrane, Ditra by Schluter.

.5 Surface Preparation:
  .1 Self leveling and smoothing underlayment for rapid leveling of concrete, portland cement mortar bed, plywood, terrazzo and existing tile floors.
  .2 Acceptable Material:
    .1 Flex-Flo up to 12 mm, by Flextile Ltd.
    .2 Laticrete 86 up to 12 mm, by Laticrete International, Inc.
    .3 Ultra lan/Ultra Plan MB up to 5 mm.
    .4 Planicrete M20 up to 50 mm by Mapei Inc.

2.8 ACCESSORIES

.1 Cleavage plane:
  .1 Polyethylene film to CGSB 51-34 .
.2 Metal lath:
  .1 To ASTM C847 galvanized finish, 10 mm rib at 2.17 kg/m2.
.3 Extruded Aluminum components:
  .1 With height of profile and type to suit design requirements and installation requirements.
  .2 Refer to finishes list for acceptable material.

2.9 CLEANING COMPOUNDS

.1 Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.
.2 Materials containing acid or caustic material are not acceptable.

3 Execution

3.1 EXAMINATION

.1 Verify existing conditions and finishes are ready to receive specified tile work.
.2 Ensure backings are structurally sound, level, and plumb within required tolerances.
.3 Ensure concrete is cured, has no structural cracks, openings and projects not required to meet design requirements.
.4 Concrete shall be cured for a minimum of 28 Days and shall have steel trowel finish if installation to include load bearing waterproof membrane over concrete and thin set application; fine broom or wood float finish for thin set application; shall have screed finish for mortar bed applications.
.5 Notify Consultant in writing of unacceptable substrate conditions.
.6 Beginning of installation implies acceptance of existing conditions.
.7 Ensure compatibility of adhesives, waterproofing, reinforcing and fillers with adjacent substrate and component coming in contact with these Products.
.8 Ensure waterproofing and adhesive manufacturers; examine substrate conditions, verify conditions are suitable for installation prior to commencement, and review application procedures. If requested submit written report.

3.2 PREPARATION

.1 Clean substrate surfaces to receive tile. Surface shall be dimensionally stable, cured free of contaminants such as oil, sealants, and curing compound.
.2 Mortar bed application substrate surface variation shall not exceed 6 mm in 3000 mm.
.3 Thin set application substrate surface variation shall not exceed 3 mm in 3000 mm.
.4 Apply latex cementitious leveling coat to correct substrate irregularity up to 8 mm thickness. Above 8 mm correct irregularity by mortar bed method.
.5 Review setting out point with Consultant for each location, verify patterns and edge condition.
.6 Verify expansion joints have been installed properly.
.7 Verify service fittings, floor drains, rough-ins and similar requirements are completed and are at proper levels to receive work.

3.3 MIXES - GENERAL

.1 Mix mortars and grouts to comply with requirements of referenced Standards and manufacturer's recommendations for accurate proportioning of materials, water or additive content, mixing equipment and mixer speeds, mixing containers, mixing time, pot life and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics.

.2 Prepare and mix latex cement leveling bed/scratch coat mortar using recommended mixing proportions to achieve proper consistency in accordance with manufacturer's instructions.

.3 Prepare and mix dry-set cement mortar, latex cement mortar using recommended mixing proportions to obtain proper consistency in accordance with manufacturer's instructions and requirements of ANSI A108.5.

.4 Prepare and mix tile grout using recommended mixing proportions to obtain proper consistency in accordance with manufacturer's instructions and requirements of ANSI A108.10.

.5 Prepare and mix modified epoxy emulsion mortar using factory proportioned adhesive units to obtain proper consistency in accordance with manufacturer's instructions and requirements of ANSI A108.9.

.6 Prepare and mix chemical resistance, water cleanable, tile setting epoxy adhesive using factory proportioned adhesive units to obtain proper consistency in accordance with manufacturer's instructions and requirements of ANSI A108.6.

.7 Prepare and mix chemical resistance, water cleanable, grouting epoxy using factory proportioned epoxy grout units to obtain proper consistency in accordance with manufacturer's instructions and requirements of ANSI A108.6.

3.4 INSTALLATION

.1 Provide tile in accordance with Terrazzo Tile & Marble Association of Canada - Specification Guide 09 30 00; Tile Installation Manual 2006 - 2007 unless specified otherwise.

.2 Lay out tile so field or patterns are centered on wall and floor areas, or conform architectural details so no tile less than 1/2 size occurs.

.3 No cut tiles are allowed at finished ceiling level.

.4 Align joints in walls, bases and floors, where tile sizes accommodate.

.5 Provide uniform joint widths throughout.

.6 Prior to installation ensure back of each tile is free of contaminants.

.7 Distribute production run variations evenly, maintaining continuity of appearance.

.8 Arrange accessories in tile work so they are spaced evenly, centered with joints and set true with proper and adequate projection conforming to manufacturer's recommendations.

.9 Make sure tile has adequate solid backing.

.10 Ensure corner and edges are fully supported by bonding material. Avoid slippage.

.11 Tile installation shall have a minimum of 95% bond coverage by backbuttering or other approved technique.

.12 Fit tile units around corners, fitments, fixtures, drains and other built-in-objects to maintain uniform joint appearance.

.13 Cut, drill and set anchors, bolts for fastening fixtures and fittings in tile work.

.14 Make cut edges smooth, even and free from chipping. Do not split tile.

.15 Grout to match colour of tile unless indicated otherwise. Fill joints.

.16 Control Joints: Provide control joints in accordance with following layout guidelines and as indicated:

- .1 Slabs-on-Grade:
  - .1 Over saw cut control joints.
  - .2 Around columns.
  - .3 Over perimeter joints.
  - .4 Every 4500 mm to 6000 mm in a grid.
- .2 Suspended Slabs:
  - .1 Over beam locations.

.2 Around columns.
.3 Every 4500 mm to 6000 mm in a grid.

.17 Anti-Fracture Membrane:
.1 Install in strict accordance with manufacturer's instructions.

.18 Waterproof Membrane:
.1 Pre cut reinforcing fabric allowing 50 mm for overlap at ends and sides. Extend fabric 150 mm through door openings.
.2 Roll up fabric so that each piece can be placed when ready. Reinforce joints.
.3 Spread layer of waterproofing liquid at joints and cracks.
.4 Embed 150 mm wide strip of reinforcing fabric into liquid. Spread coat of liquid over fabric to seal it.
.5 At flash cove spread layer of waterproofing liquid in coves.
.6 Embed 150 mm wide strip of reinforcing fabric and allow 100 mm of fabric to be flashed up walls.
.7 Spread coat of liquid over fabric to seal it.
.8 Flash fabric and waterproofing liquid into any drain and around all projections.
.9 Use roller or brush to apply a liberal coat of waterproofing liquid to floor and/or wall slightly wider than reinforcing fabric width.
.10 Include joints and covers which have been previously reinforced. While surface is still wet, unroll pre cut piece of fabric into it.
.11 Embed fabric and smooth out any wrinkles.
.12 Ensure liquid shall bleed through fabric.
.13 Seal fabric.
.14 Immediately apply liberal coat of liquid to completely cover fabric. Lap fabric 50 mm at seams.
.15 Allow to dry until dry to touch.
.16 Apply final application of liquid to entire surface.
.17 Repair and retest if required.
.18 Do not allow traffic on exposed waterproof membrane.

.19 Leveling Bed:
.1 Provide minimum 1.6 mm leveling bed to surfaces to receive waterproof membrane, in accordance with manufacturer's instructions.
.2 Provide ramped leveling bed beneath finish flooring adjacent to tile, for minimum 600 mm strip, to achieve flush finished surfaces at finished flooring transition.

.20 Tile:
.1 Provide setting bed in accordance with manufacturer's printed instructions and as specified herein.
.2 Prepare gypsum board and cement board surfaces, by applying a scratch coat of setting bed material.
.3 Provide setting compound in 1 layer with notched trowel to provide a continuous 3 mm to 6 mm bed, in accordance with tile manufacturer's written instructions.
.4 Place tiles to achieve uniform:
.1 Shading.
.2 Colouring.
.3 Jointing.
.5 Lay tiles in true lines, conforming to lines of building and arrange symmetrically in accordance with Drawing layouts.
.6 Review layout and slopes with Consultant prior to setting of tiles.
.7 When tiles are laid by thin-set method on exterior surfaces, in wet areas or laying large size tiles, achieve minimum of 95% coverage.
.8 Bonding shall be notched in horizontal straight lines.
.9 Lay tile on freshly notched thin-set mortar, slide tile back and forth at 90 degree to notches.
.10 Ensure tiles are set while bond coat is wet and in tacky stage without skin.
.11 Provide back buttering by applying thin troweled coat to back side of tile using flat side of trowel immediately before laying to achieve minimum 95% adhesion for

exterior work, or large tile area or wet areas.

.12 Lay tile with 1.6 mm joints, with joints running through in both directions.

.13 Lay out work to produce a symmetrical pattern with minimum amount of cutting. Cut tile at room perimeter shall be not less than 1/2 full size.

.14 Install divider strips and/or trims to suit design requirements at junction of flooring and dissimilar materials.

.15 Provide space or control or expansion joints in widths and depth as located and detailed on Drawings

.16 Existing joints in concrete sub floors shall be carried through to surface of tile work in accordance with details shown on Drawings.

.17 Install expansion joints where tile work abuts restraining surfaces such as perimeter walls, curbs, columns, wall corners and similar components, directly over joints in structural surfaces to details indicated.

.18 Provide slopes to floor drains using leveling bed material.

.19 Set wall tile in a true vertical plane with edges of tiles flush with each other.

.20 Provide uniform slopes to floor drains.

.21 Neatly and closely fit tiles around pipes, accessories and other items occurring in floor and walls.

.22 Provide necessary cutting without marring tile.

.23 Provide tile bases to work of Architectural Woodwork and Modular Casework Sections as indicated.

.24 Replace cracked, discoloured, chipped, and damaged tile.

.25 Align joints of floor, wall and base tiles.

.21 Grouting:

.1 Apply grout in accordance with manufacturer's printed instructions.

.2 Minimum of 2/3 of joint depth shall be kept open for grouting and grout shall penetrate joint to bond coat.

.3 When tiles have set, fill joints full with grout.

.4 Wipe clean surplus grout from face of tile, down to sharp edge of cushion edge of tile.

.5 After grout has attained slight initial set, completely clean-up and polish surfaces of tile.

3.5 CLEANING

.1 Upon completion remove protective coverings and clean down finished work of this Section leaving it in perfect condition, satisfactory to Consultant. Correct defective pointing and other unsatisfactory conditions.

.2 Clean adjacent surfaces which have been soiled or otherwise marred, to completely remove evidence of material causing same.

3.6 PROTECTION

.1 Protect other parts of Work from spatters.

.2 Remove and replace with perfect materials, sections of work which have become stained, soiled, broken, chipped or otherwise damaged.

.3 Prohibit traffic during installation and for 96 hours after completion.

3.7 SCHEDULES

.1 Install tiles according to TTMAC, Specification Guide 09 30 00 - Tile Installation Manual 2006/2007.

.2 Expansion and Control Joints for Tile Installation: TTMAC Detail 301MJ-2006 Movement Joints.

.3 Wall Tile:

.1 Tile Installed on Cement Mortar Over Masonry or Concrete Walls TTMAC Detail 302W- 2006.

.2 Tile Installed Over Masonry or Concrete walls - Thin Set Method TTMAC Detail 303W-2006.

.3 Tile Installed Over Gypsum Board - Thin Set Method, Dry Areas Only TTMAC Detail 304W-2006.

.4 Tile Installed on Cementitious Backer Unit (CBU), Thin Set Method, Walls, for Interior Wet/Dry Areas and Exterior Use; TTMAC Detail 305W-2006.

.5 Tile Installed on Cementitious Backer Unit (CBU)/ Coated Glass Mat Backer Board, on Bath Tub/Walls, Thin Set Method, TTMAC Detail 306W-2006.

.6 Tile Installed Over Cementitious Backer Unit (CBU) and Tile Installed on Coated Glass Mat Backer Board, on Bath Tub/Walls, Thin Set Method Detail A and Detail B respectively, TTMAC Detail 306W-2006.

.7 Tile installed on cement mortar over solid backing on interior/exterior walls, TTMAC Detail 307W-2006.

.8 Tile installed on interior/exterior walls on cement mortar over wood or metal studs, TTMAC Detail 308W-2006.

.4 Floor Tile:

.1 Tile Installed on Interior/Exterior Cement Mortar Bed on Concrete Slab. TTMAC Detail 310F-2002; Detail A and Detail B Chemical Resistance as applicable.

.2 Tile Bonded to Concrete Slab - Thin Set Method, TTMAC Detail 311F-2002; Detail A and Detail B Epoxy Method as applicable.

.3 Tile installed on cement mortar bed on concrete slab, TTMAC Detail 310F-2006.

.4 Tile bonded to concrete slab - Thin-set method, TTMAC Detail 311F-2006.

3.8 JOINT PATTERN

.1 As indicated on Drawings.

END OF SECTION

This page intentionally left blank

1 General

1.1 SUMMARY

.1 Provide acoustic tile ceilings including but not limited to following:
  .1 Lay-In Acoustic Ceiling Panels.

1.2 RELATED REQUIREMENTS

.1 Section 07 21 16 - Blanket Insulation.
.2 Section 09 22 26 - Suspension Systems.
.3 Mechanical Divisions
.4 Electrical Divisions

1.3 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
  .1 ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
  .2 ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
  .3 ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
  .4 ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
  .5 ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
  .6 ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
  .7 ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
  .8 ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
  .9 ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material.
    .1 Armstrong Fire Guard Products.
  .10 ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint.
  .11 ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.
  .12 ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
  .13 ASTM E 1264 Classification for Acoustical Ceiling Products.
.2 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-51.34-M86, Vapor Barrier, Polyethylene Sheet, for Use in Building Construction and Amendment No. 1 1988.
  .2 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.
  .3 CAN/ULC-S101-07, Standard Methods of Fire Endurance Tests of Building Construction and Materials.
  .4 CAN/ULC-S102-07, Surface Burning Characteristics of Building Materials and Assemblies.
  .5 CAN/ULC S114-05, Standard Method of Test for Determination of Non-Combustibility in Building Materials.
  .6 CAN/ULC-S702-97, Standard for Mineral Fibre Thermal Insulation for Buildings
.3 Underwriter's Laboratories of Canada (ULC)
  .1 CAN/ULC-S102-2003, Surface Burning Characteristics of Building Materials and Assemblies.

.4 Ceilings and Interior Systems Construction Association (CISCA):
.1 CISCA Code of Practices.

1.4 SUBMITTALS

.1 Make all submittals in accordance with Division 01 - General Requirements.
.2 Shop Drawings:
.1 Submit acoustic panel systems layouts - include bulkheads and panel sizes, locations patterns and termination at walls.
.2 Indicate insert and hanger spacing and fastening details, location of mechanical and electrical components, splicing method, and details of changes in level and junctions with dissimilar materials.
.3 Submit conditions at abutting, intersecting, and penetrating construction.
.4 Submit dimensioned locations of lighting fixtures, diffusers, sprinkler heads, sound system speakers, patient lifts, microscope, operating lights and other items that pierce the ceiling plane.
.3 Product Data:
.1 Submit manufacturer's technical literature and installation instructions describing components, materials and finishes.
.4 Material Safety Data Sheets:
.1 Submit MSDS for inclusion in Operation and Maintenance Manual.

1.5 DESIGN REQUIREMENTS

.1 Performance Requirements:
.1 Provide acoustical ceiling assembly designed and tested to provide surface burning characteristics (ASTM E84) as follows:
.1 Flame Spread: 0.
.2 Smoke Development: 0.
.2 Provide acoustical ceiling system which has been manufactured, fabricated and installed to provide Noise Reduction Coefficient (NRC) rating.
.2 Design all systems for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority. Systems are not designed to carry the weight of electrical equipment.

1.6 QUALITY ASSURANCE

.1 Applicator Qualifications: Provide work of this Section executed by competent installers with minimum of 5 years' experience in application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

1.7 COORDINATION OF WORK

.1 Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.8 REGULATORY REQUIREMENTS

.1 Fire resistance: NFPA Class A fire retardant treated wood required by code, to conform to ASTM E84.

1.9 ENVIRONMENTAL REQUIREMENTS

.1 The building shall be enclosed, the air conditioning system shall be operating with proper filters in place, and the proper temperature and humidity conditions shall be established before, during, and following installation.
.2 Building areas to receive ceilings shall be free of construction dust and debris.
.3 Do not install the Work of this Section until:
.1 Mechanical and Electrical Work above the ceiling is complete.

.2 Maintain uniform humidity of 20-40% before and during installation.
.3 Ventilation is adequate to remove excess moisture.
.4 Uniform Temperature 13-21°C.

.4 Permit wet work to dry before commencement of installation.
.5 Store materials in work area 48 hours prior to installation.
.6 Areas are closed and protected against weather and maintained at no less than 10°C.

1.10 DELIVERY, STORAGE, AND HANDLING

.1 Transport, handle and store material in manner to prevent warp, twist, and damage to panel edges and surfaces in accordance with Manufacturer's recommendations.
.2 Any bent, twisted, warped, or otherwise damaged tee grid suspension components, panels, and or trim shall not be used under any circumstances. Replace such damaged items with new straight, undamaged and acceptable material at no cost to Owner.
.3 Store material in warm, dry place away from water and the elements. Protect against undue loading stresses and shock.
.4 All packaged material shall be delivered in original manufacturer's wrappers and containers with labels and seals intact. Cartons for all fire rated materials shall bear U.L label.

1.11 EXTRA MATERIALS

.1 Provide extra materials of acoustic units in accordance with Division 01 - General Requirements.
.2 Provide acoustical units amounting to 2% of gross ceiling area for each pattern and type specified to nearest full carton, minimum two cartons.
.3 Extra materials to be from same production run as installed materials.
.4 Clearly identify each type of acoustic unit, including color and texture.
.5 Deliver to site, upon completion of the Work of this Section.
.6 Store where directed by Consultant

1.12 WARRANTY

.1 Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replacement of acoustical panels that falls within the Warranty period. Failure include, but are not limited to:
.1 Acoustical Panels: Sagging or warping
.2 Grid System: Rusting and manufacturers defects
.2 Warranty period for acoustical panels is ten (10) years from date of Substantial Completion.
.3 The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.13 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 ACOUSTICAL CEILING PANELS

.1 Acceptable material: Refer to Material / Finish Schedule.
.2 Adhesive: low VOC type recommended by acoustic unit manufacturer.
.3 Staples, nails and screws: to CSA B111 non-corrosive finish as recommended by acoustic unit manufacturer.
.4 Polyethylene: to CAN/CGSB-51.34, 0.15 mm thick.

3 Execution

3.1 INTERFACE WITH OTHER WORK

.1 Co-ordinate with Section 07 21 16 - Blanket Insulation and 09 22 26 - Suspension Systems.
.2 Co-ordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

3.2 EXAMINATION

.1 Examine surfaces scheduled to receive suspended or directly attached acoustical units for unevenness, irregularities and dampness that would affect quality and execution of work.
.2 Do not proceed with installation of ceiling system until unacceptable conditions are corrected.

3.3 MANUFACTURER'S INSTRUCTIONS

.1 Comply with the instructions and recommendations of the ceiling system manufacturer.
.2 Install materials in accordance with governing regulations, fire resistance rating requirements and industry standards applicable to work.
    .1 Comply with CISCA Code of Practices.

3.4 INSTALLATION

.1 General: Do not begin installation until materials sufficient to complete an entire room are received and prepared for installation.
.2 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 21°C for 72 hours prior to commencement of work and maintain temperature until 72 hours after completion.
.3 Install ceiling panels and metal suspension system in accordance with applicable requirements of ASTM C636 and manufacturer's directions.
.4 Where manufacturer's directions are at variance with Contract Documents, notify Consultant before proceeding with work.
.5 Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders.
.6 Recessed items shall replace or be centred on acoustical panels, except where shown otherwise.
.7 Consult with Mechanical and Electrical Divisions to co-ordinate work.
.8 Provide additional supports where required.
.9 Space hangers for suspended ceilings to support grillage independent of walls, columns, pipes and ducts at maximum 1220mm centres along support grillage and not more than 150mm from ends.
.10 Provide additional hangers at light fixtures and diffusers.
.11 Attach hangers to inserts in overhead concrete slab. Bend top of hangers at right angles, turn down and securely fasten. Turn bottom of hangers upwards and securely wrap 3 times.
.12 Suspension to Metal Deck:
    .1 Punch lower part of metal deck with special puncher at required distances.
    .2 Put hanger wire through holes, turn down, make a loop and securely wrap 3 times
.13 Provide written confirmations to Mechanical and Electrical Divisions that suspended ceiling is capable of supporting additional weight of mechanical and electrical fixtures specified in Mechanical and Electrical Divisions.
.14 Run main tees at right angles to length of light fixtures.
.15 Space main tees 1220mm oc in 1 direction and securely tie to hangers.
.16 Space cross tees 610mm oc at right angles to main tees and properly lock at intersections.
.17 Level suspended systems with a maximum tolerance of 3mm over 3m.
.18 Use longest practical lengths of tees, furring and running channels to minimize joints.
.19 Make joints square, tight, flush and reinforced with concealed splines.
.20 Assemble framework to form a rigid and interlocking system.

.21 Design suspension system to accommodate movement caused by thermal expansion or contraction.
.22 Design and space hangers and carrying members to support entire ceiling system, including lighting fixtures, diffusers and equipment openings in locations indicated on reflected ceiling drawings and related Mechanical and Electrical Division drawings.
.23 Use edge moulding where ceiling abuts vertical surface.
.24 Use corner moulding along external edges at ceiling steps.
.25 Install direct-hung exposed grid lay-in acoustic panel ceilings where shown.
.26 Install main tees, cross tees, and wall mouldings so bottom flanges are in flat, level plane at finish ceiling elevations.
.27 Arrange grid so opposite wall edge panels are of equal width but not less than 1/2 panel width and lay out and erect grid system to provide following panel pattern as shown:
.1 Pattern of 2'-0" x 4'-0" with main beam tees spaced 4'-0" oc and cross tees 2'-0" oc unless reviewed otherwise (imperial measure).
.2 Pattern of 2'-0" x 2'-0" with main beam tees spaced 2'-0" oc, primary cross tees at 2'-0" oc and secondary cross tees at 610 mm oc (imperial measure).
.28 Erect main beams parallel to main wall and to each other; space uniformly at centres specified. Stop ends of main beams 13 mm from walls allowing for expansion.
.29 In ceilings having recessed lighting fixtures, modify grid framing to provide main beams along and parallel to both long sides of lighting fixtures; at each 300 mm wide fixture.
.30 Provide an additional main beam along the long side of fixture. At other items recessed in ceiling and designed to be framed by main beams, provide additional main beams necessary.
.31 Rest ends of main beams on horizontal leg of wall mouldings.
.32 Support main beams with hangers along each run, spaced at not more than 1220mm centres; except in areas of steel framing, provide hangers at each intersection of main beam and framing.
.33 If ductwork or equipment located in ceiling plenum area interferes with hanger spacing, provide a trapeze or other arrangement reviewed by Consultant to support main beams at proper spacing.
.34 Do not secure hangers to metal roof deck, ductwork, conduit, piping, equipment or support system for any of these.
.35 Provide an additional hanger at each corner of each opening to receive a recessed lighting fixture and each opening that has been framed by main beam members.
.36 Provide additional hangers at each diffuser, grille and other points of extra loading.
.37 Secure hangers to main beams to develop full strength of hangers and per manufacturer's published directions.
.38 Install primary cross tees at right angles to main beam tees and space uniformly at centres specified. Join ends of cross tees to web of main beams with a positive interlock; except at light fixtures, secure members together with concealed steel clips and bolts.
.39 Field paint cut edges to match surface color and sheen.
.40 Arrange acoustical units and orient directionally patterned units, if any, in manner shown on reflected ceiling plans.
.41 Clip down acoustic panels at fire rated rooms or at locations shown on Room Finish Schedule against wind uplift.

3.5 CLEANING

.1 Clean exposed surfaces of acoustical ceilings, trim, edge moldings and suspension members to comply with manufacturer's instructions for cleaning.
.2 Touch up any minor finish damage.
.3 Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.6 PROTECTION

.1 Protect installed work from damage due to subsequent construction activity, including temperature and humidity limitations and dust control, so that the work will be without damage and deterioration at the time of acceptance by the Owner.

END OF SECTION

1 General

1.1 SUMMARY

.1 Provide resilient base including but not limited to following:
  .1 Surface fillers, primer and adhesive.

1.2 RELATED REQUIREMENTS

.1 Section 07 92 00 - Joint Sealants.
.2 Section 09 65 16 - Resilient Sheet Flooring.
.3 Section 09 65 19 - Resilient Tile Flooring.

1.3 REFERENCES

.1 ASTM F1861-02 - Standard Specification for Resilient Wall Base.
.2 CAN/CSA-A126.5-87, Resilient Wall Base.
.3 ASTM F2170-02 -Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

1.4 SUBMITTALS

.1 Make submittals in accordance with Division 01 - General Requirements.
.2 Product Data:
  .1 Submit manufacturer's literature, data sheets for each type of material provided under this Section for Project.
  .2 Data sheets shall provide all required information.
  .3 Submit required copies of detailed instructions for maintaining, preserving and keeping materials in clean and safe conditions and give adequate warning of maintenance practices or materials detrimental to specified materials.
  .4 Submit manufacturer's installation instructions.
.3 Data sheets:
  .1 Submit manufacturer's data sheets for each type of resilient base, resilient base adhesive, surface fillers and primers.
  .2 Data sheets shall provide all required information.
.4 Material Safety Data Sheets:
  .1 Submit MSDS for inclusion in Operation and Maintenance Manual for adhesives and sealants.
.5 Operating and Maintenance Instructions Manual:
  .1 Provide maintenance data for resilient bases for incorporation into maintenance manual specified in Division 01 - General Requirements.

1.5 QUALITY ASSURANCE

.1 Qualifications:
  .1 Surface burning characteristics to CAN/ULC-S102.2-M. Flame Spread 25 or less; Smoke Developed 50 or less.
.2 Applicator Qualifications:
  .1 Provide work of this Section executed by competent installers with minimum of 5 years experience in application of products, systems and assemblies specified, including 2 years in heat welding of seams and with approval and training of the product manufacturers.
  .2 Upon request, provide proof of manufacturer's certificate to Consultant prior to commencement of installation.
.3 Pre-Construction Meeting:
  .1 Prior to start of work, arrange for project site meeting of all parties associated with work of this Section, including Contractor, resilient base installer, trade or substrates to which flooring is applied and manufacturer's representative.

.2 Review Specification for work included under this Section and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, project staffing, restrictions on areas of resilient base installation and other matters affecting construction, to permit compliance with intent of this Section.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in good condition to site in manufacturer's original unopened containers that bears name and brand of manufacturer, project identification, shipping and handling instructions.

.2 Store on site in designated space at minimum temperature of 20 deg C for period of 48.

1.7 PROJECT CONDITIONS

.1 Provide each flooring Product in accordance with manufacturer's recommended tolerances for:

.1 Substrate moisture content.

.2 Temperature and ventilation.

.3 Maintain Relative Humidity at application to % recommended by manufacturer when tested in accordance with ASTM F2170, Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

.2 Environmental Requirements: Air temperature and structural base temperature at base installation are shall be above 20 deg C for 72 hours before, during and 48 hours after installation.

.3 Allow base materials and application adhesives to acclimatize to these temperatures for 48 hours.

1.8 MAINTENANCE MATERIALS

.1 Extra Materials: Supply to Owner at completion of job 6000 mm of coil stock of each type of resilient base in colours specified for future repairs, boxed in original containers and clearly labeled.

.2 Extra stock shall be same production run as installed products.

.3 Store extra stock in location as directed later by Consultant.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.

.2 Place in appropriate on-site bins in accordance with Waste Management Plan.

.3 A weekly clean-up is mandatory and is to be undertaken the day prior to job site meeting.

.4 Failure to comply will result in clean-up and administrative costs being allocated and backcharged on a pro rated basis.

2 Products

2.1 MATERIALS

.1 Resilient Base:

.1 PVC- Free: Supply rubber cove base 3 mm thick x 100 mm high, vulcanized rubber, in coil lengths, top set with coved toe with pre-manufactured inside and outside corners.

.2 Base shall meet performance and dimensional requirements of ASTM F-1861, Type TS, PVC free, Group 1, Class C Fire Resistance Rating.

.3 Colours selected by Consultant from manufacturer's full range including designer colours.

.4 Acceptable material: Refer to Material / Finish Schedule.

.2 Surface fillers and primers:

.1 Types and brands approved, acceptable to resilient base manufacturers for applicable conditions. Use non-shrinking latex compound.

.3 Resilient base adhesives:

.1 Waterproof, clear setting type and brands as recommended by resilient base manufacturer.

.4 Edge Strips:

.1 Extruded vinyl.

.2 Colour to be selected by the Consultant.

3 Execution

3.1 EXAMINATION

.1 Examine wall surfaces to ensure that they are dry, clean, level and free from cracks, ridges a dusting, scaling and carbonation, which might preclude a satisfactory installation.

.2 Remove irregularities and fill depressions with non-shrinking latex (epoxy) compound.

.3 This Subcontractor shall check that the primer, adhesive and filler of this section are compatible. Report in writing, all errors, defects and discrepancies immediately to Consultant.

.4 Do not commence with work until unsatisfactory conditions have been corrected.

.5 Failure to report unsatisfactory conditions will be construed acceptance and approval of substrate conditions.

.6 Commencement of work shall imply acceptance of substrate with regard to conditions of substrate at time of installation.

3.2 INSTALLATION

.1 Resilient base work shall be performed by experienced and competent workers in strict accordance with manufacturers written instructions for material concerned.

.2 Fill cracks or irregularities with crack filler approved by resilient base manufacturer.

.3 Provide a solid backing over entire area behind resilient base.

.4 Apply primer in strict accordance with manufacturer's written instructions.

.5 Permit primer to dry.

.6 Apply adhesive evenly and continuously with an approved notch tooth spreader at the recommended rate for full base adhesion and contact.

.7 Mechanical spreader not approved.

.8 Do not apply adhesive in a manner which promotes induced waviness in resilient base.

.9 Do not spread more adhesive than can be covered before initial set takes place.

.10 Use waterproof adhesive throughout.

.11 Mix and spread adhesive evenly, in quantities which can be covered by resilient base within the adhesive's working time.

.12 If the adhesive over-dries, completely remove it using solvents compatible with adhesive and re-apply adhesive.

.13 Do not soil walls, bases, fitments, finish carpentry work or adjacent surfaces with adhesive.

.14 Promptly remove all excess and spillage of adhesive.

.15 Unroll coils of resilient base.

.16 Place resilient base flat to loosen coil set.

.17 Set wall base in adhesive tightly against wall and floor surfaces.

.18 Use lengths as long as practicable and not less than 500 mm long.

.19 Install resilient bases to walls, columns and fitments as indicated on the Drawings and Room Finish Schedule, during final stages of completion of work, when ceilings and permanent partitions are finished, when prime paint coats are applied and when surface conditions are suitable for installation.

.20 Set resilient base in adhesive to produce a positive, permanent bond without gaps, tight against vertical and floor surfaces for a uniform fit.

.21 Install resilient base straight and level with maximum height variation of 1:1000, having vertical, tight and flush "hairline" butt joints with no two joints closer than 610mm apart.

.22 Provide mitred internal corners.

.23 External corners shall be wrapped around corners as sharp as possible by scoring the back.
.24 Install pre-molded end stops where end of base is exposed or does not butt against a vertical surface in the finished work.
.25 Accurately scribe and fit resilient base to metal frames and other obstructions.
.26 Roll resilient base with clean, polished 2.27 kg roller, against vertical and floor surfaces to ensure full bonding to surfaces.
.27 Ensure that installation of resilient base is tight, firm, and free of bubbling and separation of any kind from surfaces.
.28 Remove defective installation as directed by Consultant and install new resilient base as specified herein.
.29 Resilient base work shall be handed over to Owner free of blemishes and in perfect condition.

3.3 CLEANING

.1 Remove excess adhesive from floor, base and wall surfaces without damage.
.2 Clean, seal and wax floor and base surface to flooring manufacturer's instructions.

END OF SECTION

1 General

1.1 SUMMARY

.1 The work of this Section comprises the furnishing of all equipment, labour and materials necessary for the supply and installation of the following, including all accessories, as specified in this Section and indicated on the Room Finish Schedule and Drawings:
  .1 Vinyl composition tile in all rooms where vinyl composition tile (VCT) is indicated as the floor material on the Room Finish Schedule.
  .2 Preparation of sub-floor to receive VCT, including filling of saw-cut control joints.

.2 The substrate for the VCT will be:
  .1 New concrete floor slabs on grade.
  .2 New concrete floor slabs on steel floor decking.
  .3 New Plywood sub floors.

1.2 RELATED REQUIREMENTS

.1 Section 09 65 13 - Resilient Base and Accessories.
.2 Section 09 65 16 - Resilient Sheet Flooring.
.3 Section 09 68 00 - Carpeting.

1.3 REFERENCES

.1 CSA-A126.1-M1984, Vinyl Composition Floor Tile
.2 CAN/ULC-S102-2-M88, Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering, and Miscellaneous Materials and Assemblies.
.3 CGSB 25-GP-21M-78, Floor Polish, Water Emulsion, Detergent Resistant, Non-buffable.

1.4 MAINTENANCE DATA

.1 Provide data for maintenance of resilient flooring for incorporation into manual specified in Division 01 - General Requirements.

1.5 MAINTENANCE MATERIAL

.1 Deliver 2% of each color, pattern and type flooring material including base required for this project for maintenance use. Identify each box. Store where directed by owner.
.2 Maintenance materials to be of same production run as installed materials.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Maintain air temperature and structural base temperature at flooring installation area above 20 C for 48 hours before, during and for 48 hours after installation.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 MATERIALS

.1 Vinyl composition tile (VCT):
  .1 To CSA A-126.1 and CAN/ULC-S102.2
  .2 Type: A
  .3 Fire test data:

.1 Flame spread: 75 or less
.2 Smoke developed: 300 or less
.4 Size: 305 mm x 305 mm
.5 Thickness: 3.18 mm
.6 Pattern: medium.
.7 Texture: smooth
.8 Colour: Refer to the Material / Finish Schedule.
.9 Acceptable Materials:
.1 Flextile "Flex-Thru" (Canada Classic).
.2 Amtico "Fortress".
.3 Armstrong "Excelon".

.2 Primers and adhesives:
.1 Primers and adhesives: as recommended by resilient flooring manufacturer for specific installation, except products with VOC's not permitted.
.3 Sub-floor filler and leveller: while premix latex requiring water only to produce cementitious paste.
.4 Edge strips: extruded or formed metal.
.1 VCT-to-carpet by Section 09 68 00 - Carpeting.
.2 VCT-to-concrete: Prefinish metal binder bar, Roberts 16-100.
.3 VCT-to-porcelain tile: vinyl reducer, Johnsonite CRS-XX-A
.5 Sealer: type recommended by flooring manufacturer.
.6 Wax: type recommended by flooring manufacturer.

3 Execution

3.1 INSPECTION

.1 Ensure concrete floors are dry using test methods recommended by flooring manufacturer, and exhibit negative alkalinity, carbonization or dusting.

3.2 PREPARATION OF RESILIENT TILE FLOORING

.1 Prepare concrete floors to receive resilient tile flooring in accordance with requirements of ASTM F710.
.2 Consult individual manufacturer for their specific recommendations and follow them as required.
.3 For existing floors conduct non-chemical methods of removal, such as abrasive cleaning or blast cleaning, including methods described in ASTM D4259 on existing concrete slabs with deleterious residues.
.4 Mechanically prepare concrete substrate using dustless approved method to ICRI requirements to:
.1 CSP: Concrete Surface Profile.
.2 Diamond Cup Ground.
.3 Shot Blast.
.5 Remove sub-floor ridges and bumps.
.6 Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
.7 Clean floor free of paint, oil, dirt or any other foreign matter detrimental to sheet flooring application.
.8 Clean floor and apply filter; trowel and float to leave smooth, flat hard surface.
.9 Prohibit traffic until filler has cured.
.10 First apply moisture reduction barrier coating on prepared concrete by rolling in crisscross direction across entire surface being treated including up to and around perimeter of any restrained surfaces such as walls and columns in accordance with manufacturer's recommendations.
.11 Clean floor and apply fast setting cement based compound filler mixed with high performance acrylic latex additive to form skim coat; fill low spots, cracks, joints, holes and other defects with sub-floor filler, trowel and float to leave smooth, flat hard surface ready for direct glue

down installation of floor covering.

.12 Vacuum, prime and seal substrate to resilient tile flooring manufacturer's recommendations.

3.3 FLOORING-APPLICATION GENERAL

.1 Lay flooring in strict accordance with manufacturer's printed instructions for substrate over which material is being laid.

.2 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half width of tile.

.3 Install flooring in staggered grid pattern with continuous joints and pattern grain parallel for all units and parallel to width or room.

.4 Roll flooring to ensure full adhesion in accordance with flooring manufacturer's recommendations.

.5 Cut flooring neatly around fixed objects.

.6 Install flooring in pan type floor access covers. Maintain floor pattern.

.7 Terminate flooring at centerline of door openings where adjacent floor finish or color is dissimilar.

.8 Install metal edge strips at unprotected or exposed edges where flooring terminates and between flooring and dissimilar materials, in accordance with Par. 2.1.5 above.

3.4 CLEANING AND WAXING

.1 Remove excess adhesive from floor, base and wall surfaces without damage.

.2 Clean, seal and wax floor surface to flooring manufacturer's instructions.

3.5 PROTECTION OF FINISHED WORK

.1 Protect new floors from after initial waxing until just before final waxing and final inspection.

.2 Prohibit traffic on floor for 48 hours after installation.

3.6 JOINT PATTERN

.1 Straight.

.2 Staggered.

.3 45 degree straight.

.4 45 degree staggered.

END OF SECTION

This page intentionally left blank

1 General

1.1 SUMMARY

.1 Work Included:
- .1 Surface preparation.
- .2 Painting.

.2 Work Excluded:
- .1 Do not paint pre-finished metal siding, fascia and soffit, coping cap flashing and similar components. Refer to dedicated trade Sections for special finishes specified therein and their effects on your trade.
- .2 Do not paint chrome, stainless steel, vinyl, plastic laminate and aluminum surfaces throughout unless specified otherwise.
- .3 Do not paint internal surfaces of steel tanks and stacks.
- .4 Do not paint equipment furnished completely prime and finish painted by manufacturer unless required to have field painting over factory finish to have one common corporate colour as identified in finish schedule.

1.2 RELATED REQUIREMENTS

.1 Section 05 50 00 - Metal Fabrications.
.2 Section 06 10 00 - Rough Carpentry.
.3 Section 06 41 00 - Architectural Wood Casework.
.4 Section 08 11 13 - Hollow Metal Doors and Frames.
.5 Section 08 14 16 - Flush Wood Doors.
.6 Section 09 21 16 - Gypsum Board Assemblies.
.7 Mechanical Sections.
.8 Electrical Sections.

1.3 REFERENCES

.1 Department of Justice Canada (Jus)
- .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33
- .2 Environmental Protection Agency (EPA)
  - .1 EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 - 1995, (for Surface Coatings).
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .4 Master Painters Institute (MPI)
  - .1 MPI Architectural Painting Specifications Manual, 2004.
- .5 National Fire Code of Canada - latest edition.
- .6 Society for Protective Coatings (SSPC)
  - .1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

1.4 DEFINITIONS

.1 "Exposed" means visible in completed work. In case of closets, cabinets and drawers, it includes their interiors. Exposed surfaces in underground parking areas are considered "Exterior" for purpose of this Contract.

.2 "Surface Preparation" means cleaning or treating of surface to be painted to ensure best possible bond between surface to and painting to be applied; remove surface contaminants that will affect performance of painting, without limitations such as oil, grease, salts, dust, dirt, rust, rust scale, ill scale, and old coatings where applicable; remove surface imperfections without limitations such as weld spatter, sharp edges, burrs, silvers, laminations, pits, porosities and crevices; prepare surfaces to provide anchor profile or surface profile which improve mechanical bonding of coating to prepared surface by increasing surface area.

1.5 QUALITY ASSURANCE

.1 Qualifications:
- .1 Contractor: minimum of five years proven satisfactory experience.
- .2 Journeymen: qualified journeymen who have "Tradesman Qualification Certificate of Proficiency" engaged in painting work.
- .3 Apprentices: working under direct supervision of qualified trades person in accordance with trade regulations.

.2 Pre-Installation Meeting:
- .1 Attend pre-installation meeting one week prior to beginning work of this Section.
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Coordination with other building subtrades.
  - .4 Review quality expectations.

.3 Standard of Acceptance:
- .1 Walls: No defects visible from a distance of 1000 mm at 900 to surface.
- .2 Soffits: No defects visible from floor at 450 to surface when viewed using final lighting source.
- .3 Final coat to exhibit uniformity of color and uniformity of sheen across full surface area.

1.6 HEALTH AND SAFETY

.1 Occupational Health and Safety in accordance with Division 01 - General Requirements.

1.7 ENVIRONMENTAL PERFORMANCE REQUIREMENTS

.1 Environment Choice Program:
- .1 Provide paint products certified to meet the requirements of the Environmental Choice Program, Department of the Environment.
- .2 Submit CSA Certification Reports that products proposed for use are certified under the Environmental Choice Program.

1.8 INSPECTION REQUIREMENTS

.1 Interior surfaces requiring painting shall be inspected by Paint Inspection Agency who shall notify Consultant and Construction Manager in writing of defects or problems, prior to commencing painting work, or after prime coat shows defects in substrate.

.2 Where "special" painting, coating or decorating system applications (i.e. elastomeric coatings) or non MPI listed products or systems are to be used, paint or coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Owner.

.3 Exterior painting and decorating work shall be inspected by a Paint Inspection Agency (inspector) acceptable to the specifying authority and local Painting Contractor's Association. Painting contractor shall notify the Paint Inspection Agency a minimum of one week prior to commencement of work and provide a copy of project painting specification, plans and elevation drawings (including pertinent details) as well as a Finish Schedule.

.4 Exterior surfaces requiring painting shall be inspected by the Paint Inspection Agency who shall notify Consultant and Construction Manager in writing of defects or problems, prior to commencing painting work, or after prime coat shows defects in substrate.

1.9 SUBMITTALS

.1 Submittals in accordance with Division 01 - General Requirements.

.2 Product Data:
- .1 Submit manufacturer's literature, data sheets for each type of material provided under this Section for Project. Data sheets shall provide all required information. Submit manufacturer's installation instructions.

.2 Material Safety Data Sheets: Submit MSDS for inclusion in Operation and Maintenance Manual without limitations for adhesives, sealants, patching and leveling compound, solid polymer and as designated later by Consultant.

.3 Progress Reports:

.1 Materials: Submit in writing list of proposed materials prepared by paint manufacturer, for approval at least 60 Days before materials are required. List shall bear manufacturer's official certification that materials listed meet or exceed requirements specified herein.

.4 Samples:

.1 Submit full range color sample chips to indicate where color availability is restricted.

.2 Submit duplicate 200 mm sample panels of each paint with specified paint or coating in colors, gloss/sheen and textures required to MPI Painting Specification Manual standards submitted on the following substrate materials:

.1 3 mm plate steel for finishes over metal surfaces.

.2 13 mm birch 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.

.5 10 mm cedar for finishes over wood surfaces.

.6 When approved, samples shall become acceptable standard of quality for appropriate on-site surface with one of each sample retained on-site.

.5 Manufacturer's Instructions:

.1 Submit manufacturer's installation and instructions.

.6 Closeout Submittals: submit maintenance data for incorporation into manual specified in Division 01 - General Requirements. include following:

.1 Product name, type and use.

.2 Manufacturer's product number.

.1 Color numbers and associated locations.

1.10 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Division 01 - General Requirements.

.2 Deliver and store materials in original containers, sealed, with labels intact.

.3 Labels shall clearly indicate:

.1 Manufacturer's name and address.

.2 Type of paint or coating.

.3 Compliance with applicable standard.

.4 Color number in accordance with established color schedule.

.4 Remove damaged, opened and rejected materials from site.

.5 Provide and maintain dry, temperature controlled, secure storage.

.6 Observe manufacturer's recommendations for storage and handling.

.7 Store materials and supplies away from heat generating devices.

.8 Store materials and equipment in a well ventilated area with temperature range 7°C to 25°C.

.9 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.10 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Consultant. After completion of operations, return areas to clean condition to approval of Consultant.

.11 Remove paint materials from storage only in quantities required for same day use.

.12 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

1.11 FIRE SAFETY REQUIREMENTS

.1 Provide one - 3kg Type ABC fire extinguisher adjacent to storage area.

.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.12 SITE CONDITIONS

.1 Environmental Requirements: Paint and finish in clean, dust-free, properly ventilated and adequately lit areas (minimum 100 lx (9.3 ft candles).

.2 Maintain minimum interior temperature of 18 deg C during application and drying of paint and maintain until building occupancy occurs.

.3 Do not undertake exterior painting if air and surface temperature are expected to fall below 10 deg C before coating has dried. Avoid painting during winds, weather conditions which may affect paint application or following rain. Wait until frost, dew or condensation has evaporated. Avoid painting surfaces exposed directly to hot summer sun.

.4 Do not undertake interior painting on surfaces where condensation has or will form due to presence of high humidity and lack of proper ventilation.

.5 Ventilate enclosed spaces.

.6 Conduct moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple "cover patch test".

.7 Perform no painting work when maximum moisture content of substrate exceeds:

- .1 12% for concrete.
- .2 12% for clay and concrete brick and block.
- .3 15% for wood.
- .4 12% for stucco, plaster and gypsum board.

.8 Test concrete, masonry and plaster surfaces for alkalinity as required.

.9 Surface and Environmental Conditions:

- .1 Apply paint finish only 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 only to adequately prepared surfaces and to surfaces within moisture limits noted herein.
- .3 Apply paint only when previous coat of paint is dry or adequately cured.
- .4 Apply paint finishes only when conditions forecast for entire period of application fall within manufacturer's recommendations.
- .5 Do not apply paint when:
  - .1 Temperature is expected to drop below 10°C before paint has thoroughly cured.
  - .2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.
  - .3 Surface to be painted is wet, damp or frosted.
- .6 Provide and maintain cover when paint must be applied in damp or cold weather.
- .7 Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer.
- .8 Protect until paint is dry or until weather conditions are suitable.
- .9 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.
- .10 Paint occupied facilities in accordance with approved schedule only. Schedule operations to approval of the Consultant such that painted surfaces will have dried and cured sufficiently before occupants are affected.

1.13 EXTRA MATERIAL

.1 Submit maintenance materials in accordance with Division 01 - General Requirements.

.2 Submit one - one liter can of each type and color of primer, identified color and paint type in relation to established color schedule and finish system.
.3 Deliver and store where directed.

1.14 SCHEDULING OF THE WORK

.1 Submit work schedule for various stages of painting to Consultant for approval. Submit schedule minimum of 48 hours in advance of proposed operations.
.2 Obtain written authorization from Consultant for changes in work schedule.
.3 Schedule painting operations to prevent disruption of occupants in and about the building.

1.15 WARRANTY

.1 Warrant work of this Section for period of two (2) years against defects and/or deficiencies in accordance with General Conditions of the Contract.
.2 Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner.
.3 Defects include but are not limited to; material shrinkage, cracking, splitting and defective workmanship including but are not limited to failure in bubbling, blistering and delamination.

1.16 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.
.4 Separate for reuse and place in designated containers steel waste in accordance with Waste Management Plan.
.5 Handle and dispose of hazardous materials in accordance with CEPA, regulations.
.6 Unused paint materials must be disposed of at official hazardous material collections site.

2 Products

2.1 MATERIALS

.1 Provide paint materials for paint systems from single manufacturer.
.2 Conform to latest MPI requirements for painting work including preparation and priming.
.3 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.
.4 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.
.5 Provide paint products meeting MPI "Environmentally Friendly", E2 ratings based on VOC (EPA Method 24) content levels.
.6 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.
.7 Water-borne surface coatings and recycled water-borne surface coatings must have a flash point of 61.00C or greater.
.8 Both water-borne surface coatings and recycled water-borne surface coatings must be made by a process that does not release:
    .1 Matter in undiluted production plant effluent generating a 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.
    .2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.

.9 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes must meet a minimum "Environmentally Friendly" E2 rating.

.10 Recycled water-borne surface coatings must contain 50 % post-consumer material by volume.

.11 Recycled water-borne surface coatings must not contain:
- .1 Lead in excess of 600.0 ppm weight/weight total solids.
- .2 Mercury in excess of 50.0 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.

.12 The following must be performed on each batch of consolidated post-consumer material before surface coating is reformulated and canned. These tests must be performed at a laboratory or facility which has been accredited by the Standards Council of Canada.
- .1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.
- .2 Mercury is to be determined by Cold Vapor Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.

.13 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique No. 8081 as defined in EPA SW-846.

.14 Painting products: except where specifically specified otherwise all paint to be latex base with the following manufacturer's product lines as Acceptable Material for use on this project.
- .1 PPG - Pure Performance - 0 VOC.
- .2 Benjamin Moore - Genex - 0 VOC.
- .3 Glidden Lifemaster 2000 - 0 VOC.
- .4 Interior Latex:
  - .1 Benjamin Moore Ultra Spec 500.
  - .2 Sherwin Williams Promar 200 Zero VOC.
  - .3 PPG Architectural - Dulux X-Pert.
- .5 Exterior:
  - .1 Colour Your World - 5600 Series.
  - .2 CIL/Glidden - 9420 Series.
  - .3 PPG - 1 Series
- .6 Primers
  - .1 Latex or alkyd as recommended by paint manufacturer except where specifically indicated otherwise.

2.2 COLORS

.1 Consultant will provide Color Schedule after Contract award.

.2 Color schedule will be based upon selection of six (6) base colors and four (4) accent colors. Allow for two (2) deep base colors for base and accent colors.

.3 Selection of colors from manufacturers full range of colors.

.4 Second coat in three coat system to be tinted slightly lighter color than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

.1 Perform color tinting operations prior to delivery of paint to site in strict accordance with manufacturer's written instructions.

.2 Paste, powder or catalyzed paint mixes shall be mixed

.3 Where thinner is used, addition shall not exceed paint manufacturer's recommendations. Do not use kerosene or any such organic solvents to thin water-based paints.

.4 Thin paint for spraying according in strict accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Consultant.

.5 Re-mix paint prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and color and gloss uniformity.

2.4 GLOSS / SHEEN RATINGS

.1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

	Gloss @ 60 Degrees	Sheen @ 85 Degrees
Glass Level 1	Matte finish (flat)	Max. 5 Max. 10
Gloss Level 2	Velvet-Like Finish	Max. 10 10 to 25
Gloss Level 3	Eggshell Finish	10 to 25 10 to 35
Gloss Level 4	10 to 25 10 to 35	20 to 35 min. 35
Gloss Level 5	20 to 35 min. 35	35 to 70
Gloss Level 6	Traditional Gloss	70 to 85
Gloss Level 7	High Gloss Finish	More than 85

.2 Gloss level ratings of painted surfaces as indicated.

2.5 INTERIOR PAINTING SYSTEMS

.1 Concrete vertical surfaces: including horizontal soffits:
  .1 INT 3.1C - High performance architectural latex gloss level 5-semi-gloss finish.
.2 Concrete horizontal surfaces: floors:
  .1 INT 3.2D - Pigmented polyurethane finish.
  .2 INT 3.2F - Concrete floor sealer.
.3 Concrete masonry units: smooth and split face block and brick:
  .1 INT 4.2D - High performance architectural latex gloss level 5-semi-gloss finish.
.4 Structural steel and metal fabrications:
  .1 INT 5.1R - High performance architectural latex gloss level 5-semi-gloss finish.
.5 Galvanized metal: doors, frames, railings, misc. steel, pipes, overhead decking, and ducts.
  .1 INT 5.3L - Alkyd gloss level 5-semi-gloss finish (over non-cementitious primer).
.6 Dressed lumber: including doors, door and window frames, casings, mouldings:
  .1 INT 6.3A - High performance architectural latex gloss level finish.
.7 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:
  .1 INT 9.2B - High performance architectural latex gloss level finish.

2.6 EXTERIOR PAINTING SYSTEMS

.1 Concrete Horizontal Surfaces: decks
  .1 EXT 3.2H - Clear waterborne sealer.
.2 Structural Steel and Metal Fabrications:
  .1 EXT 5.1F - Epoxy finish.
.3 Galvanized Metal: not chromate passivated
  .1 EXT 5.3D - Pigmented polyurethane finish for use in high contact/high traffic areas.
.4 Dimension Lumber: columns, beams, exposed joists, underside of decking, siding, fencing, etc.
  .1 EXT 6.2J - Pigmented polyurethane finish.
.5 Dressed Lumber: doors, door and window frames, casings, battens, smooth fascias, etc.
  .1 EXT 6.3C - Solid color stain finish do not use in high contact areas or on doors.
  .2 EXT 6.3D - Semi-transparent stain finish do not use on doors.

3 Execution

3.1 TOPCOAT AND INTERMEDIATE COAT THICKNESSES

.1 Latex & Acrylics (Interior): 0.03 mm (1.2 mils) DFT/coat.
.2 Latex & Acrylics (Exterior): 0.038 mm (1.5 mils) DFT/coat.

.3 Epoxys (Interior): 0.076 mm (3 mils) DFT/coat.
.4 Urethanes (Interior and Exterior): 0.076 mm (3 mils) DFT/coat.

3.2 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.3 GENERAL

.1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual.
.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.4 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 unfavorable 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.

3.5 PREPARATION

.1 Protection:
  .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking.
  .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
  .3 Protect factory finished products and equipment.
.2 Surface Preparation:
  .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
  .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
  .3 Place "WET PAINT" signs in occupied areas as painting operations progress.
.3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
  .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
.4 Prevent contamination of cleaned surfaces by salts, acids, alkalies, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
.5 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
.6 Apply wood filler to nail holes and cracks.
.7 Tint filler to match stains for stained woodwork.
.8 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
.9 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements.

3.6 APPLICATION

.1 Method of application to be as approved by Consultant.
.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 and/or sheepskins.
.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
.5 Remove runs, sags and brush marks from finished work and repaint.

.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 time 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 cutouts of doors after fitting as specified for door surfaces.

3.7 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with color and finish to match adjacent surfaces, except as indicated.
.2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.
.3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
.4 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
.5 Do not paint over nameplates.
.6 Keep sprinkler heads free of paint.
.7 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matte black paint.
.8 Paint fire protection piping red.
.9 Paint disconnect switches for fire alarm system and exit light systems in red enamel.
.10 Paint natural gas piping yellow.
.11 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
.12 Do not paint interior transformers and substation equipment.

3.8 FIELD QUALITY CONTROL

.1 Interior painting and decorating work shall be inspected by a Paint Inspection Agency (inspector) acceptable to the specifying authority and local Painting Contractor's Association. Painting contractor shall notify Paint Inspection Agency a minimum of one week prior to commencement of work and provide a copy of project painting specification, plans and elevation drawings (including pertinent details) as well as a Finish Schedule.

.2 Interior surfaces requiring painting shall be inspected by Paint Inspection Agency who shall notify Consultant and General Contractor in writing of defects or problems, prior to commencing painting work, or after prime coat shows defects in substrate.

.3 Where "special" painting, coating or decorating system applications (i.e. elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to Consultant.

.4 Field inspection of painting operations to be carried out by independent inspection firm as designated by Consultant.

.5 Advise Consultant when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.6 Cooperate with inspection firm and provide access to areas of work.

.7 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Consultant.

3.9 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Consultant. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Consultant.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 - Rough Carpentry.
.2 Section 10 28 13 - Toilet Accessories.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
  .1 ASTM A167-99, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  .2 ASTM A480/A480M-03, Specification for General Requirements for Flat-Rolled Stainless and Heat Resisting Steel Plate, Sheet, and Strip.
  .3 ASTM A653/A653M-02a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.2 Canadian General Standards Board (CGSB).
  .1 CAN/CGSB-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
  .2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel Air Drying and Baking.
  .3 CAN/CGSB-1.104M-91, Semigloss Alkyd, Air Drying and Baking Enamel.
.3 Canadian Standards Association (CSA International).
  .1 CSA Standards\CSA-B561-04, Barrier-Free Design.

1.3 SUBMITTALS

.1 Shop Drawings:
  .1 Submit shop drawings in accordance with Division 01 - General Requirements.
  .2 Indicate fabrication details, plans, elevations, hardware, and installation details.
.2 Manufacturer's Instructions:
  .1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 MANUFACTURER

.1 Standard of Acceptance:
  .1 ASI Global Partitions, floor mounted and over head braced, powder coated metal, with integrated privacy, colour Gray 2125
.2 Toilet Partitions and Doors shall be:
  .1 1830mm / 72" high panels.
  .2 100mm / 4" off floor.
.3 Urinal Screens shall be:
  .1 1830mm / 72" high panels.
  .2 100mm / 4" off floor.

2.2 MATERIALS

.1 Metal toilet partitions.
.2 Sheet steel: commercial quality to ASTM A480 with ZF001 designation zinc coating.
.3 Minimum base steel thickness:
  .1 Panels and doors: 0.8 mm.
  .2 Pilasters: 1.0 mm.
  .3 Reinforcement: 3.0 mm.
.4 Stainless steel sheet metal: to ASTM A167, Type 304, with BA finish.
.5 Headrails: clear anodized, extruded aluminum, anti grip design tubular steel, cast end socket brackets.
.6 Pilaster shoe: 0.8 mm stainless steel, 75 mm high.
.7 Attachment: stainless steel tamper proof type screws and bolts.

2.3 COMPONENTS

.1 Hinges:
  .1 Heavy duty, non-lubricating.
  .2 Material/finish: stainless steel casting.
  .3 Swing: as shown on drawings
  .4 Return movement: gravity, non-rising.
  .5 Emergency access feature.
.2 Latch set: surface mounted, combination latch, combination door-stop, keeper and bumper, chrome plated non-ferrous.
.3 Wall and connecting brackets: chrome plated non-ferrous extrusion or casting.
.4 Coat hook: combination hook and rubber door bumper, chrome plated non-ferrous.
.5 Door pull: Barrier-free "D" type suited for out swinging doors, chrome plated non-ferrous.

2.4 FABRICATION

.1 Doors, panels and screens: 25 mm thick, two steel sheets faces pressure bonded to honeycomb core, to sizes indicated.
.2 Pilasters: 32 mm thick, constructed same as door, to sizes indicated.
.3 Provide formed and closed edges for doors, panels and pilasters. Miter and weld corners and grind smooth.
.4 Provide internal reinforcement at areas of attached hardware and fittings. Temporarily mark location of reinforcement for tissue holders.
.5 Provide 0.8 mm thick type 316 stainless steel protective shields on urinal side of toilet partition panels next to urinals and on urinal screens. Make protective shields 1000 mm high with top of shield 1200 mm above finished floor. Make shields to full width of partition or screen panel. Fasten with stainless steel screws.

2.5 FINISHES

.1 Clean, degrease and neutralize steel components with phosphate or chromate treatment.
.2 Spray apply primer to CAN/CGSB-1.81, 1 coat.
.3 Spray apply finish enamel to CAN/CGSB-1.88, type 2 gloss, 2 coats and bake to smooth, hard finish 0.025 mm thick.
.4 Finish: doors and pilaster/panels same color as selected from manufacturer's standard colors, total 2 colors for project.

3 Execution

3.1 INSTALLATION

.1 Ensure supplementary anchorage, if required, is in place.
.2 Do work in accordance with CAN/CSA-B651.

3.2 ERECTION

.1 Partition erection.
- .1 Install partitions secure, plumb and square.
- .2 Leave 12 mm space between wall and panel or end pilaster.
- .3 Anchor mounting brackets to masonry/concrete surfaces using screws and shields: blocking/backing must be provided to hollow walls using bolts and toggle type anchors, to steel supports with threaded rods nuts and washers.
- .4 Attach panel and pilaster to brackets with self-drilling screws with through type sleeve bolt and nut.
- .5 Provide for adjustment of floor-braced pilasters variations with screw jack through steel saddles made integral with pilaster. Conceal floor fixings with stainless steel shoes.
- .6 Equip doors with hinges, latch set, and each stall with coat hook mounted on partition wall.
- .7 Equip out swinging doors with door pulls on inside of door in accordance with CAN/CSA-B651.
- .8 Install hardware grab bars.

3.3 ADJUSTING

.1 Adjust doors and locks for optimum, smooth operating condition.
.2 Lubricate hardware and other moving parts.

3.4 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
.2 Clean surfaces after installation using manufacturer's recommended cleaning procedures.
.3 Clean aluminum with damp rag and approved non-abrasive cleaner.
.4 Clean and polish hardware and stainless components.
.5 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

This page intentionally left blank

1 General

1.1 SUMMARY

.1 Provide accessories per this specification section and as per the Accessories Schedule included in the appendices.

1.2 RELATED REQUIREMENTS

.1 Section 05 50 00 - Metal Fabrications
.2 Section 06 10 00 - Rough Carpentry.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM)
  .1 ASTM A167-99, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  .2 ASTM B456-95, Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
  .3 ASTM A653/A653M-99, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  .4 ASTM A924/A924M-99, Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
  .5 ASTM A666-03 - Specification for Annealed or Cold-Worked Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar.
  .6 ASTM B456-03 - Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
.2 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-1.81-M90 - Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
  .2 CAN/CGSB-1.88-92 - Gloss Alkyd Enamel, Air Drying and Baking
  .3 CGSB 31-GP-107Ma - Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.
  .4 CAN/CSA-G164-M92 (R2003) - Hot Dip Galvanizing of Irregularly Shaped Articles.
  .5 CSA W59-03 - Welded Steel Construction (Metal Arc Welding)
  .6 CAN/CGSB-12.5-M86, Mirrors, Silvered.
.3 Canadian Standards Association (CSA)
  .1 CSA Standards\CSA-B561-04, Barrier-Free Design.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Division 01 - General Requirements.
.2 Product Data:
  .1 Submit manufacturer's literature, data sheets for each type of material provided under this Section.
  .2 Data sheets shall provide all required information.
  .3 Submit required copies of detailed instructions for maintaining, preserving and keeping materials in clean and safe conditions and give adequate warning of maintenance practices or materials detrimental to specified materials.
  .4 Submit manufacturer's installation instructions.
.3 Material Safety Data Sheets:
  .1 Submit MSDS for inclusion in Operation and Maintenance Manual.
.4 Shop Drawings:
  .1 Shop drawings shall be in the form of catalogue cuts and fully illustrate specified materials with description of components, surface finishes, hardware and securement devices.
  .2 Submit a full schedule of accessories and identify Contractor Supplied / Contractor Installed and Owner Supplied / Contractor Installed accessories.

.5 Maintenance Instructions:
- .1 Submit an accessories schedule, keys and parts manual as part of project closeout documents.
- .2 Submit 2 sets of following items of manufacturer's literature:
  - .1 Technical Data Sheets of each item used for the project.
  - .2 Service and Parts Manuals.
- .3 Name of local representative to be contacted in the event of need of field service of consultation.
- .4 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.

1.5 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Division 01 - General Requirements.
.2 Provide special tools required for accessing, assembly/disassembly or removal for toilet and bath accessories in accordance with requirements specified in Division 01 - General Requirements.
.3 Deliver special tools to Owner.

1.6 EXTRA MATERIALS

.1 Provide special tools required for accessing, assembly/disassembly or removal for toilet and bath accessories in accordance with requirements specified in Division 01 - General Requirements.
.2 Deliver special tools to Consultant.

1.7 WARRANTY

.1 Warrant work of this Section for period of ten (10) years against defects and/or deficiencies in accordance with General Conditions of the Contract.
.2 Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner.
.3 Defects include but are not limited to; deterioration of mirror's silvering.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material generated by this Section.
.2 Place in appropriate on-site bins in accordance with Waste Management Plan.
.3 A clean worksite is mandatory at all times. Failure to maintain the site in a clean, safe condition shall result in the Owner initiating a clean-up and related costs being deducted from progress claims.

2 Products

2.1 MATERIALS

.1 Sheet steel: commercial quality to ASTM A653/A653M with ZF001 designation zinc coating.
.2 Stainless steel sheet metal type 302 or 304: to ASTM A167, with #4 finish. minimum 0.8mm thick except where noted otherwise.
.3 Stainless steel tubing type 304: commercial grade, seamless welded, 1.2 mm wall thickness.
.4 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fiber, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.2 BLOCKING

.1 Provide blocking for all accessories regardless of supply or installation responsibilities.

2.3 FINISHES

.1 Chrome and nickel plating: to ASTM B456 79 satin polished finish.
.2 Baked enamel: condition metal by applying one coat of metal conditioner to CGSB 31 GP 107M, apply one coat Type 2 primer to CGSB 1 GP 81M and bake, apply two coats Type 2 enamel to CGSB 1 GP 88M and bake to hard, durable finish. Sand between final coats. Color selected from standard range by Consultant.
.3 Manufacturer's or brand names on face of units not acceptable.

2.4 SCHEDULE OF ACCESSORIES

.1 Supply and install each item in quantities shown on Accessories Schedule.
.2 Confirm Owner Supplied / Contractor Installed or Contractor Supplied / Contractor Installed accessories prior to preparing shop drawings and ordering.

2.5 FABRICATION

.1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.
.2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.
.3 Brake form sheet metal work with 1.5 mm radius bends.
.4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.
.5 Back paint components where contact is made with building finishes to prevent electrolysis.
.6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CSA G164.
.7 Shop assemble components and package complete with anchors and fittings.
.8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.
.9 Provide steel anchor plates and components for installation on studding and building framing.

3 Execution

3.1 INSTALLATION

.1 Install and secure accessories rigidly in place as follows:
  .1 Stud walls: install wood blocking in stud space prior to plaster or drywall finish.
  .2 Hollow masonry units or existing plaster/drywall: use toggle bolts drilled into cell/wall cavity.
  .3 Solid masonry, marble, stone or concrete: use bolt with lead expansion sleeve set into drilled hole.
.2 Install grab bars on built-in anchors provided by bar manufacturer.
.3 Use tamper proof screws/bolts for fasteners.
.4 Fill contractor supplied units with necessary supplies shortly before final acceptance of building.
.5 Install Owner supplied washroom accessories.
.6 Install mirrors in accordance with Section 08 80 00 - Glazing.

END OF SECTION

This page intentionally left blank

1 General

1.1 SUBMITTALS

.1 Submittals: in accordance with Division 01 - General Requirements.
.2 Shop drawings; submit drawings stamped and signed by Contractor as reviewed.
.3 Shop drawings to show:
  .1 Mounting arrangements.
  .2 Operating and maintenance clearances.
.4 Shop drawings and product data accompanied by:
  .1 Detailed drawings of bases, supports, and anchor bolts.
  .2 Acoustical sound power data, where applicable.
  .3 Points of operation on performance curves.
  .4 Manufacturer to certify current model production.
  .5 Certification of compliance to applicable codes.
.5 In addition to transmittal letter referred to in Division 01 - General Requirements: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.
.6 Closeout Submittals:
  .1 Provide operation and maintenance data for incorporation into manual specified in Division 01 - General Requirements.
  .2 Operation and maintenance manual approved by, and final copies deposited with, Consultant before final inspection.
  .3 Operation data to include:
    .1 Control schematics for systems including environmental controls.
    .2 Description of systems and their controls.
    .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
    .4 Operation instruction for systems and component.
    .5 Description of actions to be taken in event of equipment failure.
    .6 Valves schedule and flow diagram.
    .7 Colour coding chart.
  .4 Maintenance data to include:
    .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
    .2 Data to include schedules of tasks, frequency, tools required and task time.
  .5 Performance data to include:
    .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
    .2 Equipment performance verification test results.
    .3 Special performance data as specified.
  .6 Approvals:
    .1 Submit electronic copies of draft Operation and Maintenance Manual to Consultant for approval 4 weeks prior to Substantial Completion. Submission of individual data will not be accepted unless directed by Consultant.
    .2 Make changes as required and re-submit as directed by Consultant.
  .7 Additional data:
    .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
  .8 Site records:
    .1 Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
    .2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.

.3 Use different colour waterproof ink for each service.
.4 Make available for reference purposes and inspection.

.9 As-built drawings:
.1 Prior to start of testing, finalize production of as-built drawings.
.2 Identify each drawing in lower right hand corner in letters at least 12 mm (1/2 inch) high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (date).
.3 Submit to Consultant for approval and make corrections as directed.
.4 Perform testing, adjusting and balancing using as-built drawings.
.5 Submit completed electronic and reproducible as-built drawings with Operating and Maintenance Manuals.

.10 Submit copies of as-built drawings for inclusion in final TAB report.

1.2 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Division 01 - General Requirements.
.2 Health and Safety Requirements: do construction occupational health and safety in accordance with Division 01 - General Requirements.

1.3 MAINTENANCE

.1 Furnish spare parts in accordance with Division 01 - General Requirements as follows:
.1 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.
.2 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Division 01 - General Requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:
.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse in accordance with Division 01 - General Requirements.

1.5 DEFICIENCY LIST

.1 Lists of work deficiencies will be issued at any time. Rectify immediately work to satisfaction of Consultant.
.2 Submit requests for takeover inspection in writing.

1.6 SITE SERVICES

.1 Known Services:
.1 Drawings indicate known existing facilities.
.2 Locate all known services prior to initiating work.
.3 Consult with and follow Engineer's written instructions before commencing work.
.4 Once location has been set out, assume responsibility for all damage during installation. Bear cost of repairs and replacements made necessary.

.2 Unknown Services:
.1 Locate all services whose exact location is not known.
.2 Avoid damaging or displacing existing services where exact position is not known. Should any damage occur, advise Engineer in writing for remedial instructions.

1.7 CO-ORDINATION

.1 Contractors are to note that space is limited and close coordination of the Work of all Trades is required. Before fabrication or installation begins, the Contractor must do the following:
.1 The General Contractor is responsible for leading the interference coordination meeting. The Division 23 Ventilation Contractor is to provide an individual with sufficient experience to manage the coordination of work with all other Trades.

.2 The Division 23 Contractor is responsible for coordinating with all other Mechanical and Electrical Trade Contractors, to minimize conflicts and poor placement of installed equipment and material; and is responsible for providing active input and coordination with all other Trades.

.3 Extra costs associated with having to redo or relocate services due to non-participation in or non-conformance with "Interdisciplinary Coordination" process by Division 23 Ventilation Contractor, shall be by Division 23 Ventilation Contractor.

.4 The interdisciplinary coordination process is to be collectively managed by the General Contractor and all the Mechanical and Electrical Contractors with only limited technical support by the Consultant. The Consultant's role will be limited to answering Requests for Information (RFI) and providing review of any coordination sketches prepared by the Mechanical and Electrical Contractors. Additionally the General Contractor's role will be that of providing review, overview and direction.

.5 The Mechanical and Electrical systems are to be coordinated and work with the available space above the ceiling plane.

.2 The order of precedence in congested area's shall be:

.1 Drainage piping;
.2 Trunk ducts;
.3 Heating mains;
.4 Main conduits;
.5 Water piping mains;
.6 Branch ducts, piping and conduits.

.3 The location of equipment / outlets shall be in accordance with the Architects reflected ceiling plan. If an outlet is not shown there or is in conflict with work of another Trade, obtain direction from the Consultant before proceeding.

.4 Relocation of branch ducts, pipes or outlets within 3m of location shown on drawings to facilitate coordination with other Trades, shall not be considered extra work.

.5 Locate distribution systems, equipment and materials to provide minimum interference and maximum usable space.

.6 Where interference occurs, Consultant shall approve location of equipment and materials regardless of installation sequence.

1.8 REGULATIONS

.1 Comply with most stringent requirements of NBC, Provincial and Municipal regulations and by-laws, specified standards, codes and these specifications and plans. Practices contained in these standards or standards suggested or recommended by referenced organizations, are to be taken as minimum requirements.

.2 Furnish certificates confirming work installed conforms to requirements of authorities having jurisdiction.

1.9 DRAWINGS

.1 Drawings:

.1 Are not intended to show structural details or architectural features.
.2 Are not to be scaled.
.3 Except where dimensioned, the drawings indicate general mechanical layouts only.

.2 Provide field drawings to indicate relative position of various services when required by Consultant. Obtain Consultant's approval before commencing work.

.3 As-Built (Record) Drawings:

.1 Maintain as specified in Division 01 - General Requirements.

1.10 EQUIPMENT LIST

.1 Submit list of manufacturers named within seven (7) days after award of the contract. Do not order equipment until list is approved.

1.11 ENERGY CONSUMPTION

.1 Consultant may reject equipment submitted for approval on basis of performance or energy consumed or demanded.

1.12 APPROVAL OF EQUIPMENT

.1 When equipment list has been reviewed by Consultant, conform to Division 01 - General Requirements procedures for items shown on equipment list and all other materials and equipment necessary to complete requirements of mechanical systems. This includes equipment named under Standard of Acceptance.

1.13 APPROVED EQUALS

.1 Submission for an Approved Equal is to contain literature and descriptive information with full specification data. Where the requested item is contained on a printed document with other items, it is to be clearly identified.

.2 The Consultant will not search catalogs, e-mails or websites or contact suppliers to obtain the necessary information for proper evaluation.

.3 Submission by Bidders for evaluation of products requested to be considered as equal must be submitted to Consultant no less than 5 working days prior to closing of tenders. No consideration will be given to approving equals after the close of tenders, except when the specified product is found to have been discontinued by the manufacturer.

.4 The consideration of a product(s) for Approved Equal status and the acceptance of individual products as approved equals is entirely at the discretion of the Consultant.

.5 When products are given Approved Equal status these products may, at the discretion of bidders, be carried in their tender price, provided that ALL costs related to changes to the contract work required to incorporate the Approved Equal product are included in the tender price.

.6 The acceptance of a product by the Consultant as an "Approved Equal," even where not specifically indicated on the Approved Equals listing in the Addendum, is to be understood as being contingent upon the provision of the particular series, model and/or type, complete with all options to meet the specified requirements of the Acceptable Material product.

.7 Products given approved status that are found, during construction period, to not have all specified options available, or do not fit in the available space, or to have discontinued production of same, or to have made other design changes since the time of approval, will not be accepted for use on this project, except when financial compensation has been mutually agreed upon between the Contractor and the Owner and deemed acceptable by the Consultant. Compensation will not be paid to the Contractor for products acknowledged by the Consultant to be superior to the specified products.

.8 The Contractor is cautioned that all layouts on the Mechanical drawings are based on the specified equipment. Any changes necessary, using acceptable materials will be done at the Contractor's expense. Furthermore, if it is found that the provisions made regarding space conditions are not met, the right is reserved by the Consultant to require installation of the equipment used on the layout.

1.14 PACKAGED EQUIPMENT

.1 The Contractor shall note that whenever package equipment is specified, it is intended that this equipment shall be a complete package with all necessary accessories to allow for fail safe automatic operation.

.2 These accessories shall include all necessary starters, disconnects, relays, transformers, pressure switches, sensors, timers, etc. Where subject to the weather, the device shall be enclosed in a "weatherproof" enclosure.

.3 The Contractor shall be responsible for checking with the supplier of the equipment to ensure that the package equipment is complete with all necessary accessories. The Contractor shall also determine which accessories are factory mounted and which ones are shipped loose with the equipment. The Contractor shall include in his tender an amount for all necessary

wiring and piping etc., required to incorporate loose pieces of equipment into the job at no additional cost to the Owner.

.4 The Contractor shall note that the above refers to all package equipment, including boilers, chillers, heat reclaim units, pump sets, condensing units, humidifiers, etc. It shall be his responsibility to ensure the supply and installation of any accessories necessary for the operation of this equipment.

1.15 AS INDICATED

.1 Means that the item or items specified are shown or noted on the drawings.

1.16 EQUIPMENT REQUIREMENTS & INSTALLATION

.1 Permit equipment maintenance and disassembly by use of unions or flanges to minimize disturbance to connecting piping without interference from building structure or other equipment.

.2 Space for servicing, disassembly and removal of equipment and components to be provided as recommended by Manufacturer or as indicated.

.3 Equipment drains to be piped to hub or funnel floor drain.

.4 Provide accessible means for lubricating equipment including permanent lubricated "lifetime" bearings.

.5 Mount base mounted equipment on chamfered edge housekeeping pads a minimum of 100mm (1") high and 50mm (2") larger than equipment dimension all around. Pads provided by this Contractor. Co-ordinate sizes with equipment provider.

.6 Pipe drain lines to drains in a manner to avoid disruption of surrounding space.

.7 Line-up equipment, rectangular cleanouts and similar items parallel or perpendicular to building walls wherever possible.

.8 Contractor to provide metal caps and counter flashing for all roof penetrations provided under this section. Installation by this Contractor. This Contractor responsible for all membrane flashing.

1.17 RESPONSIBILITY FOR TEMPORARY TRIAL USAGE

.1 Protect work against damage or loss until accepted by the Consultant.

.2 Obtain written permission to start and test permanent equipment and systems prior to acceptance by Consultant.

.3 Consultant may use equipment and systems for test purposes prior to acceptance. Supply labour, material and instruments required for testing.

.4 See Division 01 - General Requirements for temporary usage. Guarantee period and commencement date shall not be affected.

.5 Clean and renew equipment and system used prior to acceptance. Restore to original, new and full working condition.

1.18 ANCHOR BOLTS & TEMPLATES

.1 Supplied and installed by Division 21, 22, 23 and 25, as indicated and recommended by the Manufacturer.

1.19 PROTECTION OF OPENINGS

.1 Protect equipment, system openings including rough-in plumbing from dirt, dust and other foreign materials with materials compatible to the system.

1.20 ELECTRICAL

.1 Electrical work to conform to Division 26 - Electrical, including the following:

.1 Supplier and installer responsibility is indicated in the motor, controls and equipment supply schedules on the Electrical drawings and related Mechanical responsibility is indicated on Mechanical Equipment Schedule on the Mechanical drawings.

.2 Controls wiring and conduit is specified by Division 26 - Electrical, except for conduit, wiring and connections below 50V which are related to Controls systems specified in Division 25 - Integrated Automation. Refer to Division 26 - Electrical for quality of materials and workmanship.

1.21 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Electric equipment shall bear CSA label.

.2 Conform to requirements of Canadian Electrical Code, Local Provincial and Municipal Authorities and specified standards.

.3 Division 21, 22, 23 and 25 responsible for their respective conduit, wiring and connections below 50 V which are related to control systems specified in Divisions 21, 22, 21 and 25 and shown on mechanical drawings. Refer to Electrical section for quality of materials and workmanship for wiring and conduit.

.4 Motors.

.1 Provide motors for mechanical equipment.

.2 If delivery of specified motor will delay delivery or installation of any equipment, install a motor for temporary use. Final acceptance of equipment will not occur until specified motor is installed.

.5 Provide motors, low voltage 50 V and less, wiring from transformers, and temperature pressure, humidity control devices.

.6 Furnish composite wiring diagrams with remote interlocks for control systems, including performance and sequence of operation description of mechanical systems. Submit for approval by Consultant.

.7 Where motors may be subjected to high moisture levels, such as in boiler room, in the air stream after the cooling coil, in areas subjected to washdown or exposed outdoors, the motors are to be splash-proof or totally enclosed fan cooled.

.8 All equipment shall be supplied complete with a disconnect switch. Where exposed to the weather, "weatherproof" disconnects shall be provided. Disconnect switches serving explosion proof motors, shall be explosion proof.

1.22 GUARDS

.1 Provide guards for unprotected drives.

.2 Guards for belt drives:

.1 Expanded metal screen welded to steel frame.

.2 Minimum 1.2mm thick sheet metal top and bottoms.

.3 38mm diameter holes on both shaft centers for insertion of tachometer.

.4 Removable for servicing.

.3 Provide means to permit lubrication and use of test instruments with guards in place.

.4 Install belt guards to allow movement of motors for adjusting belt tension.

.5 Guard for flexible coupling:

.1 "U" shaped, minimum 1.6mm thick galvanized mild steel.

.2 Securely fastened in place.

.3 Removable for servicing.

.6 Unprotected fan inlets or outlets.

.1 Wire or expanded metal screen, galvanized 19mm mesh.

.2 Net free are of guard: not less than 80% of fan openings.

.3 Securely fasten in place.

.4 Removable for servicing.

1.23 ESCUTCHEONS AND PLATES

.1 Provide on pipes and ductwork passing through finished walls, partitions, floors and ceilings.

.2 Use chrome or nickel plated brass, solid type, with set screws for ceiling or wall mounting. Use cast iron type in equipment room. Where split escutcheons are used, they shall be installed to provide continuous appearance.

.3 Inside diameter shall fit around finished pipe. Outside diameter shall cover opening or sleeve.

.4 Where sleeve extends above finished floor, escutcheons or plates shall clear sleeve extension.
.5 Secure to pipe or finished surface but not insulation.

1.24 TESTS

.1 Provide the following supplementary requirements to tests specified:
  .1 Give written 24 hours notice of date when tests will be made.
  .2 Do not insulate or conceal work until tested and approved. Follow construction schedule and arrange for tests.
  .3 Conduct tests in presence of Engineer.
  .4 Bear costs including retesting and making good.
  .5 Pipe pressure:
    .1 Hydraulically test all water supply and steam supply systems at 1 1/2 times system operating pressure or minimum 860 kPa.
    .2 Maintain test pressures without loss for 4 hours unless otherwise specified.
    .3 Test drainage, waste and vent piping to code.
    .4 Prior to test isolate all equipment or other parts which are incomplete or not designed to withstand test pressures.
    .5 All piping of the drainage and venting systems shall be tested by means of filling the system with water after all outlets have been plugged. All joints shall be checked and the water level must hold without dropping for a period of one hour before the work is to be backfilled or otherwise built-in. Sections of the system may be tested separately provided they are at least 3000mm (120") high and include at least 1500mm (60") of the section below, where applicable. Any leaks observed must be corrected by additional caulking of joints or if necessary by removal of any section of pipe required.
    .6 Testing shall be done before pipe covering is installed. Leaks must be located, corrected and test reapplied before acceptance of building.
    .7 Provide test certification for all tests signed by Engineer or designated representative.

1.25 PAINTING

.1 Apply at least one (1) coat of corrosion resistant primer and two (2) coats of suitable industrial corrosion resistant paint to un-insulated piping, hangers, stands, supports, and equipment fabricated from ferrous metals.
.2 Prime and touch up marred finished paintwork to match original.

1.26 ACCESS DOORS

.1 This section to supply access doors for furred ceilings or spaces for servicing equipment and accessories or for inspection of safety, operating or fire devices for installation under section erecting the walls or ceilings. Provide ULC rated doors in fire rated construction. Installation by General Contractor.
.2 Access doors shall be flush mounted with integral drywall bead, sized 600 x 600 mm (24" x 24") for body entry 300 x 300 mm (12" x 12") for hand entry, or as noted on the drawings. Doors shall open 180 degrees have rounded safety corners, concealed hinges, screwdriver latches and anchor straps. Steel shall be prime coated. Doors shall be of approved manufacturer with published literature.
.3 Provide stainless steel access doors for tiled, marble or terrazzo surfaces or special surfaces, including all surfaces in the pool area.
.4 Provide cam type locking device with hand or key lock when located in public corridors and washrooms complete with master keys.
.5 Acceptable material: Williams #WB-DW, Acudor #DW-5040, MIFAB #MDW.

1.27 DIELECTRIC COUPLINGS

.1 Provide wherever pipes of dissimilar metals are jointed.

.2 Provide insulating unions for pipe sizes NPS 2 and under and insulating flanges for pipe sizes over NPS 2 (DN 50).
.3 Cast brass adapters may be used where approved by Engineer.
.4 Provide felt or rubber gaskets to prevent dissimilar metals contact.

1.28 DRAIN VALVES

.1 Minimum NPS 19mm (3/4") unless otherwise specified: straight pattern bronze with hose end male thread and complete with cap and chain.
.2 Locate at all low points and section isolating valves unless otherwise specified.
.3 Acceptable material: Dahl.

1.29 INSTRUCTION OF OPERATING STAFF

.1 Provide certified personnel to instruct operating staff on operation of mechanical equipment. Provide maintenance specialist personnel to instruct operating staff on maintenance and adjustment of mechanical equipment and any changes or modification in equipment made under terms of guarantee.
.2 Provide instruction during regular work hours prior to acceptance and turn-over to operating staff for regular operation.
.3 Use operation and maintenance data manual for instruction purposes. On completion of instruction, turn one manual over to Owner and the balance to Engineer.
.4 This Contractor to ensure mechanical systems are complete and fully operational as per the requirements of these documents and the applicable codes. Premature failure of any mechanical system(s) and/or related accessories deemed to be the result of poor workmanship shall be the financial responsibility of the Contractor responsible.

1.30 CLEANING AND FINAL ADJUSTMENT

.1 Clean interior and exterior of all systems including strainers.
.2 Clean and refurbish all equipment and leave in first class operating condition including replacement of all filters in all piping systems.
.3 Balance and adjust all systems and each piece of equipment to operate efficiently.

1.31 EXCAVATION, TRENCHING AND BACKFILLING

.1 All excavation, trenching, granular base or bedding and backfilling, both inside and outside the building, required for the work of Division 22 shall be the financial responsibility of, and carried out by the General Contractor under the direction of the Division 21, 22, 23 or 26 Sub-contractor.
    .1 This work includes the breaking out of existing concrete where new lines are installed below existing concrete floors.
    .2 This work includes housekeeping pads and concrete curbs.

1.32 CUTTING & PATCHING

.1 All cutting and patching required to properly accommodate the work of this Division shall be the financial responsibility of respective Division 21, 22 or 23 and carried out by trades to the applicable Specifications provided in this document.

1.33 FIRESTOPPING AND SMOKE SEALS

.1 All firestopping and smoke seals required to properly accommodate the work of this Division shall be the financial responsibility of the respective Division 21, 22 or 23 and carried out by trades to the applicable Specifications provided in this document.
.2 Work must be performed by a company with experience in the application of firestopping and smoke seals to ULC requirements.
.3 Material shall provide a fire rate equal to that of the separation which has been separated.
.4 Refer to the Architectural drawings for the location and rating of all fire walls.

.5 Submit material shop drawings and all ULC listed installation details for all penetrations applicable to project.
.6 Acceptable material:
  .1 Dow Corning Fire Stop System.
  .2 3M Fire Barrier Penetration.
  .3 Sealing System.
  .4 Bio-Fire Biotherm or Bio-K10 (supplied by Wormald).
  .5 Hilti.

1.34 CONCRETE

.1 All concrete work, both inside and outside the building, required specifically for the work of this Division shall be the financial responsibility of and carried out by the General Contractor under the direction of the Division 21, 22, 23 or 25 Sub-Contractor(s).
  .1 This work includes all housekeeping pads and concrete curbs.

1.35 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate waste material and place in on site bin in accordance with Waste Management Plan.

2 Products

2.1 NOT APPLICABLE

.1 Not applicable.

3 Execution

3.1 REPAIRS/ RESTORATION

.1 To Section 09 91 00 - Painting.
.2 Prime and touch up marred finished paintwork to match original.
.3 Restore to new condition, finishes which have been damaged extensively for priming and touch-up.

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.3 FIELD QUALITY CONTROL

.1 Site Tests: conduct following tests in accordance with Division 01 - General Requirements and submit report as described in PART 1 - SUBMITTALS.
  .1 Pressure test.
.2 Manufacturer's Field Services:
  .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
  .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.4 DEMONSTRATION

.1 Consultant will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
.2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of

all systems and equipment during regular work hours, prior to acceptance.

.3 Where specified elsewhere in Division 21, 22, 23 or 25 manufacturers to provide demonstrations and instructions.

.4 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

.5 Instruction duration time requirements as specified in appropriate sections.

.6 Consultant will record these demonstrations on video tape for future reference.

3.5 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

1 General

1.1 REFERENCES

.1 NFPA 10, Portable Fire Extinguishers - 2018 Edition.
.2 CAN/ULC-S508-2018, Rating and Fire Testing of Fire Extinguishers.

1.2 SHOP DRAWINGS

.1 Submit shop drawings according to Division 01 - General Requirements.

2 Products

2.1 EXTINGUISHER

.1 FE-1: 10 lb. Type ABC dry chemical (ammonium phosphate powder) extinguisher with heavy duty mounting bracket.
    .1 Acceptable material: Extinguisher
        .1 Flag ABC -10G min. ULC rating 4-A, 60-B,C (Light & Ordinary hazard)

3 Execution

3.1 INSTALLATION

.1 Install extinguishers securely mounted to walls in locations indicated on drawings.
.2 Fire extinguishers to be installed so that maximum travel distance does not exceed 22 m (72 feet).
.3 Fire extinguishers to be installed 900mm (36") above finished floor.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED SECTIONS

.1 Section 21 05 01 - Common Work Results - Mechanical.

1.2 SUBMITTALS

.1 Submittals: in accordance with Division 01 - General Requirements.
.2 Shop drawings; submit drawings stamped and signed by a Contractor as reviewed.
.3 Shop drawings to show:
  .1 Mounting arrangements.
  .2 Operating and maintenance clearances.
.4 Shop drawings and product data accompanied by:
  .1 Detailed drawings of bases, supports, and anchor bolts.
  .2 Acoustical sound power data, where applicable.
  .3 Points of operation on performance curves.
  .4 Manufacturer to certify current model production.
  .5 Certification of compliance to applicable codes.
.5 In addition to transmittal letter referred to in Division 01 - General Requirements: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.
.6 Closeout Submittals:
  .1 Provide operation and maintenance data for incorporation into manual specified in Division 01 - General Requirements.
  .2 Operation and maintenance manual approved by, and final copies deposited with, consultant before final inspection.
  .3 Operation data to include:
    .1 Control schematics for systems including environmental controls.
    .2 Description of systems and their controls.
    .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
    .4 Operation instruction for systems and component.
    .5 Description of actions to be taken in event of equipment failure.
    .6 Valves schedule and flow diagram.
    .7 Colour coding chart.
  .4 Maintenance data to include:
    .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
    .2 Data to include schedules of tasks, frequency, tools required and task time.
  .5 Performance data to include:
    .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
    .2 Equipment performance verification test results.
    .3 Special performance data as specified.
    .4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
  .6 Approvals:
    .1 Submit electronic copies of draft Operation and Maintenance Manual to Owner's Representative for approval 4 weeks prior to Substantial Completion. Submission of individual data will not be accepted unless directed by Consultant.
    .2 Make changes as required and re-submit as directed by Consultant.
  .7 Additional data:
    .1 becomes apparent during specified demonstrations and instructions.
  .8 Site records:

.1 Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
.2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
.3 Use different colour water proof ink for each service.
.4 Make available for reference purposes and inspection.

.9 As-built drawings:
.1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
.3 Submit to Owner's Representative for approval and make corrections as directed.
.4 Perform testing, adjusting and balancing for HVAC using as-built drawings.
.5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

.10 Submit copies of as-built drawings for inclusion in final TAB report.

1.3 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Division 01 - General Requirements.
.2 Health and Safety Requirements: do construction occupational health and safety in accordance with Division 01 - General Requirements.

1.4 MAINTENANCE

.1 Furnish spare parts in accordance with Division 01 - General Requirements as follows:
.1 One set of packing for each pump.
.2 One casing joint gasket for each size pump.
.2 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Division 01 - General Requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:
.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Division 01 - General Requirements.

2 Products

2.1 MATERIALS

.1 All materials used on this project shall be new and CSA approved unless noted otherwise.

3 Execution

3.1 PAINTING, REPAIRS AND RESTORATION

.1 Do painting in accordance with Section 09 91 00 - Painting.
.2 Prime and touch up marred finished paintwork to match original.
.3 Restore to new condition, finishes which have been damaged.

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.3 FIELD QUALITY CONTROL

.1 Site Tests: conduct following tests in accordance with Division 01 - General Requirements and submit report as described in PART 1 - SUBMITTALS.
  .1 Perform tests as specified in other sections of this specification.

.2 Manufacturer's Field Services:
  .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
  .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.4 DEMONSTRATION

.1 Owner's Representative will use equipment and systems for test purposes prior to acceptance. Contractor to supply labour, material, and instruments required for testing.

.2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

.4 Instruction duration time requirements as specified in appropriate sections.

.5 Owner's Representative may record these demonstrations on video tape for future reference.

3.5 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system

END OF SECTION

This page intentionally left blank

1 General

1.1 REFERENCES

.1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).

1.2 SUBMITTALS

.1 Submittals in accordance with Division 01 - General Requirements.
.2 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and data sheet for fixtures and equipment.
  .2 Submit WHMIS MSDS to Consultant for each hazardous material prior to bringing hazardous material to site. Indicate VOC's for adhesive and solvents during application and curing.
.3 Shop Drawings.
  .1 Submit shop drawings to indicate:
    .1 Equipment, including connections, fittings, control assemblies and ancillaries. Identify whether factory or field assembled.
    .2 Wiring and schematic diagrams.
    .3 Dimensions and recommended installation.
    .4 Pump performance and efficiency curves.
    .5 Operating and Maintenance Clearances.
.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.5 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Division 01 - General Requirements, include:
  .1 Manufacturers name, type, model year, capacity and serial number.
  .2 Details of operation, servicing and maintenance.
  .3 Recommended spare parts list with names and addresses.

1.3 QUALITY ASSURANCE

.1 Health and Safety:
  .1 Do construction occupational health and safety in accordance with Division 01 - General Requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Waste Management and Disposal:
  .1 Separate waste materials for reuse and recycling in accordance with Division 01 - General Requirements.
  .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
  .3 Collect and separate for disposal paper packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
  .4 Divert unused metal materials from landfill to metal recycling facility.
  .5 Unused sealant materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
  .6 Fold up metal banding, flatten and place in designated area for recycling.

2 Products

2.1 DOMESTIC HOT WATER CIRCULATING PUMPS

.1 Capacity: as indicated.

.2 Construction: closed-coupled, in-line centrifugal, all bronze or stainless steel construction, stainless steel shaft, stainless steel or bronze shaft sleeve, two oil lubricated bronze sleeves or ball bearings. Design for 860 kPa and 105°C continuous service.
.3 Motor: drip-proof, with thermal overload protection.
.4 Supports: provide as recommended by manufacturer
.5 Acceptable Material: Bell & Gosset, Grundfos, Taco, Armstrong.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 INSTALLATION

.1 Make piping and electrical connections to pump and motor assembly and controls as indicated.
.2 Ensure pump and motor assembly do not support piping.

3.3 FIELD QUALITY CONTROL

.1 Site Tests/Inspection:
  .1 Check power supply.
  .2 Check starter protective devices.
.2 Start-up, check for proper and safe operation.
.3 Adjust flow from water-cooled bearings.

3.4 START-UP

.1 General:
  .1 In accordance with Division 01 - General Requirements, supplemented as specified herein.
  .2 Procedures:
    .1 Check power supply.
    .2 Check starter O/L heater sizes.
    .3 Start pumps, check impeller rotation.
    .4 Check for safe and proper operation.
    .5 Test operation of hands off auto switch.
    .6 Test operation of alternator.
    .7 Adjust leakage through water-cooled bearings.
    .8 Run-in pumps for 12 continuous hours.
    .9 Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.
    .10 Adjust alignment of piping and conduit to ensure full flexibility.
    .11 Eliminate causes of cavitation, flashing, air entrainment.
    .12 Measure pressure drop across strainer when clean and with flow rates as finally set.
    .13 Verify lubricating oil levels.

3.5 DOMESTIC HW CIRCULATING PUMPS

.1 Balance flows using circuit setter balancing valve or lock shield globe valve.

3.6 REPORTS

.1 In accordance with Division 01 - General Requirements: reports, supplemented as specified.
.2 Include:
  .1 PV results on approved PV Report Forms.
  .2 Product Information report forms.

.3 Pump performance curves (family of curves) with final point of actual performance.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED SECTIONS

.1 Section 21 05 01 - Common Work Results - Mechanical.
.2 Section 23 05 01 - Installation of Pipework.
.3 Section 23 05 22 - Valves - Bronze.
.4 Section 23 05 23 - Valves - Cast Iron.
.5 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
.6 Section 23 20 21 - Thermal Insulation for Piping.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME).
  .1 ANSI/ASME B16.15, Cast Bronze Threaded Fittings, Classes 125 and 250.
  .2 ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
  .3 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
  .4 ANSI/ASME B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
.2 American Society for Testing and Materials International, (ASTM).
  .1 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  .2 ASTM B88M, Standard Specification for Seamless Copper Water Tube (Metric).
  .3 AST M - Standard Specification for cross linked Polyethylene (PEX) tubing.
  .4 ASTM F877 Standard specification for cross-linked polyethylene (PEX) plastic hot and cold water distribution systems.
  .5 ASTM F 1960 Standard Specification for cold expansion fittings with PEX reinforcing rings for use with cross-linked polyethylene (PEX) tubing.
.3 Canadian Standards Association (CSA International).
  .1 CSA B137.5 Cross-linked polyethylene (PEX) tubing systems for pressure applications.
.4 Department of Justice Canada (Jus).
  .1 Canadian Environmental Protection Act, (CEPA).
.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  .1 Material Safety Data Sheets (MSDS).
.6 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
  .1 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.
.7 National Research Council (NRC)/Institute for Research in Construction.
  .1 NRCC 38728, National Plumbing Code of Canada (NPC).
.8 Transport Canada (TC).
  .1 Transportation of Dangerous Goods Act, (TDGA).
.9 American National Standards Institute/National Sanitation Foundation (ANSI/NSF).
  .1 ANSI/NSF 61 Drinking Water System Components.
  .2 ANSF/NSF14 Plastic Piping System Components and Related Materials.

1.3 SUBMITTALS

.1 Submittals in accordance with Division 01 - General Requirements.
.2 Submit product data for following: piping, fittings, valves and adhesives.
  .1 Provide manufacturers printed product literature and data sheets including product characteristics, performance criteria, physical size, finish and pressure/temperature limitations.
.3 Submit WHMIS MSDS - Material Safety Data Sheets to Consultant for each hazardous material prior to bringing hazardous materials to site.

1.4 HEALTH AND SAFETY

.1 Do construction occupational health and safety in accordance with Division 01 - General Requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse in accordance with Division 01 - General Requirements.
.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
.3 Separate for reuse and recycling and place in designated containers Steel waste in accordance with Waste Management Plan.
.4 Place materials defined as hazardous or toxic in designated containers.
.5 Handle and dispose of hazardous materials in accordance with CEPA and local or municipal regulations.
.6 Fold up metal banding, flatten and place in designated area for recycling.

1.6 QUALITY ASSURANCE

.1 Cross Linked Polyethylene (PEX) tubing
  .1 Qualifications:
    .1 Installer Qualifications: Installer shall be experience in performing work of this section and has specialized in installation of work similar to that required for this project.
    .2 Installer Qualifications: Installer shall be recognized by the tubing/fitting manufacturer as a "Trained Installer".
    .3 Installation Qualifications: Installation must be by skilled tradesmen holding trade qualification license or apprentices under the supervision of a licensed tradesman.
    .4 PEX manufacturer will ensure pressure drops for critical paths will feed furthest fixtures with the specified pressure. Any costs to upsize piping as required will be the responsibility of this trade.
  .2 Regulatory Requirements: PEX tubing and components shall be installed in full compliance with all Federal, Provincial and Municipal codes, standards and requirements.
  .3 Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.
.2 Press Joint Copper Systems.
  .1 Installer shall be a qualified, licensed within the jurisdiction, and factory trained with the installation of copper press joint systems. Certificate of factory training shall be submitted prior to starting work.
  .2 Copper press fittings shall be installed using the proper tool, actuator, jaws and rings as instructed by the press fitting manufacturer.
  .3 The installation of copper tubing for hot and cold water distribution systems shall conform to the requirements of the National Plumbing Code of Canada.

2 Products

2.1 PIPING

.1 Domestic hot, cold and recirculation systems, within building.
  .1 Above ground:
    .1 Copper tube, hard drawn, type L: to ASTM B88M.
    .2 Cross-linked Polyethylene (PEX), non-air barrier type: to ASTM F 876 and ASTM F 877.
    .3 PEX tubing to be S102.2 Plenum Rated, and meet 25/50 Smoke and Flame ratings up to 3".

.2 Buried or embedded:
  .1 Copper tube, soft annealed, type K: to ASTM B88M, in long lengths and with no buried joints.
  .2 Cross-linked Polyethylene (PEX), non-air barrier type: to ASTM F 876 and ASTM F 877 with no buried joints.
  .3 Pipe sleeve shall be provided where piping passes through concrete.

2.2 FITTINGS

.1 Bronze pipe flanges and flanged fittings, Class 150: to ANSI/ASME B16.24.
.2 Cast bronze threaded fittings, Class 125: to ANSI/ASME B16.15.
.3 Cast copper, solder type: to ANSI/ASME B16.18.
.4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
.5 PEX fittings to ASTM F 877, ASTM F 1807 and/or ASTM F 1960, as appropriate.
.6 NPS 1 1/2 and under: Cast copper, ANSI/ASMS B16.12 of wrought copper, ANSI/ASME B16.22 with stainless steel internal components, EPDM seal and push to comment or press fit joints for hand drawn copper tube type L or type K rated for 1300 KPA at ASTM B88
.7 NPS 1½ and under: Cast copper, ANSI/ASME B16.18 or wrought copper, ANSI/ASME B16.22; with 301 stainless steel internal components. EPDM seal and push to connect or press fit joints, hand drawn copper tube type L or K rated for 1300 kPA at ASTM B88.

2.3 JOINTS

.1 Rubber gaskets, latex free, 1.6 mm thick: to AWWA C111.
.2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.
.3 Solder: 95/5 tin copper alloy lead free.
.4 Teflon tape: for threaded joints.
.5 Dielectric connections between dissimilar metals: dielectric fitting to ASTM F492, complete with thermoplastic liner.

2.4 GATE VALVES

.1 NPS 2 and under, soldered:
  .1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 22 - Valves - Bronze
.2 NPS 2 and under, screwed:
  .1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 22 - Valves - Bronze

2.5 GLOBE VALVES

.1 NPS2 and under, soldered:
  .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, renewable composition disc, screwed over bonnet as specified Section 23 05 22 - Valves - Bronze
  .2 Lockshield handles: as indicated.
.2 NPS 2 and under, screwed:
  .1 To MSS-SP-80, Class 150, 1 MPa, bronze body, screwed over bonnet, renewable composition disc as specified Section 23 05 22 - Valves - Bronze
  .2 Lockshield handles: as indicated.

2.6 SWING CHECK VALVES

.1 NPS 2 and under, soldered:
  .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 22 - Valves - Bronze.
.2 NPS 2 and under, screwed:
  .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 22 - Valves - Bronze.

2.7 BALL VALVES

.1 NPS 2 and under, screwed:
  .1 Class 150.
  .2 Bronze body, chrome plated brass ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle as specified Section 23 05 22 - Valves - Bronze.

.2 NPS 2 and under, soldered:
  .1 To ANSI/ASME B16.18, Class 150.
  .2 Bronze body, chrome plated brass ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 22 - Valves - Bronze.

.3 NPS 2 (DN 50) and under, ASTM F1960.
  .1 Cold Expansion by Pipe Manufacturer with Lead Free Brass body, ball, and stem, working pressure up to 250 PSIG.

3 Execution

3.1 INSTALLATION

.1 Install in accordance with NPC and local authority having jurisdiction.

.2 Install pipe work in accordance with Section 23 05 05 Installation of Pipework.

.3 Assemble piping using fittings manufactured to ANSI standards.

.4 Press Fit Piping: Prepare copper tube and install in strict accordance with installation instructions. Pipe ends to be cleaned, free from indentations, projections, burrs, and foreign matter. Use a tube preparation tool to clean and make installation mark. Keep fittings free of dirt and oil.

.5 Install CWS piping below and away from HWS and HWC and other hot piping so as to maintain temperature of cold water as low as possible.

.6 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

.7 Install pipe work in accordance with Section 23 05 05 -Installation of Pipework and by certified Journey Person supplemented as specified herein.

.8 PEX Potable Water Distribution:
  .1 Install PEX tubing in accordance with tubing manufacturer's recommendations, installation manuals and technical bulletins and as indicated on Contract Drawings.
  .2 PEX tubing shall not be exposed to direct sunlight for more than 30 days.
  .3 Insulation must cover the PEX tubing when exposed to a direct UV light source such as fluorescent light bulbs or any UV generating device.
  .4 Ensure that no glues, solvents, sealants or chemicals come in contact with the tubing without prior permission from the tube manufacturer.
  .5 PEX tubing passing through structural concrete slabs shall be pre-sleeved with corrugated polyethylene as supplied by the manufacturer.
  .6 PEX tubing passes through metal studs shall use grommets or sleeves at the penetration.
  .7 Protect PEX tubing with sleeves where abrasion may occur.
  .8 Use strike protectors where PEX tubing has the potential for being struck with a screw or a nail.
  .9 Bends are preferred to elbows where space allows. Manufacturer's bend supports shall be used where bends are less than six (6) times outside pipe diameter.
  .10 All horizontal runs of 1" and greater PEX tubing runs shall be supported by PEX-a galvanized support channels. Install as per manufacturer's recommendations with additional supports where required.
  .11 All fitting connections to the PEX tubing shall be made to the requirements ASTM F1960.
  .12 Multi-port Tee's shall be used in-suite wherever possible instead of straight or reduced tee's to minimize pressure drops in the plumbing distribution system.

.13 A mid-story support shall be installed in all PEX risers.
.14 An epoxy coated riser clamp shall be installed on top of every floor and against every second ceiling for all PEX risers.
.15 Manufacturer's wall penetration brackets shall be used at all wall membrane penetrations.

3.2 VALVES

.1 Isolate equipment, fixtures and branches with butterfly or ball valves.
.2 Balance recirculation system using lockshield globe valves. Mark settings and record on as-built drawings on completion.

3.3 PRESSURE TESTS

.1 Conform to requirements of Section 21 05 01 - Common Work Results - Mechanical
.2 Test pressure: greater of 1-½ times maximum system operating pressure or 860 kPa.

3.4 FLUSHING AND CLEANING

.1 Flush entire system for 8 h. Ensure outlets flushed for 2 h. Let stand for 24 h, then draw one sample off longest run. Submit to testing laboratory bacterialogical and chemical testing to verify that system is clean to provincial potable water guidelines. Let system flush for additional 2 h, then draw off another sample for testing.

3.5 PRE-START-UP INSPECTIONS

.1 Systems to be complete, prior to flushing, testing and start-up.
.2 Verify that system can be completely drained.
.3 Ensure that pressure booster systems are operating properly.
.4 Ensure that air chambers, expansion compensators are installed properly.

3.6 DISINFECTION

.1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction and approval of Consultant.
.2 Upon completion, provide laboratory test reports on water quality for Consultant approval.

3.7 START-UP

.1 Timing: Start up after:
.1 Pressure tests have been completed.
.2 Disinfection procedures have been completed.
.3 Water treatment systems operational.
.2 Provide continuous supervision during start-up.
.3 Start-up procedures:
.1 Establish circulation and ensure that air is eliminated.
.2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
.3 Bring HWS storage tank up to design temperature slowly.
.4 Monitor piping HWS and HWC piping systems for freedom of movement, pipe expansion as designed.
.5 Check control, limit, safety devices for normal and safe operation.
.4 Rectify start-up deficiencies.

3.8 PERFORMANCE VERIFICATION

.1 Timing:
.1 After pressure and leakage tests and disinfection completed, and certificate of completion has been issued by authority having jurisdiction.
.2 Procedures:
.1 Verify that flow rate and pressure meet Design Criteria.

.2 TAB HWC in accordance with Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
.3 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.
.4 Sterilize HWS and HWC systems for Legionella control.
.5 Verify performance of temperature controls.
.6 Verify compliance with safety and health requirements.
.7 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut off water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.
.8 Confirm water quality consistent with supply standards, verifying that no residuals remain as a result of flushing and/or cleaning.

.3 Reports:
.1 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.
.2 Chemical and biological water testing report.
.3 Pressure testing report signed off by Contractor and witness for each section of piping tested.
.4 Flushing and cleaning report signed off by Contractor and witness for each section of piping.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 23 05 05 - Installation of Pipework.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
  .1 ASTM D2235, Specification for Solvent Cement for Acrylonitrille-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
  .2 ASTM D2564, Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems.

.2 Canadian Standards Association (CSA International).
  .1 CSA-Series B1800, Plastic Nonpressure Pipe Compendium.
  .2 CSA-B181.2, PVC Drain, Waste and Vent Pipe and Pipe Fittings.
  .3 CSA-B182.1, Plastic Drain and Sewer Pipe and Pipe Fittings.

.3 Underwriters Laboratory of Canada (ULC)
  .1 CAN/ULC-S102.2 Method of Testing for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal paper packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

2 Products

2.1 PIPING AND FITTINGS

.1 For buried DWV piping to:
  .1 CSA-B181.1.
  .2 CSA-B181.2.
  .3 CSA-B182.1.
  .4 Acceptable material: ABS, PVC (IPEX System 15 or equal).

.2 For above ground DWV piping for combustible construction:
  .1 CSA-B181.2.
  .2 Acceptable material: PVC (IPEX System 15 or equal).

2.2 JOINTS

.1 Solvent weld for PVC: to ASTM D2564.
.2 Solvent weld for ABS: to ASTM D2235.

3 Execution

3.1 INSTALLATION

.1 Install in accordance with Canadian Plumbing Code and the local authority having jurisdiction.
.2 In accordance with Section 23 05 05 - Installation of Pipework and certified Journey Persons.

3.2 TESTING

.1 Pressure test buried systems before backfilling in accordance with Canadian Plumbing Code.
.2 Hydraulically test to verify grades and freedom from obstructions.

3.3 PERFORMANCE VERIFICATION

.1 Cleanouts:
  .1 Ensure accessible and that access doors are correctly located.

.2 Open, cover with linseed oil and re-seal.
.3 Verify cleanout rods can probe as far as the next cleanout, at least.

.2 Test to ensure traps are fully and permanently primed.
.3 Ensure fixtures are properly anchored, connected to system and effectively vented.
.4 Affix applicable label (storm, sanitary, vent, pump discharge etc.) c/w directional arrows every floor or 4.5 m (whichever is less).
.5 Provide copies of test reports for maintenance manuals.

END OF SECTION

1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International).
  .1 CAN/CSA-B45 Series, Plumbing Fixtures.
  .2 CAN/CSA-B125, Plumbing Fittings.
  .3 CAN/CSA-B651, Barrier-Free Design.

1.2 SUBMITTALS

.1 Submittals in accordance with Division 01 - General Requirements.
.2 Product Data:
  .1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.
    .1 Indicate, for all fixtures and trim:
      .1 Dimensions, construction details, roughing-in dimensions.
.3 Closeout Submittals:
  .1 Submit maintenance data in accordance with Division 01 - General Requirements.
  .2 Include:
    .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
    .2 Details of operation, servicing, maintenance.
    .3 List of recommended spare parts.

1.3 QUALITY ASSURANCE

.1 Health and Safety:
  .1 Do construction occupational health and safety in accordance with Division 01 - General Requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Waste Management and Disposal:
  .1 Separate waste materials for reuse in accordance with Division 01 - General Requirements.
  .2 Collect and separate for disposal paper packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
  .3 Fold up metal banding, flatten and place in designated area for recycling.

1.5 ACCEPTABLE MATERIAL

.1 Fixtures: American Standard, Kindred, Fiat, AMI Novanni, Elkay, Zurn.
.2 Trim: Delta, Chicago Faucet, Powers, Crane, Sloan, Zurn .

2 Products

2.1 MANUFACTURED UNITS

.1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
.2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.
.3 Exposed plumbing brass to be chrome plated.
.4 Number, locations: architectural drawings to govern.
.5 Fixtures in any one location to be product of one manufacturer and of same type.
.6 Trim in any one location to be product of one manufacturer and of same type.
.7 Stainless steel counter-top sinks.
  .1 S -1: double compartment, ledge-back.
    .1 From 1.0 mm thick type 302 stainless steel, self-rimming, undercoated, clamps. Overall sizes: 790 x 510 x 180 mm.

.2 Trim: chrome plated brass, with swing spout, aerator, single lever handle, washerless controls, accessories to limit maximum flow rate to 7.19 litres/minute at 413 kPa, inline spray fitting.
.3 Waste fitting: integral stainless steel basket strainer/stopper, tailpiece, cast brass P-trap with cleanout.
.4 Standard of Acceptance: Kindred QDL 20207, c/w American Standard Arch.

.2 S - 2 : triple compartment, ledge back:
.1 From 1.0 mm thick type 302 stainless steel, self-rimming, undercoated, clamps. Overall sizes: 1200mm x 520 mm x 200mm.
.2 Trim: Two (2) deck mounted faucets, one between each set of basins, Chrome plated brass, with swing spout, aerator, two handle, washerless controls, accessories to limit maximum flow rate to 7.19 litres/minute at 413 kPa, inline spray fitting.
.3 Waste fitting: integral stainless steel basket strainer/stopper, tailpiece, cast brass P-trap with cleanout.
.4 Acceptable Material: Novanni 3005AEI, c/w two (2) American Standard Arch.

.8 Laundry tubs:
.1 LT-1: Single compartment.
.1 Stain-resisting acrylic front apron, waste plug with rubber stopper, adjustable tailpiece, cast brass trap with cleanout. Sizes: 560 x 560 mm with 78 L capacity.
.2 Trim: rough brass supply fitting with mounting bracket, hose end, swing spout, indexed lever handles, vacuum breaker, aerator, accessories to limit maximum flow rate to 8.35 L/minute at 413 kPa.
.3 Acceptable Material: FIAT FL-1, Zurn MS2620F C/W Delta 28T8183-AC, Zurn Z843M1-L51.

.9 Fixture piping:
.1 Hot and cold water supplies to each fixture:
.1 Chrome plated flexible metal supply pipes each with quarter-turn angle ball valve stop, chrome plated pipe nipple or copper tube with chrome cover and escutcheon to properly cover all pipe & fittings exposed through the wall.
.2 Waste:
.1 Brass P trap with clean out on each fixture not having integral trap.
.2 Chrome plated in all exposed places.
.3 Escutcheon to properly cover all exposed pipe & fittings through the wall.

3 Execution

3.1 INSTALLATION

.1 Mounting heights:
.1 Standard: to comply with architectural plans.
.2 For barrier-free washroom: to comply with most stringent of either NBCC or CAN/CSA B651.

3.2 ADJUSTING

.1 Conform to water conservation requirements specified this section.
.2 Adjustments:
.1 Adjust water flow rate to design flow rates.
.2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
.3 Checks:
.1 Aerators: operation, cleanliness.
.2 Vacuum breakers, backflow preventers: operation under all conditions.
.4 Thermostatic controls:

.1 Verify temperature settings, operation of control, limit and safety controls.

END OF SECTION

This page intentionally left blank

1 General

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM).
  .1 ASTM A126, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
  .2 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.
.2 American Water Works Association (AWWA).
  .1 AWWA C700, Cold Water Meters-Displacement Type, Bronze Main Case.
  .2 AWWA C701, Cold Water Meters-Turbine Type for Customer Service.
  .3 AWWA C702-1, Cold Water Meters-Compound Type.
.3 Canadian Standards Association (CSA International).
  .1 CSA-B64 Series, Backflow Preventers and Vacuum Breakers.
  .2 CSA-B79, Floor, Area and Shower Drains, and Cleanouts for Residential Construction.
  .3 CSA-B356, Water Pressure Reducing Valves for Domestic Water Supply Systems.
.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  .1 Material Safety Data Sheets (MSDS).
.5 Plumbing and Drainage Institute (PDI).
  .1 PDI-WH201, Water Hammer Arresters Standard.

1.2 SUBMITTALS

.1 Submittals in accordance with Division 01 - General Requirements.
.2 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and datasheet for fixtures and equipment.
  .2 Indicate dimensions, construction details and materials for specified items.
  .3 Submit WHMIS MSDS material safety data sheets. Indicate VOC's for adhesive and solvents during application and curing.
.3 Instructions: submit manufacturer's installation instructions.
.4 Manufacturers' Field Reports: manufacturers' field reports specified.
.5 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Division 01 - General Requirements, include:
  .1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.
  .2 Details of operation, servicing and maintenance.
  .3 Recommended spare parts list.

1.3 QUALITY ASSURANCE

.1 Health and Safety:
  .1 Do construction occupational health and safety in accordance with Division 01 - General Requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse in accordance with Division 01 - General Requirements.
.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
.3 Collect and separate for disposal paper packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
.4 Divert unused metal materials from landfill to metal recycling facility.
.5 Fold up metal banding, flatten and place in designated area for recycling.

2 Products

2.1 FLOOR DRAINS

.1 Floor Drains and Trench Drains: to CSA B79.
.2 Type 1: general duty; cast iron body round, adjustable head, 125 mm, sediment basket, nickel bronze strainer, integral seepage pan and trap primer connection.
  .1 Acceptable Material: Zurn ZN-415-B5-P, J.R. Smith, Mifab, Watts.
.3 Type 2: combination funnel floor drain; cast iron body with integral seepage pan, trap primer connection and nickel-bronze adjustable head strainer with integral funnel.
  .1 Acceptable Material: Zurn ZN-415-BF-P, J.R. Smith, Mifab, Watts.

2.2 CLEANOUTS

.1 Cleanout Plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.
  .1 Acceptable Material: Zurn, Z1400, J.R. Smith, Mifab, Watts.
.2 Access Covers:
  .1 Wall Access: face or wall type, stainless steel square or round cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.
    .1 Acceptable material: Zurn ZANB-1460, Mifab, Enpoco, J.R. Smith.
  .2 Floor Access: cast iron body and frame with adjustable secured nickel bronze top and:
    .1 Plugs: bolted bronze with neoprene gasket.
    .2 Cover for Unfinished Concrete Floors: cast iron round, gasket, vandal-proof screws.
      .1 Acceptable material: Zurn ZN-1400-VP, Mifab, Enpoco, J.R. Smith.
    .3 Cover for Tile and Linoleum Floors: polished nickel bronze with recessed cover for linoleum or tile infill, complete with vandal-proof locking screws.
      .1 Acceptable material: Zurn ZN-1400-X, Mifab, Enpoco, J.R. Smith.
    .4 Cover for Carpeted Floors: polished nickel bronze with deep flange cover for carpet infill, complete with carpet retainer vandal-proof locking screws.

2.3 NON-FREEZE WALL HYDRANTS

.1 Recessed with integral hose connection vacuum breaker, NPS 3/4 hose outlet, removable operating key, polished nickel bronze finish, non-freeze, encased, anti-siphon, automatic draining, wall clamp, ceramic disc cartridge. Lead free construction. Provide to suit wall thickness.
  .1 Acceptable Material: Zurn Z-1320-XL-WC, J.R. Smith, Mifab, Watts.

2.4 WATER HAMMER ARRESTORS

.1 Stainless steel or copper construction, bellows or piston type: to PDI-WH201.
  .1 Acceptable Material: Zurn Z-1700, J.R. Smith, Mifab, Precision Plumbing Products.

2.5 BACK FLOW PREVENTERS

.1 Double Check Valve Assembly: up to NPS 12 c/w isolation valves on inlet and outlet, two independent check valves, test cocks and inlet strainer.
  .1 Acceptable Material: Watts 007, Mifab, Zurn, Conbraco.

2.6 VACUUM BREAKERS

.1 Breakers: to CSA-B64 Series, vacuum breaker atmospheric.
  .1 Acceptable Material: Watts 288A, Zurn 35, J.R. Smith, Mifab.

2.7 HOSE BIBBS

.1 Bronze construction complete with integral hose connection vacuum breaker, hose thread spout, replaceable composition disc, and chrome plated in finished areas.
  .1 Acceptable Material: Watts IHB-1, Zurn.

2.8 TRAP SEAL PRIMERS

.1 Up to 12 fixtures: Electronic trap priming manifold with:
  .1 Backflow Preventer or Air Gap
  .2 Pre-set 24 hour time clock
  .3 Manual override switch
  .4 120V solenoid valve
  .5 120V or 3-wire connection
  .6 NPS 3/4 inlet connection
  .7 Calibrated manifold
  .8 Water hammer arrestor
  .9 Mounted in steel cabinet
  .10 Compression outlet fittings
  .11 Inlet shutoff valve
  .12 Supplies minimum 59 ml at 138 kPa.
    .1 Acceptable material: Mifab MI-300

2.9 STRAINERS

.1 860 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.
.2 NPS2 and under, bronze body, screwed ends, with brass cap, tapped blow-off connection and plug.

2.10 THERMOSTATIC MIXING VALVE (INDIVIDUAL FIXTURE)

.1 Manually adjustable thermostatic mixing valve.
.2 Lockable handle with range guide.
.3 Integral high-limit stop at 50 degrees C.
.4 Basis of design: Lawler TMM 1070.
.5 Acceptable alternates: Leonard, Watts.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 INSTALLATION

.1 Install in accordance with National Plumbing Code of Canada, and.
.2 Install in accordance with manufacturer's instructions and as specified.

3.3 CLEANOUTS

.1 Install cleanouts at base of soil and waste stacks, and rainwater leaders, at locations required code, and as indicated.
.2 Bring cleanouts to wall or finished floor unless serviceable from below floor.
.3 Building drain cleanout and stack base cleanouts: line size to maximum NPS4.

3.4 NON-FREEZE WALL HYDRANTS

.1 Install 600 mm above finished grade unless otherwise indicated.

3.5 WATER HAMMER ARRESTORS

.1 Install on branch supplies to fixtures or group of fixtures where indicated.

3.6 BACK FLOW PREVENTORS

.1 Install in accordance with CSA-B64 Series, where indicated and elsewhere as required by code or the Authority Having Jurisdiction.
  .1 Double check type where backflow would constitute a nuisance or be aesthetically objectionable or material which would not constitute a health hazard.

.2 Pipe discharge to terminate over nearest drain and/or service sink.

3.7 HOSE BIBBS

.1 Install at bottom of risers, at low points to drain systems, and as indicated.

3.8 TRAP SEAL PRIMERS

.1 Install for floor drains and elsewhere, as indicated.

.2 Install on cold water supply to nearest frequently used plumbing fixture, in concealed space, to approval of Consultant.

.3 Install PEX piping to floor drain or fixture.

3.9 STRAINERS

.1 Install with sufficient room to remove basket.

3.10 START-UP

.1 General:
  .1 In accordance with Division 01 - General Requirements, supplemented as specified herein.

.2 Timing: start-up only after:
  .1 Pressure tests have been completed.
  .2 Disinfection procedures have been completed.
  .3 Certificate of static completion has been issued.

.3 Provide continuous supervision during start-up.

3.11 TESTING AND ADJUSTING

.1 General:
  .1 In accordance with Division 01 - General Requirements, supplemented as specified herein.

.2 Timing:
  .1 After start-up deficiencies rectified.
  .2 After certificate of completion has been issued by authority having jurisdiction.

.3 Application tolerances:
  .1 Pressure at fixtures: +/- 70kPa.
  .2 Flow rate at fixtures: +/- 20%.

.4 Adjustments:
  .1 Verify that flow rate and pressure meet design criteria.
  .2 Make adjustments while flow rate or withdrawal is (1) maximum and (2) 25% of maximum and while pressure is (1) maximum and (2) minimum.

.5 Floor drains:
  .1 Verify operation of trap seal primer.
  .2 Prime, using trap primer. Adjust flow rate to suit site conditions.
  .3 Check operations of flushing features.
  .4 Check security, accessibility, removeability of strainer.
  .5 Clean out baskets.

.6 Vacuum breakers, backflow preventers, backwater valves:

.1 Test tightness, accessibility for O&M of cover and of valve.
.2 Simulate reverse flow and back-pressure conditions to test operation of vacuum breakers, backflow preventers.
.3 Verify visibility of discharge from open ports.

.7 Access doors:
.1 Verify size and location relative to items to be accessed.

.8 Cleanouts:
.1 Verify covers are gas-tight, secure, yet readily removable.

.9 Water hammer arrestors:
.1 Verify proper installation of correct type of water hammer arrester.

.10 Wall, hydrants:
.1 Verify complete drainage, freeze protection.
.2 Verify operation of vacuum breakers.

.11 Strainers:
.1 Clean out repeatedly until clear.
.2 Verify accessibility of cleanout plug and basket.
.3 Verify that cleanout plug does not leak.

.12 Hose bibbs, sediment faucets:
.1 Verify operation at all low points.

.13 Commissioning Reports:
.1 In accordance with Division 01 - General Requirements, supplemented as specified herein.

.14 Training:
.1 In accordance with Division 01 - General Requirements, supplemented as specified herein.
.2 Demonstrate full compliance with Design Criteria.

END OF SECTION

This page intentionally left blank

1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International).
  .1 CAN/CSA-B45 Series-02, Plumbing Fixtures.
  .2 CAN/CSA-B125-01, Plumbing Fittings.
  .3 CSA Standards\CSA-B561-04, Barrier-Free Design.

1.2 SUBMITTALS

.1 Submittals in accordance with Division 01 - General Requirements.
.2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets.
.3 Submit shop drawings and product data in accordance with Division 01 - General Requirements.
.4 Indicate fixtures and trim:
  .1 Dimensions, construction details, roughing-in dimensions.
  .2 Factory-set water consumption per flush at recommended pressure.
  .3 For water closets, urinals: minimum pressure required for flushing.
.5 Closeout Submittals:
  .1 Provide maintenance data including monitoring requirements for incorporation into manuals specified in Division 01 - General Requirements.
  .2 Include:
    .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
    .2 Details of operation, servicing, maintenance.
    .3 List of recommended spare parts.

1.3 QUALITY ASSURANCE

.1 Health and Safety:
  .1 Do construction occupational health and safety in accordance with Division 01 - General Requirements.

1.4 DELIVERY STORAGE AND DISPOSAL

.1 Waste Management and Disposal:
  .1 Separate waste materials for reuse in accordance with Division 01 - General Requirements.
  .2 Collect and separate for disposal paper packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
  .3 Fold up metal banding, flatten and place in designated area for recycling.

1.5 ACCEPTABLE MATERIAL

.1 Fixtures: American Standard, AMI Novanni, Eljer, Toto, Kindred, Caroma, Kohler, Zurn, Gerber.
.2 Trim: Delta, Chicago Faucets, Powers, Crane, Sloan, Zurn, Gerber.

2 Products

2.1 MANUFACTURED UNITS

.1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
.2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.
.3 Exposed plumbing brass to be chrome plated.
.4 Number, locations: architectural drawings to govern.
.5 Fixtures in any one location to be product of one manufacturer and of same type.
.6 Trim in any one location to be product of one manufacturer and of same type.

.7 Water closets:
- .1 WC-1 : Floor-mounted, flush tank Barrier-Free.
  - .1 Top of seat to be between 400 mm and 460 mm from finished floor.
  - .2 Bowl: vitreous china, floor mounted, syphon jet, elongated rim, close-coupled, bolt caps.
  - .3 Closet tank: vitreous china with tank liner, flapper type flush valve assembly for ultra low flush cycle: factory set to 4.8 litres/flush.
  - .4 Acceptable material: American Standard Cadet, Right height.
- .2 WC-2 : Floor-mounted, flush valve, for children.
  - .1 Top of bowl rim to be between 250 mm and 300 mm from finished floor.
  - .2 Bowl: vitreous china, floor mounted, syphon jet, elongated rim, top spud for flush valve, bolt caps.
  - .3 Acceptable material: American Standard Baby Devoro.

.8 Water Closet Seats
- .1 Seat: white, elongated, open front, moulded solid plastic, less cover, stainless steel check hinges, stainless steel insert post.
- .2 Acceptable material: CENTOGO AM 500 ST5CC.

.9 Washroom Lavatories:
- .1 L-1 : Counter-top:
  - .1 Vitreous china, self-rimming, with front overflow, soap depressions, gasket, swivel clamps, semi-oval or rectangular bowl, supply openings on 200 mm centres. Sizes: 475 x 400 mm outside, 400 x 250 mm nominal inside.
  - .2 Acceptable material: American Standard Aqualyn.
- .2 L-2: wall-hung, Barrier-Free.
  - .1 Vitreous china, low shelf, with integral back, contoured front, shallow front basin, front overflow, soap depressions, supply openings on 299 mm centres, concealed supports. Sizes: 675 x 500 mm.
  - .2 Acceptable material: American Standard Declyn.

.10 Washroom Lavatory Electronic Trim:
- .1 Barrier-free electronic faucet:
  - .1 Activated by infra-fed sensor responding to presence person's hands in lavatory.
  - .2 Sensor: waterproof, incorporated in body of unit, with impact-resistant plastic lens with anti-scratch coating, sensitivity adjustable from 100 mm to 450 mm.
  - .3 Water conservation: 0-60 second maximum run time.
  - .4 Controls: vandal-proof, interchangeable receptacles for stainless steel sheathed sensor and modular plug-type solenoid connections, single slow-closing commercial solenoids for 860 kPa, 85 degrees C.
  - .5 Transformer: 120/24 Class 2, UL and CSA listed, hardwire type, sized for up to 8 solenoids.
  - .6 Spout: Chrome plated, with aerator having integral flow control for 1.9l/minute at 413 kPa maximum.
  - .7 Under-counter temperatures mixing controls limiting to 43C (105F).
  - .8 Acceptable material: Delta 591T0250.

.11 Fixture piping:
- .1 Hot and cold water supplies to fixtures:
  - .1 Chrome plated flexible metal supply pipes with screw driver stop, reducer, escutcheon.
- .2 Waste:
  - .1 Brass P trap with clean out on fixtures not having integral trap.
  - .2 Chrome plated in exposed places.
  - .3 Escutcheon to properly cover all exposed pipe & fittings through the wall.

.12 Chair carriers:
- .1 Factory manufactured floor-mounted carrier systems for wall-mounted fixtures.
- .2 Acceptable material: J.R. Smith or Equal.

3 Execution

3.1 INSTALLATION

.1 Mounting heights:
- .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.
- .2 Wall-hung fixtures: as indicated, measured from finished floor.
- .3 For barrier-free washroom: to comply with most stringent of either NBCC or CAN/CSA B651.

3.2 ADJUSTING

.1 Conform to water conservation requirements specified this section.

.2 Adjustments:
- .1 Adjust water flow rate to design flow rates.
- .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.

.3 Checks:
- .1 Water closets, urinals: flushing action.
- .2 Aerators: operation, cleanliness.
- .3 Vacuum breakers, backflow preventers: operation under all conditions.

.4 Thermostatic controls:
- .1 Verify temperature settings, operation of control, limit and safety controls.

END OF SECTION

This page intentionally left blank

1 General

1.1 SUBMITTALS

.1 Submittals: in accordance with Division 01 - General Requirements.
.2 Shop drawings; submit drawings stamped and signed for review by Owner's representative.
.3 Shop drawings to show:
  .1 Mounting arrangements.
  .2 Operating and maintenance clearances.
.4 Shop drawings and product data accompanied by:
  .1 Detailed drawings of bases, supports, and anchor bolts.
  .2 Acoustical sound power data, where applicable.
  .3 Points of operation on performance curves.
  .4 Manufacturer to certify current model production.
  .5 Certification of compliance to applicable codes.
.5 In addition to transmittal letter referred to in Division 01 - General Requirements: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.
.6 Closeout Submittals:
  .1 Provide operation and maintenance data for incorporation into manual specified in Division 01 - General Requirements.
  .2 Operation and maintenance manual approved by, and final copies deposited with, Consultant before final inspection.
  .3 Operation data to include:
    .1 Control schematics for systems including environmental controls.
    .2 Description of systems and their controls.
    .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
    .4 Operation instruction for systems and component.
    .5 Description of actions to be taken in event of equipment failure.
    .6 Valves schedule and flow diagram.
    .7 Colour coding chart.
  .4 Maintenance data to include:
    .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
    .2 Data to include schedules of tasks, frequency, tools required and task time.
  .5 Performance data to include:
    .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
    .2 Equipment performance verification test results.
    .3 Special performance data as specified.
    .4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
  .6 Approvals:
    .1 Submit electronic copies of draft Operation and Maintenance Manual to Consultant for approval. Submission of individual data will not be accepted unless directed by Consultant.
    .2 Make changes as required and re-submit as directed by Consultant.
  .7 Additional data:
    .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
  .8 Site records:
    .1 Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.

.2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
.3 Use different colour waterproof ink for each service.
.4 Make available for reference purposes and inspection.

.9 As-built drawings:
.1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
.3 Submit to Consultant for approval and make corrections as directed.
.4 Perform testing, adjusting and balancing for HVAC using as-built drawings.
.5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

.10 Submit copies of as-built drawings for inclusion in final TAB report.

1.2 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Division 01 - General Requirements.
.2 Health and Safety Requirements: do construction occupational health and safety in accordance with Division 01 - General Requirements.

1.3 MAINTENANCE

.1 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Division 01 - General Requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:
.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse in accordance with Division 01 - General Requirements.

2 Products

2.1 MATERIALS

.1 All materials used on this project shall be new and CSA approved unless noted otherwise.

3 Execution

3.1 PAINTING REPAIRS AND RESTORATION

.1 Do painting in accordance with Section 09 91 00 - Painting.
.2 Prime and touch up marred finished paintwork to match original.
.3 Restore to new condition, finishes which have been damaged.

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units. Protect open ends of ducts, diffusers, grilles and registers during construction to prevent ingress of dust and dirt into interior of ducts.

3.3 FIELD QUALITY CONTROL

.1 Site Tests: conduct following tests in accordance with Division 01 - General Requirements and submit report as described in PART 1 - SUBMITTALS.
.1 Submit tests as specified in other sections of this specification.
.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.4 DEMONSTRATION

.1 Consultant will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.
.2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
.3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
.4 Instruction duration time requirements as specified in appropriate sections.
.5 Consultant will record these demonstrations on video tape for future reference.

3.5 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED SECTIONS

.1 Section 07 84 00 - Firestopping.
.2 Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Division 01 - General Requirements.
.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
.3 Collect and separate for disposal paper packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.
.4 Divert unused metal materials from landfill to metal recycling facility.

2 Products

2.1 NOT USED

.1 Not Used.

3 Execution

3.1 CONNECTIONS TO EQUIPMENT

.1 In accordance with manufacturer's instructions unless otherwise indicated.
.2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.
.3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.
.4 The flexible ground joint couplings may be used in lieu of a flexible connector at equipment connections for vibration attenuation and stress relief, coupling shall be placed in close proximity to the source of vibration.

3.2 CLEARANCES

.1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer.
.2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer or as indicated (whichever is greater) without interrupting operation of other system, equipment, components.

3.3 ESCUTCHEONS

.1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.
.2 Construction: One piece type with set screws. Chrome or nickel plated brass or type 302 stainless steel.
.3 Sizes: Outside diameter to cover opening or sleeve. Inside diameter to fit around pipe or outside of insulation if so provided.

3.4 PREPARATION FOR FIRESTOPPING

.1 Material and installation within annular space between pipes, ducts, insulation and adjacent fire separation to Section 07 84 00 - Firestopping.
.2 Uninsulated unheated pipes not subject to movement: No special preparation.

.3 Uninsulated heated pipes subject to movement: Wrap with non-combustible smooth material to permit pipe movement without damaging firestopping material or installation.
.4 Insulated pipes and ducts: Ensure integrity of insulation and vapour barriers.

3.5 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

.1 Advise Consultant 48 hours minimum prior to performance of pressure tests.
.2 Pipework: Test as specified in relevant sections of Division 23.
.3 Maintain specified test pressure without loss for 4 hours minimum unless specified for longer period of time in relevant sections of Division 23.
.4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.
.5 Conduct tests in presence of Consultant. Work to be carried out in off hours after 5:00 p.m., weekends or holidays.
.6 Pay costs for repairs or replacement, retesting, and making good. Consultant to determine whether repair or replacement is appropriate.
.7 Insulate or conceal work only after approval and certification of tests by Consultant.

3.6 EXISTING SYSTEMS

.1 Connect into existing piping systems at times approved by the owner. Work to be carried out in off hours after 5:00 p.m., weekends or holidays.
.2 Request written approval ten (10) days minimum, prior to commencement of work.
.3 Be responsible for damage to existing plant by this work.
.4 Ensure daily clean-up of existing areas.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 23 05 01 - Installation of Pipework.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/ American Society of Mechanical Engineers (ASME).
  .1 ANSI/ASME B1.20.1 (R2001), Pipe Threads, General Purpose (Inch).
  .2 ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
  .3 ANSI/ASME B16-22 Wrought Copper and Copper Alloy Soldier Joint Pressure Fittings.

.2 American Society for Testing and Materials International, (ASTM).
  .1 ASTM A276, Specification for Stainless Steel Bars and Shapes.
  .2 ASTM A536, Specifications for Ductile Iron Castings.
  .3 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.
  .4 ASTM B16 Specifications for Free Cutting Brass Rod Bar and Shapes for use in Screw Machines.
  .5 ASTM B283, Specification for Copper and Copper Alloy Die Forgings (Hot-Pressed).
  .6 ASTM B505/B505M, Specification for Copper-Base Alloy Continuous Castings.

.3 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).
  .1 MSS-SP-25, Standard Marking System for Valves, Fittings, Flanges and Unions.
  .2 MSS-SP-80, Bronze Gate Globe, Angle and Check Valves.
  .3 MSS-SP-110, Ball Valves, Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
  .4 Canadian Standards Association (CSA)

1.3 SUBMITTALS

.1 Submittals in accordance with Division 01 - General Requirements.

.2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets.
  .1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.
  .2 Submit data for valves specified in this section.

.3 Closeout Submittals:
  .1 Submit maintenance data for incorporation into manual specified in Division 01 - General Requirements.

1.4 QUALITY ASSURANCE

.1 Health and Safety:
  .1 Do construction occupational health and safety in accordance with Division 01 - General Requirements.

1.5 DELIVERY STORAGE AND DISPOSAL

.1 Waste Management and Disposal:
  .1 Separate and recycle waste materials in accordance with Division 01 - General Requirements.
  .2 Collect and separate for disposal paper packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

1.6 MAINTENANCE

.1 Extra Materials:

.2 Furnish following spare parts:
  .1 One (1) valve of each size and type used on the project.

2 Products

2.1 MATERIALS

.1 Valves:
- .1 Except for specialty valves, to be single manufacturer.
- .2 Components used in potable water systems are to be low-lead compliant, and rated for use with potable water.

.2 End Connections:
- .1 Connection into adjacent piping/tubing:
  - .1 Copper tube systems:
    - .1 Solder ends to ANSI/ASME B16.18.

.3 Lockshield Keys:
- .1 Where lockshield valves are specified, provide 10 keys of each size: malleable iron

2.2 CHECK VALVES

.1 Requirements common to check valves, unless specified otherwise:
- .1 Standard specification: MSS SP-80.
- .2 Connections: screwed with hexagonal shoulders.
  - .1 Class 125, WP = 860 kPa (125 psi) 1.4 MPa (200psi) WOG
  - .2 Class 150, WP = 1.03 MPa
  - .3 200 6WP, WP = 1.4 MPa (200psi) Water.

.2 NPS 2 and under, swing type, bronze disc:
- .1 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.
- .2 Disc and seat: renewable rotating disc, two-piece hinge disc construction; seat: regrindable.

2.3 BALL VALVES

.1 NPS 2 and under:
- .1 Body and cap: cast high tensile bronze to ASTM B62.
- .2 Pressure rating: Class125, 860 kPa steam.
- .3 Connections: Screwed ends to ANSI B1.20.1 and with hexagonal shoulders, push to connect press fit ends.
- .4 Stem: tamperproof ball drive.
- .5 Stem packing nut: external to body.
- .6 Ball and seat: replaceable stainless steel solid ball of hand chrome plated brass solid ball and teflon seats.
- .7 Stem seal: TFE EPDM, Nitrile, Flooroelustomer with external packing nut.
- .8 Operator: removable lever handle.
- .9 Cup and drain for service.
- .10 Acceptable material: Jenkins Fig 201J or equal.

2.4 GLOBE VALVES

.1 Requirements common to all globe valves, unless specified otherwise:
- .1 Standard specification: MSS SP-80.
- .2 Bonnet: union with hex. shoulders.
- .3 Connections: screwed with hex. shoulders.
- .4 Inspection and pressure testing: to MSS SP-80. Tests to be hydrostatic.
- .5 Packing: non-asbestos.
- .6 Handwheel: non-ferrous.
- .7 Handwheel Nut: bronze to ASTM B62.
- .8 Class 125, WP = 860 kPa steam, 1.4 MPa WOG.
- .9 Class 150 WP = 1.03 mPa steam, 2.07 MPa WOG.

.2 NPS 2 and under, composition disc, Class 125:
- .1 Body and bonnet: screwed bonnet.

.2 Disc and seat: renewable rotating PTFE disc regrindable bronze seat, loosely secured to bronze stem to ASTM B505.
.3 Operator: Handwheel.

.3 NPS 2 and under, plug disc, Class 150, screwed ends:
.1 Body and bonnet.
.2 Disc and seat ring: tapered plug type with disc stem ring of stainless steel to ASTM A276, loosely secured of stem.
.3 Operator: Handwheel.
.4 Acceptable material: Jenkins Figure 2032J or equal

2.5 ACCEPTABLE MATERIAL

.1 Jenkins, Crane, Watts, Newman Hattersley, Milwaukee, Conbraco, Kitz, Red White, M.A. Stewart, Nibco, Victaulic, Boshart.

3 Execution

3.1 INSTALLATION

.1 Install rising stem valves in upright position with stem above horizontal.
.2 Remove internal parts before soldering.
.3 Install valves with unions at each piece of equipment arranged to allow servicing, maintenance, and equipment removal.
.1 Unions are not required in Installations using ground mechanical couplings. The couplings shall serve as unions.
.4 Add joining tube, couplings and fittings with grooved joint valves shall be copper tube dimensioned. Tlaring tube or fitting ends to accommodate IPS sized valves is not permitted.

3.2 COMMISSIONING

.1 As part of commissioning activities, develop a schedule and valves and record there on there as identifier, location, services, purchase order number and date, manufacturer, identification data specified above.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED SECTIONS

.1 Section 03 30 00 - Cast in Place Concrete.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
  .1 ASTM A125, Specification for Steel Springs, Helical, Heat-Treated.
.2 Factory Mutual (FM)
.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).
.4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
  .1 MSS SP58, Pipe Hangers and Supports - Materials, Design and Manufacture.
  .2 ANSI/MSS SP69, Pipe Hangers and Supports - Selection and Application.
  .3 MSS SP89, Pipe Hangers and Supports - Fabrication and Installation Practices.
.5 Underwriter's Laboratories of Canada (ULC)

1.3 SYSTEM DESCRIPTION

.1 Design Requirements:
  .1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
  .2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP58.
  .3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.
  .4 Design hangers and supports to support systems under conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.
  .5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP58.
.2 Performance Requirements:
  .1 Design supports, platforms, cat walks, hangers, to withstand seismic events for locations as per the national building code.

1.4 SUBMITTALS

.1 Submittals: in accordance with Division 01 - General Requirements.
.2 Shop drawings: submit drawings stamped and signed for approval by Owner's representative.
.3 Submit shop drawings and product data for following items:
  .1 Bases, hangers and supports.
  .2 Connections to equipment and structure.
  .3 Structural assemblies.
  .4 Quality Assurance Submittals: submit following in accordance with Division 01 - General Requirements.
    .1 Certification by manufacturer: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
    .2 Instructions: submit manufacturers installation instruction.
.4 Closeout Submittals:
  .1 Provide maintenance data for incorporation into manual specified in Division 01 - General Requirements.

1.5 QUALITY ASSURANCE

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Division 01 - General Requirements.

2 Products

2.1 GENERAL

.1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS SP58 and MSS SP59.
.2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

2.2 PIPE HANGERS

.1 Finishes:
  .1 Pipe hangers and supports: galvanized, painted with zinc-rich paint after manufacture.
  .2 Use electro-plating galvanizing process or hot dipped galvanized process.
  .3 Ensure steel hangers in contact with copper piping are copper plated or epoxy coated.
.2 Upper attachment structural: suspension from overhead structure:
  .1 Cold piping NPS 2 maximum: malleable iron C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.
    .1 Rod: 9 mm UL listed, 13 mm FM approved.
.3 Shop and field-fabricated assemblies:
  .1 Trapeze hanger assemblies: MSS SP89.
  .2 Steel brackets: MSS SP89.
.4 Hanger rods: threaded rod material to MSS SP58:
  .1 Ensure that hanger rods are subject to tensile loading only.
  .2 Provide linkages where lateral or axial movement of pipework is anticipated.
  .3 Do not use 22 mm or 28 mm rod.
.5 Pipe attachments: material to MSS SP58:
  .1 Attachments for copper piping: copper plated black steel.
  .2 Use insulation shields for hot pipework.
  .3 Oversize pipe hangers and supports for insulated pipes.
.6 Adjustable clevis: material to MSS SP69 UL listed, (FM approved where required) clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
  .1 Ensure "U" has hole in bottom for riveting to insulation shields.
.7 Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP69.
.8 U-bolts: carbon steel to MSS SP69 with 2 nuts at each end to ASTM A563.
  .1 Finishes for steel pipework: galvanized.
  .2 Finishes for copper, glass, brass or aluminum pipework: black with farmed portion plastic coated or epoxy coated.

2.3 RISER CLAMPS

.1 Steel or cast iron pipe: galvanized carbon steel to MSS SP58, type 42, UL listed, FM approved where required.
.2 Copper pipe: carbon steel copper plated to MSS SP58, type 42.
.3 Bolts: to ASTM A307.
.4 Nuts: to ASTM A563.

2.4 INSULATION PROTECTION SHIELDS

.1 Insulated cold piping:
  .1 64 kg/m3 density insulation plus insulation protection shield to: MSS SP69, galvanized sheet carbon steel. Length designed for maximum 3 m span.
.2 Insulated hot piping:
  .1 Curved plate 300 mm long, with edges turned up.

2.5 EQUIPMENT SUPPORTS

.1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel meeting requirements of Section 05 12 23 - Structural Steel for Buildings. Submit calculations with shop drawings.

2.6 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

.1 Provide templates to ensure accurate location of anchor bolts.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install in accordance with:
  .1 manufacturer's instructions and recommendations.
.2 Vibration Control Devices:
  .1 Install on piping systems at pumps, boilers, chillers, cooling towers, and as indicated.
.3 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

3.3 HANGER SPACING

.1 Plumbing piping: to most stringent requirements of Canadian Plumbing Code.
.2 Copper piping: up to NPS 1/2: every 1.5 m.
.3 Within 300 mm of each elbow.

Max Pipe Size: NPS	Max Spacing Copper
up to 1-1/4	1.8m
1-1/2	2.4m

3.4 HANGER INSTALLATION

.1 Install hanger so that rod is vertical under operating conditions.
.2 Adjust hangers to equalize load.
.3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members. Comprised of angle Iron or c-channel.

3.5 HORIZONTAL MOVEMENT

.1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.
.2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.6 FINAL ADJUSTMENT

.1 Adjust hangers and supports:
  .1 Ensure that rod is vertical under operating conditions.
  .2 Equalize loads.
.2 Adjustable clevis:
  .1 Tighten hanger load nut securely to ensure proper hanger performance.
  .2 Tighten upper nut after adjustment.
.3 C-clamps:

.1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 09 91 00 - Painting.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.60-97, Interior Alkyd Gloss Enamel.
- .2 CAN/CGSB-24.3-92, Identification of Piping Systems.

1.3 SUBMITTALS

.1 Product Data:
- .1 Submittals: in accordance with Division 01 - General Requirements.
- .2 Product data to include paint colour chips, other products specified in this section.
- .3 Samples:
  - .1 Submit samples in accordance with Division 01 - General Requirements.
  - .2 Samples to include nameplates, labels, tags, lists of proposed legends.

1.4 QUALITY ASSURANCE

.1 Quality assurance submittals: submit following in accordance with Division 01 - General Requirements.

.2 Health and Safety:
- .1 Do construction occupational health and safety in accordance with Division 01 - General Requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:
- .1 Deliver, store and handle in accordance with Division 01 - General Requirements.
- .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:
- .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse in accordance with Division 01 - General Requirements.
- .2 Dispose of unused paint material at official hazardous material collections site approved by Owner's Representative.
- .3 Do not dispose of unused paint material into sewer system, into streams, lakes, onto ground or in locations where it will pose health or environmental hazard.

2 Products

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

.1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.

.2 Lettering and numbers raised or recessed.

.3 Information to include, as appropriate:
- .1 Equipment: manufacturer's name, model, size, serial number, capacity.
- .2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATES

.1 Colours:
- .1 Hazardous: red letters, white background.
- .2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).

.2 Construction:
.1 3 mm thick laminated plastic, matte finish, with square corners, letters accurately aligned and machine engraved into core.
.3 Sizes:
.1 Conform to following table:

Size # mm	Sizes (mm)	No. of Lines	Height of Letters (mm)
1	10 x 50	1	3
2	13 x 75	1	5
3	13 x 75	2	3
4	20 x 100	1	8
5	20 x 100	2	5
6	20 x 100	1	8
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

.2 Use maximum of 25 letters/numbers per line.
.4 Locations:
.1 Terminal cabinets, control panels: use #5.
.2 Equipment in Mechanical Rooms: use #9.

2.3 EXISTING IDENTIFICATION SYSTEMS

.1 Apply existing identification system to new work.
.2 Where existing identification system does not cover for new work, use identification system specified this section.
.3 Before starting work, obtain written approval of identification system from Consultant.

2.4 IDENTIFICATION OF PIPING SYSTEMS

.1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.
.2 Pictograms:
.1 Where required: Workplace Hazardous Materials Information System (WHMIS) regulations.
.3 Legend:
.1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.
.4 Arrows showing direction of flow:
.1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.
.2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.
.3 Use double-headed arrows where flow is reversible.
.5 Extent of background colour marking:
.1 To full circumference of pipe or insulation.
.2 Length to accommodate pictogram, full length of legend and arrows.
.6 Materials for background colour marking, legend, arrows:
.1 Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.
.2 Other pipes: pressure sensitive plastic-coated cloth with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150 degrees C and intermittent temperature of 200 degrees C.
.7 Colours and Legends:
.1 Where not listed, obtain direction from Owner's Representative.

Background colour:	Legend, arrows:
Yellow	BLACK
Green	WHITE
Red	WHITE

.2 Colours for legends, arrows: to following table:

Contents	Background colour marking	Legend
City water	Green	CITY WATER
Domestic hot water supply	Green	DOM. HW SUPPLY
Dom. HWS recirculation	Green	DOM. HW CIRC
Dom. cold water supply	Green	DOM. CWS
Sanitary	Green	SAN
Plumbing vent	Green	SAN. VENT
Refrigeration suction	Yellow	REF. SUCTION
Refrigeration liquid	Yellow	REF. LIQUID
Refrigeration hot gas	Yellow	REF. HOT GAS

2.5 IDENTIFICATION DUCTWORK SYSTEMS

.1 50 mm high stenciled letters and directional arrows 150 mm long x 50 mm high.
.2 Colours: back, or coordinated with base colour to ensure strong contrast.
.3 Identify Systems: eg Supply AHU-1, Exhaust EF-1

2.6 VALVES, CONTROLLERS

.1 Brass tags with 12 mm stamped identification data filled with black paint.
.2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

2.7 CONTROLS COMPONENTS IDENTIFICATION

.1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.
.2 Inscriptions to include function and (where appropriate) fail-safe position, component ID name.

2.8 LANGUAGE

.1 Identification in English.
.2 Use one nameplate and label for each language.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 TIMING

.1 Provide identification only after painting specified Section 09 91 23 - Interior Painting has been completed.

3.3 INSTALLATION

.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

.2 Provide ULC and CSA registration plates as required by respective agency.

3.4 NAMEPLATES

.1 Locations:
  .1 In conspicuous location to facilitate easy reading and identification from operating floor.
.2 Standoffs:
  .1 Provide for nameplates on hot and/or insulated surfaces.
.3 Protection:
  .1 Do not paint, insulate or cover in any way.

3.5 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

.1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.
.2 Adjacent to each change in direction.
.3 At least once in each small room through which piping or ductwork passes.
.4 On both sides of visual obstruction or where run is difficult to follow.
.5 On both sides of separations such as walls, floors, partitions.
.6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.
.7 At beginning and end points of each run and at each piece of equipment in run.
.8 At point immediately upstream of major manually operated or automatically controlled valves, and dampers. Where this is not possible, place identification as close as possible, preferably on upstream side.
.9 Identification easily and accurately readable from usual operating areas and from access points.
  .1 Position of identification approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.6 VALVES, CONTROLLERS

.1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S" hooks.
.2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Consultant. Provide one copy (reduced in size if required) in each operating and maintenance manual.
.3 Number valves in each system consecutively.

3.7 CLEANING

.1 Proceed in accordance with Division 01 - General Requirements.
.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

1 General

1.1 QUALIFICATIONS OF TAB PERSONNEL

.1 Submit names of personnel to perform TAB to Consultant within 90 days of award of contract.

.2 Provide documentation confirming qualifications, successful experience. TAB Contractor shall have a minimum of five (5) years experience to AABC, NBC, NEBB or SMACNA

.3 TAB: performed in accordance with the requirements of Standard under which TAB Firm's qualifications are approved:

- .1 Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1.
- .2 National Balancing Council (NBC) Certified Air Balancing Specifications and Certified Hydronic Balancing Specifications.
- .3 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems.
- .4 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing.

.4 Recommendations and suggested practices contained in the TAB Standard: mandatory.

.5 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.

.6 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.

.7 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.

.8 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.

- .1 For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.
- .2 Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or TABB), requirements and recommendations contained in these procedures and requirements are mandatory.

1.2 EXCEPTIONS

.1 TAB of systems and equipment regulated by codes, standards to satisfaction of authority having jurisdiction.

1.3 CO-ORDINATION

.1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.

.2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

1.4 PRE-TAB REVIEW

.1 Review contract documents before project construction is started confirm in writing to Consultant adequacy of provisions for TAB and other aspects of design and installation pertinent to success of TAB.

.2 Review specified standards and report to Consultant in writing proposed procedures which vary from standard.

.3 During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.

1.5 START-UP

.1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.
.2 Follow special start-up procedures specified elsewhere in Division 23.

1.6 OPERATION OF SYSTEMS DURING TAB

.1 Operate systems for length of time required for TAB and as required by Consultant for verification of TAB reports.

1.7 START OF TAB

.1 Notify Consultant seven (7) days prior to start of TAB.
.2 Start TAB when building is essentially completed, including:
  .1 Installation of ceilings, doors, windows, other construction affecting TAB.
  .2 Application of weatherstripping, sealing, and caulking.
  .3 Pressure, leakage, other tests specified elsewhere Division 23.
  .4 Provisions for TAB installed and operational.
.3 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:
  .1 Proper thermal overload protection in place for electrical equipment.
  .2 Air systems:
    .1 Filters in place, clean.
    .2 Duct systems clean.
    .3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.
    .4 Correct fan rotation.
    .5 Fire, smoke, volume control dampers installed and open.
    .6 Coil fins combed, clean.
    .7 Access doors, installed, closed.
    .8 Outlets installed, volume control dampers open.
  .3 Liquid Systems:
    .1 Flushed, filled, vented.
    .2 Correct pump rotation.
    .3 Strainers in place, baskets clean.
    .4 Isolation and balancing valves installed and open.
    .5 Calibrated balancing valve installed at factory settings.
    .6 Chemical treatment systems complete, operational.

1.8 APPLICATION TOLERANCES

.1 Do TAB to following tolerances of design values:
  .1 Other HVAC Systems: plus 5%, minus 5%.
  .2 Refrigeration Systems: plus or minus 10%

1.9 ACCURACY TOLERANCES

.1 Measured values accurate to within plus or minus 2 % of actual values.

1.10 INSTRUMENTS

.1 Prior to TAB, submit to Consultant list of instruments used together with serial numbers.
.2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.
.3 Calibrate within 3 months of TAB. Provide certificate of calibration to Consultant.

1.11 SUBMITTALS

.1 Submit, prior to commencement of TAB:

.1 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.12 PRELIMINARY TAB REPORT

.1 Submit for checking and approval of Consultant, prior to submission of formal TAB report, sample of rough TAB sheets. Include:
  .1 Details of instruments used.
  .2 Details of TAB procedures employed.
  .3 Calculations procedures.
  .4 Summaries.

1.13 TAB REPORT

.1 Format in accordance with referenced standard.
.2 TAB report to show results in SI units and to include:
  .1 Project record drawings.
  .2 System schematics.
.3 Submit electrical copies of TAB Report to Consultant for verification and approval, in English in D-ring binders, complete with index tabs.

1.14 VERIFICATION

.1 Reported results subject to verification by Consultant.
.2 Provide personnel and instrumentation to verify up to 30 % of reported results.
.3 Number and location of verified results as directed by Consultant.
.4 Pay costs to repeat TAB as required to satisfaction of Consultant.

1.15 SETTINGS

.1 After TAB is completed to satisfaction of Consultant, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.
.2 Permanently mark settings to allow restoration at any time during life of facility. Do not eradicate or cover markings.

1.16 COMPLETION OF TAB

.1 TAB considered complete when final TAB Report received and approved by Consultant.

1.17 AIR SYSTEMS

.1 Standard: TAB to most stringent of this section.
.2 Do TAB of systems, equipment, components, controls specified in other Divisions.
.3 Qualifications: personnel performing to be qualified to Standards of AABC, NBC or NEBB.
.4 Quality assurance: perform TAB under direction of supervisor qualified to Standards of AABC, NBC, or NEBB.
.5 Measurements: to include as appropriate for systems, equipment, components, controls:
  .1 Air velocity
  .2 Static pressure
  .3 Flow rate
  .4 Pressure drop (or loss)
  .5 Temperatures (dry bulb, wet bulb, dewpoint)
  .6 Duct cross-sectional area
  .7 RPM
  .8 Electrical power
  .9 Voltage
  .10 Noise
  .11 Vibration
  .12 Amperage and volts for each stage of electric heating coils.

.6 Locations of equipment measurements: to include but not be limited to, following as appropriate:
- .1 Inlet and outlet of dampers
- .2 Filter
- .3 Coil
- .4 Fan
- .5 Other equipment causing changes in conditions.
- .6 Controllers.
- .7 Controlled device.

.7 Locations of systems measurements to include as appropriate: main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

1.18 DOMESTIC WATER SYSTEMS

.1 Meet requirements as specified for hydronic systems.

.2 Locations of equipment measurements: to include, but not limited to, following as appropriate: inlet and outlet heaters, tank, pump, circulator, at controllers, controlled device.

.3 Locations of systems measurements to include, but not limited to, following as appropriate: main, main branch, branch, sub-branch.

1.19 POST-OCCUPANCY TAB

.1 Measure DBT, WBT (or %RH), air velocity, air flow patterns, NC levels, in occupied zone of areas designated by Owner's Representative.

.2 Participate in systems checks twice during Warranty Period - #1 approximately 3 months after acceptance and #2 within 3 months of termination of Warranty Period.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.

1.2 REFERENCES

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
- .1 ANSI/ASHRAE/IESNA 90.1-, SI; Energy Standard for Buildings Except Low-Rise Residential Buildings.

.2 American Society for Testing and Materials International, (ASTM)
- .1 ASTM B209M-, Specification for Aluminum and Aluminum Alloy Sheet and Plate (Metric).
- .2 ASTM C335-, Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
- .3 ASTM C411-, Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
- .4 ASTM C449/C449M-, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
- .5 ASTM C547-, Specification for Mineral Fiber Pipe Insulation.
- .6 ASTM C553-, Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
- .7 ASTM C612-, Specification for Mineral Fiber Block and Board Thermal Insulation.
- .8 ASTM C795-, Specification for Thermal Insulation for Use with Austenitic Stainless Steel.
- .9 ASTM C921-, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

.3 Canadian General Standards Board (CGSB)
- .1 CGSB 51-GP-52Ma-, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.4 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (R1999).

.5 Underwriters Laboratories of Canada (ULC)
- .1 CAN/ULC-S102-, Surface Burning Characteristics of Building Materials and Assemblies.
- .2 CAN/ULC-S701-, Thermal Insulation Polyotrene, Boards and Pipe Covering.

1.3 DEFINITIONS

.1 For purposes of this section:
- .1 "CONCEALED" - means any work which is installed in suspended ceilings (accessible or non-accessible), attics and non-accessible chases and furred-in spaces.
- .2 "EXPOSED" - means any work which is not concealed in walls, shafts, or above accessible or non-accessible ceilings. Work behind doors, in closets, in cupboards, or under counters is considered exposed.
- .3 Insulation systems - insulation material, fasteners, jackets, and other accessories.

.2 TIAC Codes:
- .1 CRD: Commercial Round Ductwork,
- .2 CRF: Commercial Rectangular Finish,
- .3 CEF: Commercial Rigid Insulation External Application.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Division 01 - General Requirements.

.2 Submit for approval manufacturer's catalogue literature related to installation, fabrication for duct jointing recommendations.

1.5 MANUFACTURERS' INSTRUCTIONS

.1 Submit manufacturer's installation instructions in accordance with Division 01 - General Requirements.
.2 Installation instructions to include procedures used, and installation standards achieved.

1.6 QUALIFICATIONS

.1 Installer: specialist in performing work of this section, and have at least 3 years successful experience in this size and type of project, qualified to TIAC standards.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
.2 Protect from weather and construction traffic.
.3 Protect against damage from any source.
.4 Store at temperatures and conditions recommended by manufacturer.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Division 01 - General Requirements.
.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
.3 Collect and separate for disposal paper packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.
.4 Divert unused metal materials from landfill to metal recycling facility approved by Consultant.
.5 Divert unused adhesive material from landfill to official hazardous material collections site.
.6 Do not dispose of unused adhesive materials into sewer systems, into lakes, streams, onto ground or in other locations where it will pose health or environmental hazard.

2 Products

2.1 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC-S102:
  .1 Maximum flame spread rating: 25.
  .2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 Mineral fibre: as specified includes glass fibre, rock wool, slag wool.
.2 Thermal conductivity ("k" factor) not to exceed specified values at 24°C mean temperature when tested in accordance with ASTM C335.
.3 TIAC Code C-1: Rigid mineral fibre board to ASTM C612, with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this Section).
.4 TIAC Code C-2: Mineral fibre blanket to ASTM C553 faced with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this section).
  .1 Mineral fibre: to ASTM C553.
  .2 Jacket: to CGSB 51-GP-52Ma.
  .3 Maximum "k" factor: to ASTM C553.

2.3 JACKETS

.1 Canvas:
  .1 220 gm/m2 cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
.2 Lagging adhesive: Compatible with insulation.
.3 Self-adhesive weather barrier membranes shall be considered an alternate jacketing on all exterior ductwork, except high temperature ducts (i.e. grease exhaust ducts). Any exterior

ductwork with this alternate shall be installed with 0% leakage.
.1 Acceptable material: Bakor Foilskin.

2.4 ACCESSORIES

.1 Vapour retarder lap adhesive:
.1 Water based, fire retardant type, compatible with insulation.
.2 Indoor Vapour Retarder Finish:
.1 Vinyl emulsion type acrylic, compatible with insulation.
.3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C449.
.4 ULC Listed Canvas Jacket:
.1 220 gm/m2 cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
.5 Tape: self-adhesive, aluminum, reinforced, 75 mm wide minimum.
.6 Contact adhesive: quick-setting
.7 Canvas adhesive: washable.
.8 Tie wire: 1.5 mm stainless steel.
.9 Banding: 12 mm wide, 0.5 mm thick stainless steel.
.10 Facing: 25 mm galvanized steel hexagonal wire mesh stitched on one face of insulation.
.11 Fasteners: 4 mm diameter pins with 35 mm diameter clips, length to suit thickness of insulation.

3 Execution

3.1 PRE-INSTALLATION REQUIREMENTS

.1 Pressure testing of ductwork systems complete, witnessed and certified.
.2 Surfaces clean, dry, free from foreign material.

3.2 INSTALLATION

.1 Install in accordance with TIAC National Standards.
.2 Apply materials in accordance with manufacturers instructions and as indicated.
.3 Use two layers with staggered joints when required nominal thickness exceeds 75 mm.
.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
.1 Hangers, supports to be outside vapour retarder jacket.
.5 Supports, Hangers in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
.1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.
.6 Fasteners: At 300 mm oc in horizontal and vertical directions, minimum two rows each side.

3.3 DUCTWORK INSULATION SCHEDULE

.1 Insulation types and thickness: Conform to following Table:

	TIAC Code	Vapour Retarder	Thickness (mm)
Rectangular cold and dual temperature supply air ducts (exposed)	C-1	yes	50
Rectangular cold and dual temperature supply air ducts (concealed)	C-2	yes	50
Outside air ducts	C-1	yes	50
Exhaust duct between dampers and louvers	C-1	no	50

.2 Finishes: Conform to following table:

	TIAC Code Rectangular
Indoor, concealed	None
Indoor, exposed within mechanical room	CRF/1

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 22 11 18 - Domestic Water Piping Copper & PEX.
.2 Section 22 42 01 - Plumbing Specialties and Accessories.
.3 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
.4 Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.
.5 Section 23 23 00 - Copper Tubing and Fittings Refrigerant.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
  .1 ASTM E202-04, Standard Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.

1.3 CLEANING AND START-UP OF MECHANICAL PIPING SYSTEMS

.1 In accordance with Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

1.4 POTABLE WATER SYSTEMS

.1 When cleaning is completed and system filled:
  .1 Verify performance of equipment and systems as specified elsewhere in Division 23.
  .2 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut of water immediately. If water hammer occurs, replace water hammer arrestor or recharge air chambers. Repeat for each outlet and flush valve.
  .3 Confirm water quality consistent with supply standards, verifying that no residuals remain resulting from flushing and/or cleaning.

1.5 SANITARY AND STORM DRAINAGE SYSTEMS

.1 Buried systems: perform tests prior to back-filling. Perform hydraulic tests to verify grades and freedom from obstructions.
.2 Ensure that traps are fully and permanently primed.
.3 Ensure that fixtures are properly anchored, connected to system.
.4 Operate flush valves, tank and operate each fixture to verify drainage and no leakage.
.5 Cleanouts: refer to Section 22 42 01 - Plumbing Specialties And Accessories
.6 Roof drains:
  .1 Refer to Section 22 42 01 - Plumbing Specialties And Accessories
  .2 Remove caps as required.

1.6 REPORTS

.1 In accordance with Division 01 - General Requirements: Reports, supplemented as specified herein.

1.7 TRAINING

.1 In accordance with Division 01 - General Requirements, supplemented as specified herein.

END OF SECTION

This page intentionally left blank

1 General

1.1 REFERENCES

.1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).

1.2 SUBMITTALS

.1 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Division 01 - General Requirements. Include product characteristics, performance criteria, and limitations.
    .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Division 01 - General Requirements.

.2 Quality assurance submittals: submit following in accordance with Division 01 - General Requirements.
  .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  .2 Instructions: submit manufacturer's installation instructions.

1.3 QUALITY ASSURANCE

.1 Health and Safety Requirements: do construction occupational health and safety in accordance with Division 01 - General Requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:
  .1 Deliver, store and handle in accordance with Division 01 - General Requirements.
  .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:
  .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse in accordance with Division 01 - General Requirements.

2 Products

2.1 THERMOSTAT (LINE VOLTAGE, HEATING) PIPE STRAP MOUNTING, FOR DWH RECIRC PUMP CONTROL

.1 Line voltage wall mounted electric heating thermostat with:
  .1 Full load rating: 22 A at 120 V.
  .2 Temperature setting range: 40 degrees C to 60 degrees C.
  .3 Single pole.
  .4 Scale markings: 5C increments.
  .5 Complete with strap pipe clamp type attachment, and sensor for pipe temperature detection.

2.2 LOW-VOLTAGE HEAT PUMP THERMOSTAT, PROGRAMMABLE

.1 Unit compatible with ducted heat pumps, complete with contacts for: fan, 2 stages of heat, 1 stage of cooling.
.2 Equipped with integrated battery backup.
.3 Programmable with 5-1-1 (weekday, Saturday, Sunday) functions, and multi-period control (day, night, away).
.4 Adjustable heating and cooling setpoints, with adjustable deadband.
.5 Adjustable temperature offset for engaging second stage heating.

.6 Supplied with vented lockable wall cover.

2.3 LOW-VOLTAGE THERMOSTAT FOR VESTIBULES:

.1 Manual low-voltage thermostat, with optional range-stop accessory.
.2 Heating contacts only.
.3 Supplied with vented lockable wall cover.
.4 Standard of Acceptance: Honeywell T87K.

2.4 ERV TIMER CONTROL

.1 Digital time of day scheduler, 24/7 adjustable On/Off.
.2 Integral battery backup.
.3 Low voltage device.
.4 Standard of acceptance: Fantech FTD7.

2.5 LINE VOLTAGE THERMOSTAT

.1 Manual wall thermostat with dial.
.2 Adjustable range from 10-30 °C.
.3 Heating control only, 22A rated contacts, 120-277V.
.4 White Moulded plastic casing.
.5 Standard of acceptance: Stelpro SWT.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install control devices.
.2 On outside wall, mount thermostats on bracket or insulated pad 25 mm from exterior wall.
.3 Install remote sensing device and capillary tube in metallic conduit. Conduit enclosing capillary tube must not touch heater or heating cable.

3.3 CLEANING

.1 Proceed in accordance with Division 01 - General Requirements.
.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Related Sections:
  .1 Section 23 05 01 - Installation of Pipework.

1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME)
  .1 ASME B16.22, Wrought Copper and Copper Alloy Solder - Joint Pressure Fittings.
  .2 ASME B16.24, Cast Copper Pipe Flanges and Flanged Fittings: Class 150, 300, 400, 600, 900, 1500 and 2500.
  .3 ASME B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.
  .4 ASME B31.5, Refrigeration Piping and Heat Transfer Components.
.2 American Society for Testing and Materials International (ASTM)
  .1 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  .2 ASTM B280, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
.3 Canadian Standards Association (CSA International)
  .1 CSA B52, Mechanical Refrigeration Code.
.4 Environment Canada (EC)
  .1 EPS 1/RA/1, Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.
.5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).
.6 Province of Prince Edward Island boiler and pressure vessel act and regulation.

1.3 SUBMITTALS

.1 Submittals in accordance with Division 01 - General Requirements.
.2 Product Data:
.3 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.5 Instructions: submit manufacturer's installation instructions.
.6 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Division 01 - General Requirements.

1.4 QUALITY ASSURANCE

.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 the schedule.
    .1 Verify project requirements.
    .2 Review installation and substrate conditions.
    .3 Co-ordination with other building subtrades.
    .4 Review manufacturer's installation instructions and warranty requirements.
.2 Health and Safety:
  .1 Do construction occupational health and safety in accordance with Division 01 - General Requirements.
.3 All work to be performed by certified refrigeration journey person.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:
- .1 Separate waste materials for reuse in accordance with Division 01 - General Requirements.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan (WMP).
- .4 Separate for reuse and place in designated containers Steel waste in accordance with Waste Management Plan (WMP).
- .5 Divert unused metal materials from landfill to metal recycling facility.

2 Products

2.1 TUBING

.1 Processed for refrigeration installations, deoxidized, dehydrated and sealed.
- .1 Hard copper: to ASTM B88, type K or type L, ASTM B280, type ACR. B (nitrogenized).
- .2 Annealed copper: to ASTM B280, with minimum wall thickness as per CSA B52 and ASME B31.5.

2.2 FITTINGS

.1 Service: design pressure 2070 kPa and temperature 121 degrees C.

.2 Brazed:
- .1 Fittings: wrought copper to ASME B16.22.
- .2 Joints: silver solder, 15% Ag-80% Cu-5%P and non-corrosive flux for copper to steel or brass; silfoss-15 for copper to copper.

.3 Flared:
- .1 Bronze or brass, for refrigeration, to ASME B16.26.

2.3 PIPE SLEEVES

.1 Hard copper or steel, sized to provide 6 mm clearance around between sleeve and uninsulated pipe or between sleeve and insulation.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 GENERAL

.1 Install in accordance with CSA B52, EPS1/RA/1 and ASME B31.5 Section 23 05 01 - Installation of Pipework.

.2 Suction Lines NPS 1-1/2 (DN 40) and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.

.3 Hot-Gas and Liquid Lines: Copper, Type ACR or L (B), annealed or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

3.3 BRAZING PROCEDURES

.1 Bleed inert gas into pipe during brazing.

.2 Remove valve internal parts, solenoid valve coils, sight glass.

.3 Do not apply heat near expansion valve and bulb.

3.4 PIPING INSTALLATION

.1 General:

- .1 Soft annealed copper tubing: bend without crimping or constriction. Hard drawn copper tubing: do not bend. Minimize use of fittings.
- .2 Install refrigerant piping according to ASHRAE 15.
- .3 Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- .4 Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- .5 Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- .6 Install piping adjacent to machines to allow service and maintenance.
- .7 Install piping free of sags and bends.
- .8 Install fittings for changes in direction and branch connections.
- .9 Select system components with pressure equal to or greater than system operating pressure.
- .10 Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- .11 Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as required.
- .12 Install refrigerant piping in protective conduit where installed belowground.
- .13 Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.
- .14 Slope Refrigerant piping as follows:
  - .1 Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
  - .2 Install horizontal suction lines with a uniform slope downward to compressor.
  - .3 Install traps and double risers to entrain oil in vertical runs.
  - .4 Liquid lines may be installed level.
- .15 When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.
- .16 Before installation of steel refrigerant piping, clean pipe and fittings using the following procedures:
  - .1 Shot blast the interior of piping.
  - .2 Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through tubing by means of wire or electrician's tape.
  - .3 Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
  - .4 Draw a clean, lintless cloth, saturated with compressor oil, squeeze dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
  - .5 Finally, draw a clean, dry, lintless cloth through the tube or pipe.
  - .6 Safety-relief-valve discharge piping is not required to be cleaned but is required to be open to allow unrestricted flow.
- .17 Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
- .18 Identify refrigerant piping and valves.
- .19 Install sleeves for piping penetrations of walls, ceilings, and floors.
- .20 Install sleeve seals for piping penetrations of concrete walls and slabs.
- .21 Install escutcheons for piping penetrations of walls, ceilings, and floors.

.2 Hot gas lines:

.1 Pitch at least 1:240 down in direction of flow to prevent oil return to compressor during operation.
.2 Provide trap at base of risers greater than 2400 mm high and at each 7600 mm thereafter.
.3 Provide inverted deep trap at top of risers.
.4 Provide double risers for compressors having capacity modulation.
.1 Large riser: install traps as specified.
.2 Small riser: size for 5.1 m/s at minimum load. Connect upstream of traps on large riser.

3.5 PRESSURE AND LEAK TESTING

.1 Close valves on factory charged equipment and other equipment not designed for test pressures.
.2 Leak test to CSA B52 before evacuation to 2MPa and 1MPa on high and low sides respectively.
.3 Test Procedure: build pressure up to 35 kPa with refrigerant gas on high and low sides. Supplement with nitrogen to required test pressure. Test for leaks with electronic or halide detector. Repair leaks and repeat tests.

3.6 FIELD QUALITY CONTROL

.1 Site Tests/Inspection:
.1 Close service valves on factory charged equipment.
.2 Ambient temperatures to be at least 13 degrees C for at least 12 hours before and during dehydration.
.3 Use copper lines of largest practical size to reduce evacuation time.
.4 Use two-stage vacuum pump with gas ballast on 2nd stage capable of pulling 5Pa absolute and filled with dehydrated oil.
.5 Measure system pressure with vacuum gauge. Take readings with valve between vacuum pump and system closed.
.6 Triple evacuate system components containing gases other than correct refrigerant or having lost holding charge as follows:
.1 Twice to 14 Pa absolute and hold for 4 h.
.2 Break vacuum with refrigerant to 14 kPa.
.3 Final to 5 Pa absolute and hold for at least 12 h.
.4 Isolate pump from system, record vacuum and time readings until stabilization of vacuum.
.5 Submit test results to Consultant.
.7 Charging:
.1 Charge system through filter-drier and charging valve on high side. Low side charging not permitted.
.2 With compressors off, charge only amount necessary for proper operation of system. If system pressures equalize before system is fully charged, close charging valve and start up. With unit operating, add remainder of charge to system.
.3 Re-purge charging line if refrigerant container is changed during charging process.
.8 Checks:
.1 Make checks and measurements as per manufacturer's operation and maintenance instructions.
.2 Record and report measurements to Consultant.
.9 Manufacturer's Field Services:
.1 Have manufacturer of products, supplied under this Section, review work involved in the handling, installation/application, protection and cleaning, of its products and submit written reports, in acceptable format, to verify compliance of work with Contract.
.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 at stages listed:
  .1 After delivery and storage of products, and when preparatory work, or other work, on which the work of this section depends, is complete but before installation begins.
  .2 Twice during progress of work at 25% and 60% complete.
  .3 Upon completion of the work, after cleaning is carried out.

.4 Obtain reports, within three (3) working days of review, and submit, immediately to Owner's Representative.

3.7 DEMONSTRATION

.1 Instructions:
  .1 Post instructions in frame with glass cover in accordance with Division 01 - General Requirements and CSA B52.

3.8 CLEANING

.1 Perform cleaning operations as specified in Division 01 - General Requirements and in accordance with manufacturer's recommendations.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.9 ADJUSTING

.1 Adjust thermostatic expansion valve to obtain proper evaporator superheat.

.2 Adjust high and low pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

.3 Adjust set-point temperature of air conditioning or chilled water controllers to the system design temperature.

.4 Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:
  .1 Open shutoff valves in condenser water circuit.
  .2 Verify that compressor oil level is correct.
  .3 Open compressor suction and discharge valves.
  .4 Open refrigerant valves except bypass valves that are used for other purposes.
  .5 Check open compressor motor alignment and verify lubrication for motors and bearings.

.5 Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED SECTIONS

.1 Section 07 84 00 - Firestopping.
.2 Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.

1.2 REFERENCES

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).
.2 American Society for Testing and Materials International, (ASTM).
  .1 ASTM A480/A480M, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
  .2 ASTM A635/A635M, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot Rolled.
  .3 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  .1 Material Safety Data Sheets (MSDS).
.4 National Fire Protection Association (NFPA).
  .1 NFPA 90A, Standard for the installation of Air-Conditioning and Ventilation Systems.
  .2 NFPA 90B, Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.
  .3 NFPA 96, Standard for ventilation control and fire protection of commercial cooling operations.
.5 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
  .1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, 2nd Edition and Addendum No. 1.
  .2 SMACNA HVAC Air Duct Leakage Test Manual, 1st Edition.
  .3 IAQ Guideline for Occupied Buildings Under Construction, 1st Edition.

1.3 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.
.2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets for the following:
  .1 Sealants.
  .2 Tape
  .3 Proprietary Joints.

1.4 QUALITY ASSURANCE

.1 Certification of Ratings:
  .1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.
.2 Health and Safety:
  .1 Do construction occupational health and safety in accordance with Division 01 - General Requirements.
.3 Indoor Air Quality (IAQ) Management Plan.
  .1 Develop and implement an Indoor Air Quality (IAQ) Management Plan for construction and preoccupancy phases of building.
  .2 During construction meet or exceed the requirements of SMACNA IAQ Guideline for Occupied Buildings under Construction.
.4 Installers to be certified journey person level in sheet metal works.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Protect on site stored or installed absorptive material from moisture damage.
.2 Waste Management and Disposal:
  .1 Separate waste materials for reuse in accordance with Division 01 - General Requirements.
  .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
  .3 Collect and separate for disposal paper packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
  .4 Separate for reuse and place in designated containers Steel waste in accordance with Waste Management Plan.
  .5 Place materials defined as hazardous or toxic in designated containers.
  .6 Handle and dispose of hazardous materials in accordance with Provincial regulations.
  .7 Fold up metal banding, flatten and place in designated area for recycling.

2 Products

2.1 SEAL CLASSIFICATION

.1 Classification as follows:

MAX Pressure Pa	SMACNA Seal Class
1000	A
750	B
500	C
250	C
125	C

.2 Seal classification:
  .1 Class A: longitudinal seams, transverse joints, duct wall penetrations, and connections made air tight with sealant and tape.
  .2 Class B: Longitudinal seam transverse joints, and connections made air tight with sealant, type or combination thereof.
  .3 Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.

2.2 SEALANT

.1 Sealant: oil resistant, polymer type flame resistant duct sealant. Temperature range of minus 30 degrees C to plus 93 degrees C.

2.3 TAPE

.1 Tape: polyvinyl treated, open weave fiberglass tape, 50 mm wide.

2.4 DUCT LEAKAGE

.1 In accordance with SMACNA HVAC Air Duct Leakage Test Manual.

2.5 FITTINGS

.1 Fabrication: to SMACNA.
.2 Radiused elbows.
  .1 Rectangular: centreline radius: 1.5 times width of duct.
  .2 Round: smooth radius or five piece. Centreline radius: 1.5 times diameter.
.3 Mitred elbows, rectangular:
  .1 To 400 mm: with single thickness turning vanes.
  .2 Over 400 mm: with double thickness turning vanes.
.4 Branches:

.1 Rectangular main and branch: with radius on branch 1.5 times width of duct or 45 degree entry on branch.
.2 Round main and branch: enter main duct at 45 degrees with conical connection.
.3 Provide volume control damper in branch duct near connection to main duct.
.4 Main duct branches: with splitter damper.

.5 Transitions:
.1 Diverging: 20 degrees maximum included angle.
.2 Converging: 30 degrees maximum included angle.

.6 Offsets:
.1 Full radiused elbows.

.7 Obstruction deflectors: maintain full cross-sectional area.
.1 Maximum included angles: as for transitions.

2.6 FIRE STOPPING

.1 Retaining angles around duct, on both sides of fire separation in accordance with Section 07 84 00 - Firestopping.
.2 Fire stopping material and installation must not distort duct.

2.7 GALVANIZED STEEL

.1 Lock forming quality: to ASTM A653/A653M, Z90 zinc coating.
.2 Thickness, fabrication and reinforcement: to SMACNA.
.3 Joints: to SMACNA or proprietary manufactured duct joint. Proprietary manufactured flanged duct joint to be considered to be a class A seal.

2.8 HANGERS AND SUPPORTS

.1 Hangers and Supports: in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
.1 Strap hangers: of same material as duct but next sheet metal thickness heavier than duct.
.1 Maximum size duct supported by strap hanger: 500.
.2 Hanger configuration: to ASHRAE.
.3 Hangers: black steel angle with black steel rods to ASHRAE:

Duct Size (mm)	Angle Size (mm)	Rod Size (mm)
up to 750	25 x 25 x 3	6
751 to 1050	40 x 40 x 3	6
1051 to 1500	40 x 40 x 3	10
1501 to 2100	50 x 50 x 3	10
2101 to 2400	50 x 50 x 5	10
2410 and over	50 x 50 x 6	10

.4 Upper hanger attachments:
.1 For concrete: manufactured concrete inserts.
.2 For steel joist: manufactured joist clamp.
.3 For steel beams: manufactured beam clamps.
.4 Acceptable material: Myatt, Grinnel, Hunt.

3 Execution

3.1 GENERAL

.1 Do work in accordance with, NFPA 90A & 90B, ASHRAE and SMACNA.
.2 Do not break continuity of insulation vapour barrier with hangers or rods.
.1 Insulate strap hangers 100 mm beyond insulated duct.
.3 Support risers in accordance with SMACNA.

.4 Install breakaway joints in ductwork on sides of fire separation.
.5 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.
.6 Manufacture duct in lengths and diameter to accommodate installation of acoustic duct lining.

3.2 HANGERS

.1 Strap hangers: install in accordance with SMACNA.
.2 Angle hangers: complete with locking nuts and washers.
.3 Hanger spacing: in accordance with SMACNA

Duct Size (mm)	Spacing (mm)
to 1500	3000
1501 and over	2500

3.3 SEALING AND TAPING

.1 Apply sealant to outside of joint to manufacturer's recommendations.

3.4 LEAKAGE TESTS AND COMMISSIONING

.1 Refer to Section 23 05 94 - Pressure testing of ducted air systems.
.2 In accordance with SMACNA HVAC Duct Leakage Test Manual.
.3 Do leakage test in sections.
.4 Make trial leakage tests as instructed to demonstrate workmanship.
.5 Install no additional ductwork until trial test has been passed.
.6 Test section minimum of 30 m long with not less than three branch takeoffs and two 90 degree elbows.
.7 Complete test before insulation or concealment.

END OF SECTION

1 General

1.1 REFERENCES

.1 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  .1 Material Safety Data Sheets (MSDS).
.2 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
  .1 SMACNA - HVAC Duct Construction Standards - Metal and Flexible, 95.

1.2 SUBMITTALS

.1 Submittals in accordance with Division 01 - General Requirements.
.2 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and data sheet. Indicate the following:
    .1 Flexible connections.
    .2 Duct access doors.
    .3 Turning vanes.
    .4 Instrument test ports.
  .2 Submit WHMIS MSDS material safety data sheets. Indicate VOC's for adhesive and solvents during application and curing.
.3 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
  .1 Certification of ratings: catalogue or published ratings to be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.
.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.5 Instructions: submit manufacturer's installation instructions.
.6 Manufacturer's Field Reports: manufacturer's field reports specified.
.7 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Division 01 - General Requirements.

2 Products

2.1 GENERAL

.1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

2.2 FLEXIBLE CONNECTIONS

.1 Materials: Flame-retardant or noncombustible fabrics.
.2 Coatings and Adhesives: Comply with UL 181, Class 1.
.3 Metal-Edge Connectors: Factory fabricated with a fabric strip 3-1/2 inches (89 mm) wide attached to 2 strips of 2-3/4 inch (70 mm) wide, 0.028 inch (0.7 mm) thick, galvanized sheet steel or 0.032 inch (0.8 mm) thick aluminum sheets. Provide metal compatible with connected ducts.
.4 Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
  .1 Minimum Weight: 26 oz / sq. yd. (880 g/sq. m).
  .2 Tensile Strength: 480 lbf/inch (84 N/mm) in the wrap and 360 lbf/inch (63 N/mm) in the filling.
  .3 Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).
.5 Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.

.1 Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
.2 Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
.3 Minimum Additional Travel: 50 percent of the required deflection at rated load.
.4 Lateral Stiffness: More than 80 percent of rated vertical stiffness.
.5 Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
.6 Elastomeric Element: Molded, oil-resistant rubber or neoprene.
.7 Coil Spring: Factory set and field adjustable for a maximum of 1/4 inch (6 mm) movement at start and stop.

2.3 ACCESS DOORS IN DUCTS

.1 Non-Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame.
.2 Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.
.3 Gaskets: neoprene.
.4 Hardware:
    .1 Hold open devices.
    .2 300 x 300 glass viewing panels.
    .3 Up to 300 x 300 mm: two sash locks complete with safety chain.
    .4 301 to 450 mm: four sash locks complete with safety chain.
    .5 451 to 1000 mm: piano hinge and minimum two sash locks.
    .6 Doors over 1000 mm: piano hinge and two handles operable from both sides.
        .1 Hold open devices.
        .2 300 x 300 mm glass viewing panels.

2.4 TURNING VANES

.1 Factory or shop fabricated single thickness, to recommendations of SMACNA and as indicated.

2.5 INSTRUMENT TEST

.1 1.6 mm thick steel zinc plated after manufacture.
.2 Cam lock handles with neoprene expansion plug and handle chain.
.3 28 mm minimum inside diameter. Length to suit insulation thickness.
.4 Neoprene mounting gasket.

2.6 SPIN-IN COLLARS

.1 Conical galvanized sheet metal spin-in collars with lockable butterfly damper.
.2 Sheet metal thickness to co-responding round duct standards.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 INSTALLATION

.1 Flexible Connections:
    .1 Install in following locations:
        .1 Inlets and outlets to supply air units and fans.

.2 Inlets and outlets of exhaust and return air fans.
.3 As indicated.

.2 Length of connection: 100 mm.
.3 Minimum distance between metal parts when system in operation: 75 mm.
.4 Install in accordance with recommendations of SMACNA.
.5 When fan is running:
.1 Ducting on sides of flexible connection to be in alignment.
.2 Ensure slack material in flexible connection.

.2 Access Doors and Viewing Panels:
.1 Size:
.1 600 x 600 mm for person size entry.
.2 450 x 450 mm for servicing entry.
.3 300 x 300 mm for viewing.
.4 As indicated.
.2 Locations:
.1 Fire dampers.
.2 Control dampers.
.3 Devices requiring maintenance.
.4 Required by code.
.5 Reheat coils.
.6 Elsewhere as indicated.

.3 Instrument Test Ports:
.1 General:
.1 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.
.2 Locate to permit easy manipulation of instruments.
.3 Install insulation port extensions as required.
.4 Locations:
.1 For traverse readings:
.1 Ducted inlets to roof and wall exhausters.
.2 Inlets and outlets of other fan systems.
.3 Main and sub-main ducts.
.4 And as indicated.
.2 For temperature readings:
.1 At outside air intakes.
.2 In mixed air applications in locations as approved by Consultant.
.3 At inlet and outlet of coils.
.4 Downstream of junctions of two converging air streams of different temperatures.
.5 And as indicated.

.4 Turning vanes:
.1 Install in accordance with recommendations of SMACNA and as indicated.

3.3 CLEANING

.1 Perform cleaning operations as specified in Division 01 - General Requirements and in accordance with manufacturer's recommendations.
.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

This page intentionally left blank

1 General

1.1 REFERENCES

.1 Sheet Metal and Air Conditioning National Association (SMACNA)
  .1 SMACNA HVAC Duct Construction Standards, Metal and Flexible.
.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).

1.2 SUBMITTALS

.1 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Division 01 - General Requirements. Include product characteristics, performance criteria, and limitations.
.2 Quality assurance submittals: submit following in accordance with Division 01 - General Requirements.
  .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  .2 Instructions: submit manufacturer's installation instructions.
    .1 Consultant will make available 1 copy of systems supplier's installation instructions.

2 Products

2.1 GENERAL

.1 Manufacture to SMACNA standards.

2.2 SPLITTER DAMPERS

.1 Fabricate from same material as duct but one sheet metal thickness heavier, with appropriate stiffening.
.2 Single thickness construction.
.3 Control rod with locking device and position indicator.
.4 Rod configuration to prevent end from entering duct.
.5 Pivot: piano hinge.
.6 Folded leading edge.

2.3 SINGLE BLADE DAMPERS

.1 Fabricate from same material as duct, but one sheet metal thickness heavier. V-groove stiffened.
.2 Size and configuration to recommendations of SMACNA, except maximum height 100 mm.
.3 Locking quadrant with shaft extension to accommodate insulation thickness.
.4 Inside and outside nylon end bearings.
.5 Channel frame of same material as adjacent duct, complete with angle stop.

2.4 MULTI-BLADED DAMPERS

.1 Factory manufactured of material compatible with duct.
.2 Opposed blade: configuration, metal thickness and construction to recommendations of SMACNA.
  .1 Frame: minimum 16 Ga galvanized steel hat channel with mitered and welded corners. Provide 0.10 in thick aluminum hot channel frame for manual volume dampers installed in aluminum ductwork.
.3 Blades: Roll formed, 18 Ga galvanized steel, 4 inch maximum blade width. Provide roll-formed, 0.10 inch thick aluminum blade for manual volume dampers installed in aluminum ductwork, maximum 4 inch blade width.

.4 Blade Axles:
  .1 1/2" diameter square or hex plated steel.
  .2 1/2" diameter square or hex type 316 stainless steel axles for manual volume dampers installed in aluminum ductwork.
.5 Control Rod:
  .1 1/2" diameter plated steel or 3/8" square plated steel. Control rod located out of the airstream.
  .2 1/2" diameter or 3/8" square type 316 stainless steel control rod for manual volume dampers installed in aluminum ductwork. Control rod located out of the airstream.
.6 Bearings: Nylon, molded synthetic, or self-lubricating porous bronze.
.7 Finish: Mill.
.8 Performance: Designed for maximum pressure differential of 2" s.p. for 48", maximum temperature of 150 deg F, and maximum system velocity of 2,000 feet per minute.
.9 Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32 inch (2.4 mm) thick zinc-plated steel, and a 3/4 inch (19 mm) hexagon locking nut. Include center hole to suit damper operating rod size. Include elevated platform for insulated duct mounting.
.10 Jackshaft: 1 inch (25 mm) diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multi-damper assemblies.
  .1 Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.
.11 Acceptable material: Ruskin MD-35/OB, Greenneck, MBD-15, Ventex, TAMCO, EH Price CLD-GV5-3V-MBD.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install where indicated.
.2 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.
.3 Locate balancing dampers in each branch duct, for supply, return and exhaust systems.
.4 Runouts to registers and diffusers: install single blade damper located as close as possible to main ducts.
.5 Dampers: vibration free.
.6 Ensure damper operators are observable and accessible.

END OF SECTION

1 General

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
  .1 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).

1.2 SUBMITTALS

.1 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Division 01 - General Requirements. Include product characteristics, performance criteria, and limitations.
  .2 Indicate the following:
    .1 Performance data.
.2 Quality assurance submittals: submit following in accordance with Division 01 - General Requirements.
  .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  .2 Instructions: submit manufacturer's installation instructions.
    .1 Consultant will make available 1 copy of systems supplier's installation instructions.
.3 Closeout Submittals
  .1 Provide maintenance data for incorporation into manual specified in Division 01 - General Requirements.

2 Products

2.1 MULTI-LEAF DAMPERS

.1 Opposed blade or parallel blade type as indicated.
.2 Control Dampers:
  .1 Construction: blades, 152mm wide, 1219mm long, maximum. Modular maximum size, 1219mm wide x 2438mm high. Multiple sections to have stiffening mullions and jack shafts.
  .2 Materials`:
    .1 Frame: 2.3mm minimum thickness galvanized steel or extruded aluminum.
    .2 Blades: structurally formed galvanized steel with two (2) sheets 0.5mm thick or extruded aluminum, otherwise reinforced to ensure specified low leakage when fully closed.
    .3 Bearings: oil impregnated sintered bronze. Provide thrust bearings for vertical blades.
    .4 Linkage and shafts: zinc plated steel.
    .5 Seals: replaceable neoprene or stainless steel spring on sides, top, bottom of frame, along all blade edges and blade ends.
  .3 Performance:
    .1 Capacity: refer to specifications.
    .2 Leakage: in closed position, less than 2% of rated air flow at 250 Pa, differential across the damper.
    .3 Pressure drop: at full open position less than 20 Pa differential across the damper at 7.62 m/s.
    .4 Temperature range: -50°C to +100°C.
    .5 Arrangements: damper mixing warm and cold air to be parallel blade, mounted at right angles to each other, with blades opening to mix air stream.

.3 Insulated aluminum dampers:
  .1 Frames: insulated with extruded polystyrene foam with RSI 0.88.
  .2 Blades: constructed from aluminum extrusions with internal hollows insulated with polyurethane or polystyrene foam, RSI 0.88.
.4 Acceptable material: Tamco, Ventex, EH Price, Green Tech or equal.

2.2 DISC TYPE DAMPERS

.1 Frame: insulated brake formed, welded, 1.6 mm thick, galvanized steel to ASTM A653/A653M.
.2 Disc: insulated spin formed, 1.6 mm thick, galvanized steel to ASTM A653/A653M.
.3 Gasket: extruded neoprene, field replaceable, with 10 year warranty.
.4 Bearings: roller self lubricated and sealed.
.5 Operator: compatible with damper, linear stroke operator, spring loaded actuator, zinc-aluminum foundry alloy casting cam follower.
.6 Performance:
  .1 Leakage: in closed position less than 0.1 % of rated air flow at 500 kPa pressure differential across damper.
  .2 Pressure drop: at full open position less than 25 kPa differential across damper at 10 m/s.

2.3 BACK DRAFT DAMPERS

.1 Suitable for horizontal or vertical mounting.
.2 Maximum Air Velocity: 1500 fpm (8 m/s).
.3 Maximum System Pressure: 2 inch wg (0.5 kPa).
.4 Frame of barometric relief damper shall match the mating duct system or equipment as follows: 0.064 inch (1.6 mm) thick, galvanized sheet steel or 0.063 inch (1.6 mm) thick extruded aluminums, with welded corners and mounting flange.
.5 Blades:
  .1 Multiple, 0.050 inch (1.2 mm) thick aluminum sheet.
  .2 Maximum Width: 6 inches (150 mm)l
  .3 Action: Parallel.
  .4 Balance: Gravity.
  .5 Eccentrically pivoted.
.6 Blade Seals: Neoprene.
.7 Blade Axles: Galvanized steel.
.8 Tie Bars and Brackets
  .1 Material: Aluminum
  .2 Rattle free with 90 degree stop.
.9 Return Spring: Adjustable tension.
.10 Bearings: Synthetic.
.11 Accessories:
  .1 Flange on intake.
  .2 Adjustment device to permit setting for vary differential static pressures.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install where indicated.
.2 Install in accordance with recommendations of SMACNA and manufacturer's instructions.
.3 Seal multiple damper modules with silicon sealant.
.4 Install access door adjacent to each damper. See Section 23 33 00 - Air Duct Accessories.

.5 Ensure dampers are observable and accessible.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED SECTIONS

.1 Section 23 31 13 - Metal Ducts Low Pressure.

1.2 REFERENCES

.1 American National Standards Institute/National Fire Protection Association (ANSI/NFPA)
  .1 ANSI/NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems.
.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  .1 Material Safety Data Sheets (MSDS).
.3 Underwriters Laboratories of Canada (ULC)
  .1 CAN4-S112, Fire Test of Fire Damper Assemblies.
  .2 CAN4-S112.2, Standard Method of Fire Test of Ceiling Firestop Flap Assemblies.
  .3 ULC-S505, Fusible Links for Fire Protection Service.

1.3 SUBMITTALS

.1 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Division 01 - General Requirements. Include product characteristics, performance criteria, and limitations.
  .2 Indicate the following:
    .1 Fire dampers.
    .2 Smoke dampers.
    .3 Fire stop flaps.
    .4 Operators.
    .5 Fusible links.
    .6 Design details of break-away joints.
.2 Quality assurance submittals: submit following in accordance with Division 01 - General Requirements.
  .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  .2 Instructions: submit manufacturer's installation instructions.
.3 Closeout Submittals:
  .1 Provide maintenance data for incorporation into manual specified in Division 01 - General Requirements.

1.4 MAINTENANCE

.1 Extra Materials:
  .1 Provide maintenance materials in accordance with Division 01 - General Requirements.
.2 Provide following:
  .1 2 fusible links of each type.

2 Products

2.1 FIRE DAMPERS

.1 Fire dampers: arrangement Type B or C, blades out of Air Stream, listed and bear the label of UL/ULC, meet requirements of ANSI/NFPA 90A and provincial fire authority. Fire damper assemblies fire tested in accordance with CAN4-S112. Type A dampers will not be accepted.
.2 Mild steel, factory fabricated for fire rating requirement to maintain integrity of fire wall and/or fire separation.
  .1 Fire dampers: 1-1/2 hour fire rated unless otherwise indicated.

.2 Fire dampers: automatic operating type and have dynamic rating suitable for maximum air velocity and pressure differential to which it will be subjected.

.3 Top hinged: offset single damper, round or square; multi-blade hinged, interlocking type; roll door type or guillotine type; sized to maintain full duct cross section.

.4 Fusible link actuated, weighted to close and lock in closed position when released or having negator-spring-closing operator for multi-leaf type or roll door type in horizontal position with vertical air flow.

.5 40 x 40 x 3 mm retaining angle iron frame, on full perimeter of fire damper, on both sides of fire separation being pierced.

.6 Equip fire dampers with steel sleeve or frame installed disruption ductwork or impair damper operation.

.7 Equip sleeves or frames with perimeter mounting angles attached on both sides of wall or floor opening. Construct ductwork in fire-rated floor-ceiling or roof-ceiling assembly systems with air ducts that pierce ceiling to conform with ULC.

.8 Design and construct dampers to not reduce duct or air transfer opening cross-sectional area.

.9 Dampers shall be installed so that the centerline of the damper depth or thickness is located in the centerline of the wall, partition of floor slab depth or thickness.

.10 Unless otherwise indicated, the installation details given in SMACNA fire, smoke and radiation damper installation guide for HVAC and in manufacturer's instructions for fire dampers shall be followed.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install in accordance with ANSI/NFPA 90A and in accordance with conditions of ULC listing.

.2 Maintain integrity of fire separation.

.3 After completion and prior to concealment obtain approvals of complete installation from authority having jurisdiction.

.4 Install access door adjacent to each damper. See Section 23 33 00 - Air Duct Accessories.

.5 Co-ordinate with installer of firestopping.

.6 Ensure access doors/panels, fusible links, damper operators are easily observed and accessible.

.7 Install break-away joints of approved design on each side of fire separation.

END OF SECTION

1 General

1.1 REFERENCES

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).
.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  .1 Material Safety Data Sheets (MSDS).
.3 National Fire Protection Association (NFPA).
  .1 NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems.
  .2 NFPA 90B, Standard for Installation of Warm Air Heating and Air-Conditioning Systems.
.4 Sheet Metal and Air-Conditioning Contractors' National Association (SMACNA).
  .1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, (Addendum No.1, November 1997).
  .2 SMACNA IAQ Guideline for Occupied Buildings under Construction, 1st Edition.
.5 Underwriters' Laboratories Inc. (UL).
  .1 UL 181, Standard for Factory-Made Air Ducts and Air Connectors.
.6 Underwriters' Laboratories of Canada (ULC).
  .1 CAN/ULC-S110, Fire Tests for Air Ducts.

1.2 SUBMITTALS

.1 Make submittals in accordance with Division 01 - General Requirements.
.2 Product Data: submit for the following:
  .1 Thermal properties.
  .2 Friction loss.
  .3 Acoustical loss.
  .4 Leakage.
  .5 Fire rating.
.3 Samples: submit samples with product data of different types of flexible duct being used in accordance with Division 01 - General Requirements.

1.3 QUALITY ASSURANCE

.1 Certification of Ratings:
  .1 Catalogue or published ratings to be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.
.2 Health and Safety:
  .1 Do construction occupational health and safety in accordance with Division 01 - General Requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Protect on site stored or installed absorptive material from moisture damage.
.2 Waste Management and Disposal:
  .1 Separate waste materials for reuse in accordance with Division 01 - General Requirements.
  .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
  .3 Collect and separate for disposal paper packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
  .4 Place materials defined as hazardous or toxic in designated containers.
  .5 Handle and dispose of hazardous materials in accordance with Provincial regulations.
  .6 Ensure emptied containers are sealed and stored safely.
  .7 Fold up metal banding, flatten and place in designated area for recycling.

1.5 INDOOR AIR QUALITY (IAQ) MANAGEMENT PLAN

.1 During construction meet or exceed the requirements of SMACNA IAQ Guideline for Occupied Buildings under Construction.

2 Products

2.1 GENERAL

.1 Factory fabricated to CAN/ULC-S110.
.2 Pressure drop coefficients listed below are based on relative sheet metal duct pressure drop coefficient of 1.00.
.3 Flame spread rating not to exceed 25. Smoke developed rating not to exceed 50.

2.2 NON-METALLIC - INSULATED

.1 Type 4: non-collapsible, coated mineral base fabric or aluminum foil/mylar type mechanically bonded to, and helically supported by, external steel wire with factory applied, 37 mm thick flexible mineral fibre thermal insulation with vapour barrier and vinyl or reinforced mylar/neoprene laminate jacket, as indicated.
.2 Performance:
  .1 Factory tested to 2.5 kPa without leakage.
  .2 Maximum relative pressure drop coefficient: 3.
  .3 Thermal loss/gain: 1.3 W/m2 degrees C mean.

3 Execution

3.1 DUCT INSTALLATION

.1 Install in accordance with: CAN/ULC-S110, NFPA 90A & 90B and SMACNA.

END OF SECTION

1 General

1.1 SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Division 01 - General Requirements. Include product characteristics, performance criteria, and limitations.
  - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Division 01 - General Requirements.
  - .2 Indicate following:
    - .1 Capacity.
    - .2 Throw and terminal velocity.
    - .3 Noise criteria.
    - .4 Pressure drop.
    - .5 Neck velocity.

1.2 MAINTENANCE

.1 Extra Materials:
- .1 Provide maintenance materials in accordance with Division 01 - General Requirements.
- .2 Include:
  - .1 Keys for volume control adjustment.
  - .2 Keys for air flow pattern adjustment.

2 Products

2.1 GENERAL

.1 To meet capacity, pressure drop, terminal velocity, throw, noise level, neck velocity as indicated.

.2 Frames:
- .1 Full perimeter gaskets.
- .2 Plaster frames where set into plaster or gypsum board.
- .3 Concealed fasteners.

.3 Concealed manual volume control damper operators.

.4 Colour: standard.

.5 Acceptable Material: E.H. Price, Titus, Nailor, Tuttle & Bailey.

2.2 MANUFACTURED UNITS

.1 Grilles, registers and diffusers of same generic type, products of one manufacturer.

2.3 RETURN AND EXHAUST GRILLES AND REGISTERS (REFER TO SCHEDULE)

.1 General: See Schedule.

2.4 DIFFUSERS (REFER TO SCHEDULE)

.1 General: See Schedule.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install in accordance with manufacturers instructions.
.2 Install with flat head screws in countersunk holes where fastenings are visible.
.3 Bolt grilles, registers and diffusers, in place, in gymnasium and similar game rooms.
.4 Provide concealed safety chain on each grille, register and diffuser in gymnasium and similar game rooms and elsewhere as indicated.

END OF SECTION

1 General

1.1 SUMMARY

.1 Section Includes:
  .1 Materials, components and installation for heat reclaim devices.
.2 Related Sections:
  .1 Section 23 33 00 - Air Duct Accessories.
  .2 Section 23 33 15 - Dampers Operating.

1.2 REFERENCES

.1 American Bearing Manufacturer's Association (ABMA)
  .1 ANSI/ABMA 9 Load Ratings and Fatigue Life for Ball Bearings.
  .2 ANSI/ABMA 11 Load Ratings and Fatigue Life for Roller Bearings.
.2 Air Movement and Control Association (AMCA)
  .1 AMCA 210, Laboratory Method of Testing Fans for Aerodynamic Performance Rating (ASHRAE).
  .2 AMCA 300 Reverberant Room Method for Second Testing of Fans.
.3 American National Standards Institute / Air-Conditioning. Heating and Refrigeration Institute (ANSI/ASHRI).
  .1 ANSI/AHRI 430, Central Station Air Handling Units.
  .2 ANSI/AHRI 1060, Performance Rating of Air-to-Air Heat Exchangers Energy Recovery Ventilation Equipment.
.4 American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE).
  .1 ASHRAE 68, Laboratory Method of Testing to Determine the Sound Power in a Duct.
  .2 ASHRAE 84, Method of Testing Air-to-Air Exchangers.
.5 American Society for Testing and Materials (ASTM).
  .1 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
.6 Canadian General Standards Board (CGSB).
  .1 CAN/CGSB 1.181, Ready-Mixed Organic Zinc-Rich Coating.
.7 Canadian Standards Association (CSA)
  .1 CSA B52 Mechanical Refrigeration Code.
.8 National Electrical Manufacturer's Association (NEMA)
  .1 NEMA MG1 Motors and Generators
  .2 NEMA ICS 7-1 Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive System.
.9 Sheet Metal and Air-Conditioning Contractors' National Association (SMACNA).

1.3 SUBMITTALS

.1 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Division 01 - General Requirements. Include product characteristics, performance criteria, and limitations.
    .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Division 01 - General Requirements.
.2 Shop Drawings:
  .1 Submit shop drawings in accordance with Division 01 - General Requirements.
    .1 Shop drawings: submit drawings stamped and signed by Contractor as reviewed.
    .2 Indicate following: fan, fan curves showing points of operation, motor drive, bearings fillers.
.3 Quality assurance submittals: submit following in accordance with Division 01 - General Requirements.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.4 Closeout Submittals:

.1 Provide operation and maintenance data for incorporation into manual specified in Division 01 - General Requirements.

.5 Certificates:

.1 Catalogued or published ratings: obtained from tests carried out by manufacturer or those ordered from independent testing agency signifying adherence to codes and standards in force.

.2 Provide confirmation of testing.

1.4 QUALITY ASSURANCE

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Division 01 - General Requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with manufacturer's written instructions and Division 01 - General Requirements.

.2 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse in accordance with Division 01 - General Requirements.

1.6 MAINTENANCE

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Division 01 - General Requirements.

.2 Furnish list of individual manufacturer's recommended spare parts for equipment include:

.1 Bearings and seals.

.2 Addresses of suppliers.

.3 List of specialized tools necessary for adjusting, repairing or replacing.

2 Products

2.1 GENERAL

.1 Factory assembled total energy recovery device in packaged air handler.

2.2 HEAT TYPE AIR TO AIR FIXED PLATE HEAT EXCHANGER

.1 Factory assembled indoor central station air handling unit, equipped with the following components;

.1 Supply air blower (centrifugal backqard inclined, or squirrel-cage forward curved at package assemblers discretion).

.2 Exhaust air blower (same criterion as above).

.3 Single wall insulated casing constructed of satin coat G90 Galvanized steel.

.4 Casing insulation to be continuous, plenum rated, with vapour barrier. Internal partitions separating airstreams to be insulated to prevent condensation.

.5 Blowers to be equipped with direct or belt drive open drip proof motors (or TEFC at package assemblers discretion).

.6 Factory wiring harness with integral contactors, defrost control, overloads, disconnect switch, for single point connection of power wiring.

.7 Casing to be fully drainable with full condensate drip pan and connections to drainage outlets.

.8 Filter housings, sized to accommodate cartridge type MERV-8 panel filters to be provided on each inlet to the energy-reclaim device.
.9 Unit to be equipped with static-plate energy transfer device, fitted with molecular sieve media capable of sensible heat transfer, and latent humidity transmission across the membrane.
.10 Thermal effectiveness of transfer core, airflow specifications of unit are indicated on drawings.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install in accordance with manufacturers recommendations.
.2 Support independently of adjacent ductwork with flexible connections.
.3 Install access doors in accordance with Section 23 33 00 - Air Duct Accessories for access to coils, dampers, and motors.

3.3 CLEANING

.1 Proceed in accordance with Division 01 - General Requirements.
.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.4 FIELD QUALITY CONTROL

.1 Commissioning:
  .1 Manufacturer to:
    .1 Certify installation.
    .2 Start up and commission installation.
    .3 Carry out on-site performance verification tests.
    .4 Demonstrate operation and maintenance.
  .2 Provide Consultant at least 24 hours notice prior to inspections, tests and demonstrations. Submit written report of inspections and test results.

END OF SECTION

This page intentionally left blank

1 General

1.1 REFERENCES

.1 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE):
  .1 ASHRAE 52.1, Gravimetric and Dust Spot Procedures for Testing Air-Cleaning Devices used in General Ventilation for Removing Particulate Matter.

.2 Canadian General Standards Board (CGSB):
  .1 CAN/CGSB-115.10, Disposable Air Filters for Removal of Particulate Matter from Ventilating Systems.
  .2 CAN/CGSB-115.15, High Efficiency, Rigid Type Air Filters for Removal of Particulate Matter from Ventilating Systems.

.3 Canadian Standards Association (CSA International):
  .1 CSA B52, Mechanical Refrigeration Code.
  .2 CAN/CSA-C656, Performance Standard for Single Package Central Air-Conditioners and Heat Pumps.

.4 Environment Canada (EC) / Environmental Protection Services (EPS):
  .1 EPS 1/RA/2, Code of Practice for Elimination of Fluorocarbons Emissions from Refrigeration and Air Conditioning Systems.
  .2 Environment Canada, Ozone-Depleting Substances Alternatives and Suppliers List.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.
.2 Indicate major components and accessories including sound power levels of units.
.3 Type of refrigerant used.

1.3 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for incorporation into manual specified in Division 01 - General Requirements.

2 Products

2.1 GENERAL

.1 Integrated package: to CAN/CSA-C656.
.2 System type:
  .1 DX cooling, with reversible heat pump operation.
  .2 Condensing: air cooled.
.3 Cooling capacity, see Equipment Schedule.
.4 Acceptable material: Daikin, Mitsubishi, LG.

2.2 CABINET

.1 Cabinets shall be of heavy gauge sheet metal, galvanized construction.
.2 Exposed surfacing shall be primed and painted followed by enamel finish coat.
.3 Cabinet shall be supported on formed galvanized or structural steel channel supports, designed and welded for low deflection.
.4 Access doors shall be waterproof, hinged with cam lock fasteners.
.5 Integral lifting lugs shall be provided for hoisting.

2.3 COMPRESSORS

.1 Fully hermetic scroll set on resilient neoprene mounts.
.2 Compressors are complete with crank case heaters, as a means of overload protection.
.3 An internal and external pressure limiting device to protect the compressor in the event of over pressure.

.4 Scroll compressor shall be equipped with a device to limit noise due to scroll reversal and resultant noise on compressor shutdown.

2.4 CONDENSER

.1 Air cooled: free standing, welded steel unit construction, corrosion protected.
- .1 Circuit to provide separate refrigerant circuit for each compressor / evaporator combination.
- .2 Aluminium fins, mechanically bonded to copper tubes, tested to 3.1 MPa.
- .3 Propeller type fan(s), direct drive.
- .4 Electrical and control components housed in weather-tight access panels with electrical disconnect switch and control cable for control interconnection.
- .5 Vibration isolation: providing at least 95% isolation efficiency.

2.5 CONTROLS

.1 Controls shall include compressor and condenser fan motor contactors, control circuit transformer, cooling relays, pump down relays, ambient compressor lockout, fuses, manual reset high pressure controls and automatic reset low pressure controls, head pressure actuated fan cycling controls for all multiple condenser fan units.

.2 Factory mounted and wired fused dual front panel mounted disconnect switch.

.3 Five minute anti short cycling timer on lead compressor and inter stage time delay relay(s) on subsequent stages.

.4 Standard A/C operating temperature range, extended heating range to -25°C.

2.6 REFRIGERANT PIPING, VALVES, FITTING AND ACCESSORIES WITHIN UNIT

.1 To CSA B52.

.2 Include for each refrigerant circuit:
- .1 Thermal expansion valve, external equalizing type.
- .2 Combination filter-dryer.
- .3 Solenoid valves.
- .4 Liquid sight glass with moisture indicator.
- .5 Suction line insulation: flexible elastomeric unicellar to ASTM C547, 12mm minimum thickness.
- .6 Liquid refrigerant receiver.
- .7 Suction and liquid shut off valves.
- .8 Internal factory mounted hot gas bypass valve.

2.7 ENVIRONMENTAL CONTROLS

.1 Refer to multi-stage low-voltage thermostat specifications in Section 23 09 33 - Electric and Electronic Control System for HVAC.

2.8 REFRIGERANT CHARGE

.1 Charge refrigerant system at factory, seal and test.

.2 Holding charge of refrigerant applied at factory.

2.9 INDOOR CENTRAL STATION SPLIT AHU WITH REFRIGERANT COIL

.1 Insulated cabinet with plenum, coil, integral drain pan, squirrel cage blower, direct drive preferred.

.2 Integral filter housing to accommodate MERV 8 pleated filter in frame.

.3 Multi-position configurations available. Including side return and top discharge.

.4 To be compatible with external mounting of electric resistive backup heating coil, as outlined in Section 23 82 16.14 - Electric-Resistance Air Coils.

.5 Unit to be complete with an integrated control board, with a terminal strip for communication with the zone thermostat (to have contacts for fan, cooling, heating). Unit to have interconnection communication bus with outdoor condensing unit.

.6 Unit capacity to be as per the schedule on the drawings.
.7 Unit to be complete with ground mount stand for outdoor unit, provide sufficient slack in refrigerant and wiring to allow for differential movement.
.8 A full charge of refrigeration for 30 feet of refrigerant tubing shall be provided in the condensing unit.
.9 Refrigerant shall be R410a.

3 Execution

3.1 GENERAL

.1 Install as indicated, to manufacturer's recommendations, and in accordance with EPS 1/RA/2.
.2 Manufacturer to certify installation.
.3 Run drain line from cooling coils condensate drain pan to terminate over nearest floor drain.

3.2 EQUIPMENT PREPARATION

.1 Provide services of manufacturer's field engineer to set and adjust equipment for operation as specified.

3.3 FIELD QUALITY CONTROL

.1 Commissioning:
  .1 Manufacturer to:
    .1 Certify installation.
    .2 Start up and commission installation.
    .3 Carry out on-site performance verification tests.
    .4 Demonstrate operation and maintenance.
  .2 Provide Consultant at least 24 hours notice prior to inspections, tests and demonstrations. Submit written report of inspections and test results.

END OF SECTION

This page intentionally left blank

1 General

1.1 SUMMARY

.1 Section Includes: Materials and application of electric duct heaters.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).
  .1 CSA C22.2 No.155, Electric Duct Heaters.
.2 Department of Justice Canada (Jus.)
  .1 Canadian Environmental Protection Act (CEPA).
.3 Transport Canada (TC)
  .1 Transportation of Dangerous Goods Act (CEPA).

1.3 SUBMITTALS

.1 Make submittals in accordance with Division 01 - General Requirements.
.2 Submit product data and include:
  .1 Element support details.
  .2 Heater: total kW rating, voltage, phase.
  .3 Number of stages.
  .4 Rating of stage: rating, voltage, phase.
  .5 Heater element watt/density and maximum sheath temperature.
  .6 Maximum discharge temperature.
  .7 Physical size.
  .8 Unit support.
  .9 Performance limitations.
  .10 Clearance from combustible materials.
  .11 Internal components wiring diagrams.
  .12 Minimum operating airflow.
  .13 Pressure drop, operating and minimum airflow
  .14 Controller type.
  .15 Accessories included.

1.4 QUALITY ASSURANCE

.1 Health and Safety:
  .1 Do construction occupational health and safety in accordance with Division 01 - General Requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:
  .1 Separate waste materials for reuse and recycling in accordance with `Division 01 - General Requirements.
  .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
  .3 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
  .4 Place materials defined as hazardous or toxic in designated containers in accordance with Division 01 - General Requirements.
  .5 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
  .6 Ensure emptied containers are sealed and stored safely.
  .7 Fold up metal and plastic banding, flatten and place in designated area for recycling.

.2 Deliver materials to site in original factory packaging, labeled with manufacturer's name, address.

1.6 QUALITY ASSURANCE

.1 All wiring shall be in accordance with the Canadian Electrical Code.
.2 The units shall be listed by Electrical Testing Laboratories (ETL) and bear the ETL label.

2 Products

2.1 DUCT HEATERS

.1 Duct heaters: flange type or insert type.
.2 To carry CSA Approval, and listed for zero clearance to combustibles.
.3 Elements:
  .1 Open coil elements of nickel-chrome resistance wire.
  .2 Coils machine crimped into stainless steel terminals extending at least 25mm into the air stream.
  .3 All terminal hardware shall be stainless steel.
  .4 Coils shall be supported by ceramic bushings staked into the supporting brackets.
.4 Frames: Heater frames and boxes shall be corrosion resistant steel.
.5 Terminal box:
  .1 NEMA 1 general purpose enclosure.
  .2 Hinged, latching cover.
  .3 Multiple concentric knockouts to accept field wiring
  .4 Terminal blocks to accommodate field wiring.
  .5 All internal wiring to be complete with 105ºC rated insulation.
.6 Ratings:
  .1 Heaters to be rated for voltage, phase, and KW capacity as indicated in schedule on drawings.
  .2 All three phase heaters to have equal, balanced, three phase stages.
  .3 Supply heaters with size and quantity of fixed and proportional heating stages as indicated in schedule.
.7 Controls:
  .1 Factory mounted and wired in control box. Use terminal blocks for power and control wiring.
  .2 Controls to include:
    .1 Magnetic contactors.
    .2 Fixed differential pressure switch.
    .3 Manual and automatic reset high limit.
    .4 Control transformers.
    .5 Solid state relays.
    .6 Door interlocked disconnect switch (non-fused).
    .7 HRC load fuses.
    .8 Controller type to be as indicated in the duct heater schedule or on Control drawings as follows:
      .1 Proportional Control: single-stage proportional control providing full modulation of the heater capacity with a silicon controlled rectifier (SCR) suitable for control input of 0 - 10 VDC or 4-20mA.
        .1 SCR setpoint on heat pump coils is to be 125°F.
        .2 SCR setpoint on HRV coil is to be 60°F.
      .2 For heat pump stacked heating coils, the unit should include a master enable/disable contact, which will be terminated to the second stage of the heat pump thermostats.
    .9 Airflow Providing Switch: diaphragm type air pressure switch with automatic reset, screw type setpoint adjustment and static pressure probe; switch to de-energize duct heater circuits in case of insufficient air flow.

.3 Performance: see schedule.
.4 Provide heater complete with protective screens on inlet/outlet.

3 Execution

3.1 INSTALLATION

.1 Make power and control connections in accordance with CSA C22.2 No.46. Install in accordance with manufacturer's instructions.
.2 Locate duct heater in accordance with manufacturer's minimum recommended distances for operation, service access and unit removal.
.3 Provide additional hangers and supports in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment where duct heater weight cannot be supported solely by existing duct.
.4 Make power and control connections to CSA C22.2 No.155.
.5 Verify that ductwork and casings are free of debris before operating and testing duct heaters.

3.2 START-UP AND COMMISSIONING

.1 Perform tests in accordance withDivision 01 - General Requirements and Section 26 05 00 - Common Work Results - Electrical.

END OF SECTION

This page intentionally left blank

1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
  .1 CSA C22.2 No.46, Electric Air-Heaters.
.2 Underwriters' Laboratories (UL) Inc.
  .1 UL 1042, Electric Baseboard Heating Equipment.

1.2 PRODUCT DATA

.1 Submit product data in accordance with Division 01 - General Requirements.
.2 Submit product data sheets for baseboard convectors. Include:
  .1 Product characteristics.
  .2 Performance criteria.
  .3 Mounting methods.
  .4 Physical size.
  .5 kW rating, voltage, phase.
  .6 Cabinet material thicknesses.
  .7 Limitations.
  .8 Colour and finish.
.3 Manufacturer's Instructions: Provide to indicate special handling criteria, installation sequence and cleaning procedures.

1.3 CLOSEOUT SUBMITTALS

.1 Submit operation and maintenance data for baseboard convectors in accordance with Division 01 - General Requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Division 01 - General Requirements and with Waste Reduction Workplan.
.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
.3 Collect and separate for disposal paper packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
.4 Divert unused metal and wiring materials from landfill to metal recycling facility approved by Consultant.
.5 Collect, package and store existing convectors units for either reuse or recycling and return to recycler in accordance with Waste Management Plan.

2 Products

2.1 MANUFACTURERS

.1 Acceptable material:
  .1 Ouellet, Dimplex, Chromalox, Stelpro.

2.2 CONVECTORS

.1 Heaters: to CSA C22.2 No.46 wattage density as indicated with connection box one ends.
  .1 Element through-type fitted with aluminum convector vanes and resistor wire enclosed in mineral insulation in aluminum sheath.
.2 Element: locked to cabinet and supported at additional points throughout length to allow for linear expansion with non metallic supports.
.3 Cabinet: to CSA C22.2 No.46, pre-drilled back for securing to wall. Integral air diffusion reflector with wireway at bottom and built-in clamps.
  .1 Bottom inlet/top outlet.
  .2 Bottom inlet/front outlet.

.3 Front inlet/front outlet.
.4 Sloping inlet/sloping front outlet.
.5 Panel: steel, metal thickness, bottom 1 mm, front 1.6 mm thick.
.6 Finish: phosphatized and finished with two (2) coats baked enamel, beige colour.

.4 Blank cabinet sections and outside corners complete with wireway in sections including splice plates, to match heater cabinets in respects for continuous baseboard effect as indicated.

2.3 CONTROLS

.1 Wall mounted thermostats: type line voltage, Energy Star certified, to Section 23 09 33 - Electric and Electronic Control System for HVAC.
.2 Integral thermostats 1 or 2 pole to control load as indicated.
.3 Relays and transformers to switch loads in excess of thermostat rating.
.4 Double pole, double throw switch and receptacle terminal box assembly for combination heater and air conditioner power supply.

3 Execution

3.1 INSTALLATION

.1 Install baseboard convector heaters, blank sections and controls.
.2 When wireway is used, remove knock-outs and insert insulating bushing between units.
.3 Install grounding wire to maintain ground integrity between heating, blank, and auxiliary sections.
.4 Install thermostats in locations indicated.
.5 Make power and control connections.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.
.2 Ensure heaters and controls operate correctly.

END OF SECTION

1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)
- .1 CSA C22.1-21, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.
- .2 CAN3-C235-83 (R2015), Preferred Voltage Levels for AC Systems, 0 to 50,000V.
- .3 CSA Z462-21, Workplace Electrical Safety.

.2 Institute of Electrical and Electronics Engineers (IEEE) / National Electrical Safety Code Product Line (NESC).
- .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standard Terms, 7th Edition.

1.2 DEFINITIONS

.1 Electrical terms used in electrical specifications and on electrical drawings are those defined by IEEE SP1122.

1.3 CARE, OPERATION AND START-UP

.1 Instruct Consultant and operating personnel in the operation, care and maintenance of systems, system equipment and components.

.2 Operating instructions to include following:
- .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
- .2 Start up, proper adjustment, operating, maintenance, and shutdown procedures.
- .3 Safety precautions.
- .4 Procedures to be followed in event of equipment or component failure.
- .5 Other items of instruction as recommended by manufacturer of the system or equipment.

.3 Print operating instructions in laminated plastic adjacent to equipment or systems interface.

.4 Arrange and pay for manufacturer's factory service technician to supervise start-up, installation, check, adjust, balance and calibrate components and instruct operating personnel.

.5 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

1.4 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235-83 (R2015).

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.5 SITE VISIT

.1 Prior to tender submission visit the site and become familiar with the job and all conditions which may affect the overall cost. Ignorance of existing conditions will not be considered as basis for extra claims. Refer to Division 01 - General Requirements for additional information.

1.6 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.
- .1 Submit shop drawings for all electrical equipment unless otherwise indicated.

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, and other items that must be shown to ensure coordinated installation.
.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
.4 Indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.
.5 If changes are required, resubmit corrected shop drawings.

.2 Manufacturer's Field Reports: submit to Consultant within 7 days of review, verifying compliance of work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.
.3 Provide single line electrical diagrams in glazed frames or laminated sheets as follows:
.1 Electrical distribution system: locate in main electrical room.
.4 Submit WHMIS MSDS information in accordance with Division 01 - General Requirements.
.5 Upon completion of work submit As-Built Drawings, Maintenance Manuals, and Submittals in accordance with Division 01 - General Requirements.

1.7 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Division 01 - General Requirements.
.2 All electrical work is to be carried out by qualified, licensed electricians or apprentices for the province of Prince Edward Island and the electrical contractor must have a valid contractor license issued by the province of Prince Edward Island.
.1 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.
.3 The Consultant reserves the right to approve the quality of material and workmanship, and to call for any tests which they deem necessary to establish the integrity of the installation during the progress of the work and a complete test of each system at the completion of the work. The cost of such tests are not to be considered as extras.
.4 Health and Safety: in accordance with Division 01 - General Requirements.
.1 Protect exposed live equipment during construction for personnel safety.
.2 Shield and mark all live parts “LIVE 120 VOLTS”, or with appropriate voltage in English.
.3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision of an electrician.
.5 Quality Control: in accordance with Division 01 - General Requirements.
.1 Provide CSA certified equipment and material. Where CSA certified equipment and material is not available, submit such equipment and material to the authority having jurisdiction for approval before delivery to site.
.2 Submit test results of installed electrical systems and instrumentation.
.3 Upon completion of work, submit load balance report as described in PART 3 - LOAD BALANCE.
.4 Submit certificate of acceptance from authority having jurisdiction upon completion of work to Consultant.

1.8 PERMITS, FEES AND INSPECTION

.1 Submit to Electrical Inspection Division and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.
.2 Pay all associated fees.
.3 Notify Consultant of changes required by Electrical Inspection Division prior to making changes.
.4 Submit Certificates of Acceptance from Electrical Inspection Division or authorities having jurisdiction on completion of work to Consultant.

1.9 CO-ORDINATION

.1 Co-ordinate all work with work of other divisions to avoid conflict and notify Consultant if any changes are required.

.2 Locate electrical systems, equipment, and materials to provide minimum interference and maximum usable space.

.3 Contractor to locate all existing underground services before commencing work and be responsible for any damages caused by failure to coordinate with and preserve underground services.

.4 Where interference occurs, the Consultant must approve relocation of equipment and materials regardless of installation order.

.5 Notwithstanding the review of shop drawings, the Electrical Contractor may be required to relocate electrical equipment which interferes with the equipment of other trades, due to lack of co-ordination of the Electrical Contractor with other trades. The cost of this relocation will be the responsibility of the Electrical Contractor and the Consultant will determine the extent of relocation required.

.6 Leave space clear, and install equipment to accommodate future materials and/or equipment as indicated or specified, or to accommodate equipment and/or materials supplied by other Contractors.

.7 Verify that the spaces in which the equipment is to be installed is sufficient and install all equipment to maintain head room and clearances, to conserve space, comply with codes, and to ensure adequate space for future servicing.

.8 The Drawings for the Electrical work are diagrammatic performance Drawings only and are intended to convey the scope of work and indicate the general arrangement, locations, and size of equipment fixtures and outlets. The Drawings do not show Architectural, Mechanical or Structural details.

.9 Do not scale or measure Drawings, but obtain information regarding accurate dimensions, from the dimensions shown on the Architectural Drawings or by site measurements. Follow the Electrical Drawings for laying out the work.

1.10 CUTTING AND PATCHING

.1 Electrical Contractor to inform all other divisions in time, of required electrical openings and/or penetrations. Where this requirement is not met, the cost of all cutting and associated work to provide openings and/or penetrations will be the responsibility of the Electrical Contractor. Obtain written approval of Structural Engineer before drilling through any beams or floors. Keep hole sizes to a minimum and be responsible to repair damage caused by lack of coordination.

1.11 DELIVERY, STORAGE AND HANDLING

.1 Provide Consultant with material delivery schedule within two weeks after award of Contract.

.2 Arrange for delivery access and unloading and/or storage areas with General Contractor.

1.12 INSPECTION OF WORK

.1 Periodic visits to the site during construction phase will take place to ascertain reasonable conformity to plans and specifications. The Contractor will be responsible for the execution of their work in conformity with the construction documents, the Contract, and the requirements of the inspection authority.

1.13 SCHEDULING OF WORK

.1 Work is to be scheduled in phases as described in Division 01 - General Requirements.

.2 Become familiar with the phasing requirements for the work and comply with these conditions.

.3 No additional monies will be paid for Contractor's requirement to comply with work phasing conditions.

.4 Note that the Owner intends to carry on business in the Kinkora Community Centre as usual and work activities must be coordinated to maintain electrical services in occupied areas.

Provide any required temporary work.

.5 Work activities which disrupt occupants of the building, such as excessive noise caused by drilling of walls, floors or ceilings must be approved and scheduled in writing by the Project Manager at least 48 hours in advance.

.6 All power shutdowns which affect building occupants or building operation must have prior approval of Owner and must be scheduled in writing at least 48 hours in advance with the Project Manager.

.7 Overtime work, and work outside normal work hours deemed necessary to meet the schedule are the responsibility of the Contractor and must meet the requirements of the PEI Employment Standards Act. All costs resulting from such overtime work must be included in the Contractor's total tender price.

1.14 FIRE RATING OF PENETRATIONS

.1 Provide fire stopping and smoke seal materials at openings around cabling conduits passing through floors, ceilings and fire rated walls, as required to maintain fire rating equal to the fire rated assembly.

.2 Use ULC or approved equal fire barrier products installed in accordance with manufacturers instructions at each penetration.

.3 Acceptable material for fire barrier products to be 3M #CP25 fire barrier caulk, #303 putty, #FS 195 wrap and #CS195 sheet.

2 Products

2.1 PRIOR APPROVAL OF PRODUCTS

.1 The use of any product not listed by name in the specification must be approved by Consultant prior to tender submission.

.2 By using pre-approved product substitutions the Contractor accepts the responsibility and associated costs for all required modifications to circuitry, devices and wiring. The Contractor is to submit shop drawings with deviation from the original design highlighted to the Consultant for review and approval prior to rough-in.

2.2 MATERIALS AND EQUIPMENT

.1 Provide materials and equipment in accordance with Division 01 - General Requirements.

.2 Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Electrical Inspection Division prior to delivery and submit such approval as described in Part 1 - Submittals.

2.3 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.1 Paint outdoor electrical equipment "equipment green" finish to EEMAC Y1-1.

.2 Paint indoor electrical equipment enclosures light grey to EEMAC 2Y-1.

2.4 WARNING SIGNS

.1 As specified and to meet requirements of Electrical Inspection Department.

.2 Porcelain enamel or acrylic decal signs, minimum size 175 x 250 mm.

2.5 WIRING TERMINATIONS

.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.6 EQUIPMENT IDENTIFICATION

.1 All junction and pull boxes are to be marked with an indelible ink marker to designate the circuit number of enclosed wiring, the designated panel name and electrical characteristics.

Where boxes are painted in exposed areas, information is to be written on inside of box cover.

.2 Identify electrical equipment with nameplates and labels as follows:
- .1 Nameplates: Lamicoid 3 mm thick plastic engraving sheet, black white face, black white core, mechanically attached with self tapping screws.
- .2 Sizes as follows:

NAMEPLATE SIZES:			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	12 x 70 mm	1 line	8 mm high letters
Size 5	12 x 70 mm	2 lines	5mm high letters
Size 6	12 x 70 mm	1 line	12mm high letters
Size 7	12 x 70 mm	2 line	6 mm high letters

.3 Labels:
- .1 Embossed plastic labels with 6 mm high letters unless specified otherwise.

.4 Wording on nameplates and labels to be approved by Consultant prior to manufacture.

.5 Allow for average of twenty-five (25) letters per nameplate and label.

.6 Identification to be English.

.7 Nameplates for pull boxes and junction boxes to indicate system name and voltage characteristics.

.8 Nameplates for disconnects to indicate equipment being controlled, wire, voltage, phase, number of power source and branch circuit breaker number.

.9 Nameplates for pull boxes and panelboards to indicate system name, overcurrent protection device rating, voltage, phase, and number of wire, and power source.

.10 Lamicoid nameplate installed on panelboards shall indicate the following:
- .1 Designated name of equipment.
- .2 Voltage, number of phases and wires.
- .3 Designation of power source.
- .4 The following is an example:

PANEL 'A1' 120/240V - 1PH - 3W
FED FROM DISTRIBUTION PANELBOARD 'DPA'

.11 Lamicoid nameplates installed on disconnect switches, and large junction and pull boxes shall contain the following information:
- .1 Designated name of equipment.
- .2 Designated name of power source.
- .3 Voltage, number of phases and wires.
- .4 Branch circuit breaker number(s) where possible.
- .5 The following is an example:

HC - 2
240V-1PH, FED FROM 'DPA-41,43'

.12 Install an additional nameplate on all, or any piece of electrical equipment, or apparatus, i.e. panelboards and fusible switches, etc., that may contain overcurrent devices, i.e. circuit

breakers and/or fuses, that have been designed for, and incorporate an interrupting capacity sized "larger" than 10 KAIC.

Example:

Minimum interrupting capacity of breakers installed in this panel is to be not less than 22 KAIC	Minimum interrupting capacity of fuses installed in this switch are to be not less than 100 KAIC

2.7 WIRING IDENTIFICATION

.1 Identify wiring with indelible pre-printed self-adhesive vinyl tape, indicating panel and circuit number. Wiring to be identified at both ends and at junction, pull boxes and splices.
.2 Maintain phase sequence and colour coding throughout.
.3 Colour code: to CSA C22.1-21, Canadian Electrical Code.

2.8 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.
  .1 Colour coding of electrical boxes and their associated covers located in finished areas to be applied to the inside cover and box.
.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
.3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.
  .1 Colours indicated below are for reference only.

SYSTEM	PRIME COLOR	AUXILIARY COLOR
240/120V (normal)	Yellow	-------
Telephone	White	-------
Data	Blue	-------
Fire Alarm	Red	-------
Low Voltage Lighting	Black	-------
Access Control	Orange	-------

3 Execution

3.1 NAMEPLATES AND LABELS

.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.2 FIRE STOPPING

.1 In walls requiring a fire-resistance rating, where outlets are on opposite sides within a single stud cavity or within 600 mm of one another measured horizontally (150 mm minimum back-to-back separation); or where the area of the penetration(s) exceed the requirements of the NBCC, the outlet boxes are to be protected by a firestop system. Supply and install ULC/cUL listed intumescent elastomer fire-stopping and smoke seal moldable putty pads to maintain fire-resistance rating equal to assembly. Acceptable manufacturer or approved equal:
  .1 3M Fire Barrier Moldable Putty Pads MPP+.
  .2 Hilti Firestop Putty Pad, Firestop Box Insert and CFS-P PA Firestop Putty Pad.
  .3 Specified Technologies Inc. (STI) Powershield Electrical Box Insert and Series SSP Putty Pads.
.2 Supply and install ULC/cUL listed elastomeric fire-stopping and smoke seal materials around cable and conduit inside of sleeve penetrations as required to maintain firestop system rating equal to assembly. Acceptable manufacturer or approved equal:
  .1 3M.

.2 Hilti.
.3 Specified Technologies Inc. (STI).

.3 Supply and install ULC/cUL listed fire and smoke sealing cable pass-through system at all locations where communications cable pathways penetrate fire rated assemblies. Size pass-through system assembly for required quantity of cabling plus 40% spare capacity. Fire and smoke sealing cable pass-through system to be equal in rating to assembly. Acceptable manufacturer or approved equal:
.1 3M Fire Barrier Pass-Through Devices.
.2 Hilti Speed Sleeve.
.3 Specified Technologies Inc. (STI) “EZ-Path” Fire Rated Pathway.

.4 Installation of fire-stopping and smoke seal materials and components to be in accordance with ULC/cUL certification and manufacturer’s instructions.

3.3 LOCATION OF EQUIPMENT

.1 Change location of equipment at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

3.4 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm.
.2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
.3 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.
.4 Prior to rough-in, coordinate locations of conduit runs with other trades.

3.5 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless indicated otherwise.
.2 If mounting height of equipment is not specified or indicated, verify with Consultant before proceeding with installation.
.3 Install electrical equipment at the following heights:
.1 Local switches: 1200 mm.
.2 Wall receptacles:
.1 General: 450 mm.
.2 152mm above counter or 230mm above counter with backsplash.
.3 In mechanical rooms: 1400 mm.
.3 Panelboards: 1600 mm or as required by Code.
.4 Telephone and data outlets: 450 mm.
.5 Fire alarm manual stations: 1100 mm.
.6 Fire alarm visual and/or audible signal devices: 2400 mm.
.7 Fire alarm end-of-line resistors: 1800 mm.
.8 Television outlets: 1830 mm.
.9 Wall mounted exit signs: 2400 mm.
.10 Emergency lighting heads: 2400 mm.
.11 Luminaires: as indicated in the Luminaire Schedule.
.12 Access control card reader stations: 1200 mm.

3.6 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.7 FIELD QUALITY CONTROL

.1 All electrical work to be carried out by qualified, licensed electricians or apprentices as per the conditions of the Provincial Act respecting manpower vocational training and qualification. Employees registered in a provincial apprentices program will be permitted, under the direct

supervision of a qualified licensed electrician.

.1 Permitted activities are to be determined based on the level of training attained and the demonstration of ability to perform specific duties.

.2 The work of this division to be carried out by a contractor who holds a valid Code 1 Electrical Contractor License as issued by the Province.

.3 Load Balance:

.1 Measure phase current to panelboard with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment. Coordinate with Utility for balancing of service transformers.

.3 Submit, at completion of work, report listing phase and neutral currents on panelboards, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

.4 Conduct and pay for following tests in accordance with Division 01 - General Requirements.

.1 Distribution system including phasing, voltage, grounding and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Lighting and its control.

.4 Exit sign and emergency lighting.

.5 Motors, heaters and associated control equipment including sequenced operations of systems where applicable.

.6 Systems: fire alarm system, communications and access control.

.7 Ground system continuity and resistance test.

.5 Furnish manufacturer’s certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer’s instructions.

.6 Insulation resistance testing for:

.1 Megger and record circuits, incoming service feeders and wiring to distribution panels up to 350 V with a 500 V instrument.

.2 Check resistance to ground before energizing and record value.

.7 Provide instruments, meters, equipment and personnel required to conduct tests during and conclusion of project.

3.8 CLEANING

.1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

.2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

.3 Clean luminaire lenses, housings, louvers, etc. upon completion of construction.

END OF SECTION

1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)
  .1 CAN/CSA-C22.2 No.18-98 (R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
  .2 CSA C22.2 No.65-93 (R2008), Wire Connectors.
.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
  .1 EEMAC 1Y-2, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

2 Products

2.1 MATERIALS

.1 Crimp style wire connectors, nylon insulated, with current carrying parts of copper alloy for conductors #16 AWG and smaller.
.2 Fork tongue or ring style connectors, nylon insulated crimp style. Terminals for connecting conductors #16 AWG and smaller to screw down terminals.
.3 Pressure type wire connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required. Use twist-on connectors for #14 AWG to #8 AWG conductors.
.4 Fixture type twist-on splicing connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors #10 AWG or less.
.5 Compression type connectors for connecting #6 AWG conductors and larger, unless indicated otherwise.
.6 Bushing stud connectors: to EEMAC 1Y-2 to consist of:
  .1 Connector body and stud clamp for stranded round copper or aluminum conductors.
  .2 Clamp for stranded round copper or aluminum conductors.
  .3 Stud clamp bolts for copper or aluminum conductors.
  .4 Bolts for copper bar.
  .5 Sized for conductors and bars as indicated.
.7 Clamps or connectors for armoured cable, aluminum sheathed cable, non-metallic sheathed, Teck cable and flexible conduit as required to: CAN/CSA-C22.2 No.18.

3 Execution

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:
  .1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation is to meet secureness tests in accordance with CSA C22.2 No.65.
  .2 Install fixture type connectors and tighten. Replace insulating cap.
  .3 Install bushing stud connectors in accordance with EEMAC 1Y-2.
  .4 Where ACM conductors are used, apply zinc joint compound on aluminum conductors prior to installation of connectors or termination.
  .5 Install crimp style connectors with snap-on nylon caps on splices and joints on branch circuits.
.2 All connections are to be made electrically and mechanically secure. Size and type of connector to be in accordance with manufacturers recommendations for each wire size and combination of wires.

3.2 RESTRICTIONS

.1 Circuit splices are NOT permitted in equipment enclosures or electrical panelboards.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results - Electrical.
.2 Section 26 05 20 - Wire and Box Connectors (0-1000V).
.3 Section 26 05 29 - Hangers and Supports for Electrical Systems.
.4 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
.5 Section 26 24 01 - Service Entrance.
.6 Section 26 50 00 - Lighting.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
  .1 CSA C22.2 No. 03-09 (R2019), Test Methods for Electrical Wires and Cables.
  .2 CAN/CSA C22.2 No. 131, Type TECK 90 Cable.

2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for #8 AWG and larger, solid for #10 AWG and smaller.
.2 Minimum size to be #12 AWG for lighting and power, #14 AWG for controls, #16 AWG for low voltage and lighting controls.
.3 Conductors to be sized as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE.
.4 Single conductor metal sheathed cables are not permitted.
.5 Conductor sizes on drawings are based on copper conductors.
.6 Aluminum Composite Material (ACM) conductors will be permitted as an acceptable alternative to copper conductors for service, and panelboard feeders equal or greater than 60 A. ACM conductors are not to be terminated with copper bodied connectors, and all ACM conductor ends are to be treated with an oxide retardant coating prior to termination. The use of ACM conductors must be approved by the Consultant prior to tender submission. Exact size of ACM conductors as an alternate to copper conductors are to be verified by the Consultant prior to rough-in.

2.2 TECK CABLE

.1 Cable: to CAN/CSA C22.2 No. 131.
.2 Conductors:
  .1 Grounding conductor: copper.
  .2 Circuit conductors: copper and ACM alloy, size as indicated.
.3 Insulation:
  .1 Chemically cross-linked polyethylene (XLPE), rated RW90, 600 V.
.4 Inner jacket: polyvinyl chloride material.
.5 Armour: interlocking aluminum.
.6 Overall covering: thermoplastic polyvinyl chloride material.
.7 Fastenings:
  .1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
  .2 Channel type supports for two or more cables at 1500 mm centers.
  .3 Threaded rods: 6 mm dia. to support suspended channels.
.8 Connectors:
  .1 Watertight spin-on style connectors or type approved for TECK cable.
    .1 Acceptable material:
      .1 Thomas & Betts - Star Teck.

2.3 ARMOURED CABLES

.1 Conductors: insulated, copper, size as indicated.
.2 Type: AC90.
.3 Armour: interlocking type fabricated from aluminum strip.
.4 Connectors: standard as required, complete with double split rings in accordance with Section 26 05 20 - Wire and Box Connectors (0 - 1000 V).

2.4 CONTROL CABLES

.1 Type LVT: 2 soft annealed copper conductors, sized as indicated, with thermoplastic insulation, outer covering of thermoplastic jacket.
.2 Low energy 300 V control cable: stranded annealed copper conductors sized as indicated, with PVC insulation type TW -40°C polyethylene insulation with shielding of tape coated with paramagnetic material wire braid over each conductor and overall covering of PVC jacket.

2.5 NON-METALLIC SHEATHED CABLE

.1 Non-metallic sheathed copper cable type: NMD90 nylon, size as indicated.

2.6 ACM CONDUCTORS

.1 Annealed, compacted aluminum alloy conductor material (ACM), single or multi-conductor, 600 V insulation.
.2 Type: AC90, ACWU90 and TECK90.
.3 Armour: interlocked aluminum strip.
.4 Conductivity: 61% IACS to that of copper.
.5 Restrictions: On service or panelboard feeders only, which are equal or greater than 60 A, and pending approval by Consultant prior to tender submission.

3 Execution

3.1 WIRING METHODS

.1 All work to be concealed in finished areas where possible, wire in painted conduit where exposed in finished areas.
.2 All work in or through fire rated or acoustic structures to be in accordance with Section 26 05 00 - Common Work Results - Electrical.
.3 Panelboard feeders: building wire in conduit.
.4 Branch circuit work:
  .1 Concealed work in wall partitions: building wire in conduit or armoured cable.
  .2 Horizontal work above accessible ceilings: building wire in conduit or armoured cable.
  .3 Surface work in unfinished areas: building wire in conduit.
.5 Drops to light fixtures to be building wire in flexible conduit or armoured cable, maximum length 1.5 m.
.6 Branch circuit wiring to be sized for a maximum voltage drop of 3% and no greater than 5% across the entire circuit length from service to point of utilization.
  .1 15A branch circuits to be wired with:
    .1 #12 AWG up to 80'
    .2 #10 AWG up to 125'
    .3 #8 AWG up to 200'
  .2 20A branch circuits to be wired with:
    .1 #12 AWG up to 60'
    .2 #10 AWG up to 95'
    .3 #8 AWG up to 150'
  .3 30A branch circuits to be wired with:
    .1 #10 AWG up to 60'

.2 #8 AWG up to 100'
.3 #6 AWG up to 160'

3.2 GENERAL CABLE INSTALLATION

.1 Support cables in accordance with Section 26 05 29 - Hangers and Supports for Electrical Systems.
.2 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors (0-1000 V).
.3 Cable Colour Coding: to Section 26 05 00 - Common Work Results - Electrical.
.4 Conductor length for parallel feeders to be identical.
.5 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.
.6 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.
.7 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:
  .1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
  .2 In surface and lighting fixture raceways in accordance with Section 26 50 00 - Lighting.

3.4 INSTALLATION OF TECK CABLE

.1 Install Teck cables where indicated.
  .1 Group cables wherever possible on channels.
.2 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors (0 - 1000 V).

3.5 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible.
.2 Use permitted only for work in movable partitions and vertical power supply drops to lighting fixtures.
.3 Install anti-shorts as required.
.4 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors (0 - 1000 V).

3.6 INSTALLATION OF CONTROL CABLES

.1 Controls wiring for mechanical systems to be completed by the Controls Contractor. All other controls wiring to be completed by the Electrical Contractor.
.2 Install control cables in conduit as indicated.
.3 Ground control cable shield.
.4 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors (0 - 1000 V).

3.7 INSTALLATION OF ACM CONDUCTORS

.1 Install ACM cables as per CSA 22.1-21 and manufacturers installation requirements.
.2 Do not terminate ACM conductors with a copper bodied connector.
.3 Apply oxide coating on base cables as per CSA 22.1-21 requirements.

3.8 RESTRICTIONS

.1 Splices in wire and cable #6 AWG and larger are not permitted.

.2 Flexible conduit or armoured cable drops to luminaires are to be installed from junction box to luminaires, loops between luminaires is not permitted.

.3 Wiring and cabling, both concealed and exposed, is to be installed parallel and/or perpendicular to building lines in a clean, organized and professional fashion. Where possible, wiring and cabling is to follow a common pathway.

3.9 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Perform tests using method appropriate to site conditions and to approval of Consultant and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results - Electrical.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)
  .1 ANSI/IEEE 837-1989 (R1996), Qualifying Permanent Connections Used in Substation Grounding.

2 Products

2.1 EQUIPMENT

.1 Rod electrodes: copper clad steel 19 mm dia by 3 m long.
.2 Grounding conductors: bare stranded copper, soft annealed, size as indicated.
.3 Insulated grounding conductors: green, type RW90, copper, size as indicated.
.4 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.
.5 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
  .1 Grounding and bonding bushings.
  .2 Protective type clamps.
  .3 Bolted type conductor connectors, as required by local authority having jurisdiction.
  .4 Bonding jumpers, straps.
  .5 Pressure wire connectors.

3 Execution

3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, and accessories.
.2 Install connectors in accordance with manufacturer's instructions.
.3 Protect exposed grounding conductors from mechanical injury.
.4 Make buried connections, and connections to electrodes, using mechanical bolt type connection.
.5 Use mechanical connectors for grounding connections to equipment provided with lugs.
.6 Soldered joints not permitted.
.7 Install a bonding wire in all conduits. Where EMT is used, run insulated copper bond wire in conduit.
.8 Install internal bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw.
.9 Connect building structural steel and metal siding to ground by welding copper to steel.
.10 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.
.11 Connect conductive floor tile to ground. Make connections from tile system to ground in accordance with tile manufacturers instructions.

3.2 ELECTRODES

.1 Install concrete encased electrodes in building foundation footings, with terminal connected to grounding network.
.2 Install rod electrodes and make grounding connections.
.3 Bond separate, multiple electrodes together.

.4 Use size # 1/0 AWG copper conductors for connections to electrodes as required by Section 10 of the Canadian Electrical Code.
.5 Make special provision for installing electrodes that will give acceptable resistance to ground value where rock or sand terrain prevails. Ground as indicated.

3.3 SYSTEM AND CIRCUIT GROUNDING

.1 Install system and circuit grounding connections to neutral of secondary 240 V system.

3.4 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, frames of motors, starters, building steel work, and distribution panels.

3.5 GROUNDING BUS

.1 Install copper grounding bus mounted on insulated supports on wall of electrical room.
.2 Ground items of electrical equipment in electrical room to ground bus with individual bare stranded copper connections size as required by Section 10 of the Canadian Electrical Code.

3.6 COMMUNICATION SYSTEMS

.1 Install grounding connections for fire alarm and intercommunication systems as follows:
  .1 Communications: make grounding system in accordance with service provider's requirements and as indicated.
  .2 Fire alarm systems as indicated and in accordance with the manufacturers grounding instructions.
  .3 Access control as indicated and in accordance with manufacturers grounding instructions.

3.7 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 – Common Work Results - Electrical.
.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Consultant and local authority having jurisdiction over installation.
.3 Perform tests before energizing electrical system.
.4 Disconnect ground fault indicator during tests.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results - Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA C22.2 No. 18.4-04 (R2019), Hardware for the support of Conduit, Tubing, and Cable (Bi-National Standard with UL 2239).

2 Products

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted suspended or set in poured concrete walls and ceilings as required.

2.2 SPECIFIC PURPOSE SUPPORTS

.1 Specific purpose heat treated, spring steel fasteners to support boxes, conduit and cable from main structure, channels, and wooden studs.

3 Execution

3.1 INSTALLATION

.1 Secure equipment to hollow or solid masonry, tile and plaster surfaces with lead anchors or nylon shields.

.2 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

.3 Secure surface mounted equipment with bar type box hangers. Ensure that box hangers are adequately supported to carry weight of equipment specified before installation.

.4 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.5 Fasten exposed conduit or cables to building construction or support system using straps.

.1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.

.2 Two-hole steel straps for conduits and cables larger than 50 mm.

.3 Beam clamps to secure conduit to exposed steel work.

.4 Strap AC90 at box location and at every 900 mm.

.6 Suspended support systems.

.1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.

.2 Support two (2) or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

.7 For surface mounting of two or more conduits use channels at 1.5 m on centre spacing.

.8 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.9 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.10 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

.11 Electrical boxes concealed in hollow gypsum board walls to be supported by specific purpose brackets or clips designed for stud wall construction.

3.2 RESTRICTIONS

.1 Do not use wire lashing, wood blocking, nylon or plastic strap ('Ty-Wraps') to support or secure raceways or cables.

.2 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant.

.3 Do not install cable, raceway, or boxes directly to underside of roof deck, maintain a minimum separation of 1.5" as required by Code.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results – Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
  .1 CSA C22.1-21, Canadian Electrical Code, Part 1, 25th Edition.

2 Products

2.1 JUNCTION AND PULL BOXES

.1 Welded steel construction with screw-on flat covers for surface mounting.
.2 Covers with 25 mm minimum extension all around, for flush-mounted pull and junction boxes.
.3 Covers with turned edges for surface-mounted pull and junction boxes.

3 Execution

3.1 JUNCTION AND PULL BOXES INSTALLATION

.1 Install pull boxes in inconspicuous, but accessible locations. No junction boxes or pull boxes is permitted to be installed in attic space.
.2 Only main junction and pull boxes are indicated. Install pull boxes so as not to exceed 30 m of conduit run between pull boxes.

3.2 IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 – Common Work Results - Electrical.
.2 Install size 2 identification labels indicating system name voltage and phase or box designation as indicated.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results – Electrical.
.2 Section 26 05 29 – Hangers and Supports for Electrical Systems.
.3 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
  .1 CSA C22.2 No. 18-98 (R2003), Outlet Boxes, Conduit Boxes, and Fittings and Associated Hardware, a National Standard of Canada.
  .2 CSA 22.1-21, Canadian Electrical Code, Part 1, 25th Edition.

2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA 22.1-21.
.2 102 mm square or larger outlet boxes as required.
.3 Gang boxes where wiring devices are grouped.
.4 Blank cover plates for boxes without wiring devices.
.5 Combination boxes with steel barriers where outlets for more than one system or voltage are grouped.

2.2 GALVANIZED STEEL OUTLET BOXES

.1 Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.
.2 Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.
  .1 Screw-on, turned edge covers for surface mounted boxes.
.3 102 mm square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster walls.
.4 102 mm square or octagonal outlet boxes for luminaires.

2.3 CONCRETE BOXES

.1 Electro-galvanized steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.4 CONDUIT BOXES

.1 Cast FS or FD aluminum boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacle.

2.5 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.
.2 Knock-out fillers to prevent entry of debris.
.3 Conduit outlet bodies for conduit up to 32 mm and pull boxes for larger conduits.
.4 Double locknuts and insulated bushings on sheet metal boxes.
.5 Double split rings for AC90 terminations.

3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.
.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
.3 For flush installations mount outlets flush within finished walls using plaster rings to permit wall finish to come within 6 mm of opening.
.4 Provide correct size of openings in boxes for conduit, and armoured cable connections. Reducing washers are not allowed.
.5 Vacuum clean interior of outlet boxes before installation of wiring devices.
.6 Identify systems for outlet boxes in accordance with Section 26 05 00 - Common Work Results - Electrical.
.7 Outlet boxes and conduit boxes to be flush mounted in new construction.
.8 Install vapour barrier boxes around all device boxes installed in acoustical wall types and structures. Fill void between device box and vapour barrier with isolating expansion foam where indicated.
.9 Install vapour barrier boxes around all galvanized steel device boxes recess mounted in exterior walls and structures.

END OF SECTION

1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA)
- .1 CSA C22.2 No. 45, Rigid Metal Conduit.
- .2 CSA C22.2 No. 56-04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .3 CSA C22.2 No. 83-M1985 (R2017), Electrical Metallic Tubing.
- .4 CSA C22.2 No. 227.3, Nonmetallic Mechanical Protection Tubing (NMPT), a National Standard of Canada.
- .5 CSA C22.2 No. 18.3-12 (2022), Conduit, Tubing, and Cable Fittings (Tri-National Standard with ANCE NMX-J-017 & UL 514B).
- .6 CSA 22.1-21, Canadian Electrical Code, Part 1, 25th Edition.

1.2 SUBMITTALS

.1 Provide shop drawings and product data in accordance with Division 01 - General Requirements.

1.3 LOCATION OF CONDUITS

.1 Drawings do not show all conduits. Those shown are in diagrammatic form only.

2 Products

2.1 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, hot dipped galvanized steel threaded.

.2 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.

.3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with steel set-screw couplings and connectors.
- .1 Exposed conduit in finished areas to be painted to match adjacent finished surfaces where indicated.

.4 Flexible metal conduit: to CSA C22.2 No. 56, aluminum flexible metal.

.5 FRE conduit: to CSA C22.2.

.6 Flexible PVC conduit: to CAN/CSA-C22.2 No. 227.3.

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 50 mm and smaller. Two hole steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits spaced every 1.5 m on center.

.4 Threaded rods, 6 mm dia., to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings: To CAN/CSA C22.2 No. 18.3, manufactured for use with conduit specified. Coating: same as conduit.

.2 Factory "ells" where 90° bends are required for 25 mm and larger conduits, unless indicated otherwise.

.3 Ensure conduit bends other than factory “ells” are made with an approved bender. Making offsets and other bends by cutting and rejoining 90 degree bends is not permitted.

.4 Connectors and couplings for EMT. Steel set-screw type, size as required.

2.4 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Watertight expansion fittings with integral bonding jumper suitable for 100mm linear expansion to suit installation and 19 mm deflection in all directions.
.2 Weatherproof expansion fittings for linear expansion at entry to panel.

2.5 FISH CORD

.1 Polypropylene.

2.6 SEALANT

.1 Low VOC mastic compound.
  .1 Acceptable material:
    .1 DS-321.
    .2 Flex Grip.
    .3 Kingco 11-600.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install all conduit, conduit fittings and accessories in accordance with the latest edition of the Canadian Electrical Code in a manner that does not alter, change or violate any part of the installed system components or the certification of the components.
.2 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
.3 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.
.4 Surface mount conduits except in finished areas or as indicated.
.5 Use rigid hot dipped galvanized steel threaded conduit for exposed work below 2.4 m above finished floor.
.6 Use epoxy coated conduit where exposed to exterior elements. (ie: pole mounted service entrance conduits)
.7 Use electrical metallic tubing (EMT) except in cast concrete and above 2.4 m not subject to mechanical injury, as well as concealed work in masonry construction.
.8 Use flexible metal conduit for connection to motors in dry areas, connection to recessed luminaires without a prewired outlet box.
.9 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.
.10 Use AC-90 for vertical power supply drops to luminaires.
.11 Minimum conduit size for lighting and power circuits: 21 mm. 16 mm conduit is acceptable for switch leg drops and control circuits only.
.12 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
.13 Mechanically bend steel conduit over 21 mm dia.
.14 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
.15 Install fish cord in empty conduits.
.16 Run 2 - 25 mm spare conduits up to ceiling space of Corridor 102. Terminate these conduits in 152 x 152 x 102 mm junction boxes in ceiling space.
.17 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
.18 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.
.2 Run conduits in flanged portion of structural steel.
.3 Group conduits wherever possible on suspended channels.
.4 Do not pass conduits through structural members except as indicated.
.5 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.
.2 Do not install horizontal runs in masonry walls.

3.5 CLEANING

.1 On completion and verification of performance of installation, remove surplus materials, excess materials rubbish, tools and equipment.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results - Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
  .1 CSA C22.2 No.184.1, Solid-State Dimming Controls (Bi-national standard with UL 1472).

1.3 SUBMITTALS

.1 Provide shop drawings and product data in accordance with Division 01 - General Requirements.
  .1 Submit product data sheets for lighting dimming control equipment. Include product characteristics, performance criteria, physical size, limitations and finish.
.2 Manufacturer’s Instructions: Provide to indicate special handling criteria, installation sequence and cleaning procedures.

2 Products

2.1 0 - 10 VDC CONTROL DIMMERS

.1 Operating voltage dimming: Control 0 - 10 VDC, 120V, 8A rated line voltage switch.
.2 ON/OFF rocker style or push button switch.
.3 Manual pre-set slide control for adjustment from maximum intensity to off, and minimum threshold adjustment to eliminate lamp flicker.
.4 Finish: White gloss.
.5 Five-year warranty.
.6 Complete with matching faceplate for single or ganged wall boxes.
.7 Suitable for installation in a one gang wall box.
  .1 Provide physical partition when ganged with one or more line voltage devices.
.8 Acceptable material:
  .1 Lutron #DVTV-WH (Single pole).
  .2 Wattstopper #RH4FBL3PW
  .3 Sensor Switch #sPODMRA D WH
  .4 Leviton

3 Execution

3.1 INSTALLATION

.1 Install dimmers and remote control stations in accordance with manufacturer's instructions.
.2 Connect luminaire circuits to dimmer power sections and power packs in accordance with the manufacturers wiring instructions.
.3 Install remote monitoring station.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 – Common Work Results - Electrical.
.2 Demonstrate that dimming systems are installed as indicated.
.3 Demonstrate that dimming systems operate as intended and that there are no problems in starting luminaires, nor in keeping them lit and flicker-free at any setting of dimming intensity control.

.4 Demonstrate that no audio, radio or TV interference is carried by system.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results - Electrical.
.2 Section 26 50 00 - Lighting.

1.2 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.

1.3 SYSTEM DESCRIPTION

.1 Occupancy sensors to turn lighting on when entering a controlled area and off after the area is vacated.
.2 Products sourced from a single manufacturer.

2 Products

2.1 TECHNOLOGY

.1 Passive infrared (PIR) sensing systems are passive and react only to energy sources. They detect the difference between heat emitted by the human body and the background space.
.2 Ultrasonic sensors (US) detect volumetric motion using the Doppler Principle to sense movement.
.3 Dual technology (DT) sensors use both PIR and US technologies.

2.2 PASSIVE INFRARED AUTOMATIC WALL SWITCH

.1 Advanced PIR technology wall switch to provide automatic control of lighting.
.2 Programmable for either Manual-ON or Automatic-ON.
.3 Digital time delay of 15 seconds to 30 minutes.
.4 LED to indicate occupancy detection.
.5 Adjustable unit sensitivity.
.6 No minimum load requirement.
.7 Compatible with all load types.
.8 Five-year warranty.
.9 Load: up to 800 W @ 120 V.
.10 Minimum coverage: 180 deg. - 290 sq.ft.
.11 Finish: White.
.12 Acceptable material:
    .1 Lutron #4-MS-OPS6M2-DV
    .2 Cooper Greengate #OSW-P-0801-120-W.
    .3 Wattstopper #PW-100.
    .4 Steinel #IR-WLS-1W
    .5 Sensor Switch #WSX WH

2.3 DUAL TECHNOLOGY CEILING SENSOR

.1 40 kHz frequency ultrasonic transmission, 120V line voltage.
.2 Digital time delay of 15 seconds to 30 minutes (fixed), walk-through or test-mode.
.3 Sensitivity adjustment.
.4 2000 sq.ft. of walking motion mounted at 10'.
.5 Dimensions: 4.5" diameter, 1" deep.
.6 Five year warranty.
.7 Acceptable material:
    .1 Sensor Switch #CMR.
    .2 Cooper Greengate

.3 WattStopper
.4 Steinel.
.5 Lutron

3 Execution

3.1 INSTALLATION

.1 Obtain complete installation instructions from manufacturer prior to rough-in.
.2 Review sensor locations on site prior to rough-in and install in location within room that provides maximum sensor coverage but confines coverage to the room. Motion outside the room is not to activate lighting within the room.
.3 Locate occupancy sensors on vibration-free surfaces at least 1.8 m away from air vents.
.4 Wire sensors into circuits as indicated to control luminaires in the indicated areas of coverage.
.5 Program sensors and timers with time delay off set to 15 minutes.
.6 Occupancy sensors are to be individually adjusted in accordance with the manufacturer's recommendations for the specific room in which they are installed, taking into account room shape, size and usage.
.7 Test for acceptable operation.
.8 Demonstrate operation to the satisfaction of the Consultant.

3.2 COMMISSIONING

.1 The system must be completely commissioned prior to interim inspection to verify optimum operation.
.2 Sensors must be added or relocated and patterns adjusted as required to eliminate nuisance turning on/off of luminaires.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 – Common Work Results - Electrical.
.2 Section 26 05 28 - Grounding - Secondary.
.3 Section 26 05 31 - Junction and Pull Boxes.
.4 Section 26 24 16.01 - Panelboards Breaker Type.
.5 Section 26 28 16.02 - Moulded Case Circuit Breakers.
.6 Section 26 28 23 - Disconnect Switches - Fused and Non-Fused.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit product data in accordance with Division 01 – General Requirements.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Division 01 – General Requirements.

1.4 SUPPLY DATA

.1 Power supply: 400A, 120/240V, 60 Hz, single phase, 3 wire, grounded neutral.

2 Products

2.1 EQUIPMENT

.1 Fused disconnect switch: in accordance with Section 26 28 23 - Disconnect Switches - Fused and Non-Fused, rating as indicated, approved for service entrance use.
.2 Panelboard breaker type: in accordance with Section 26 24 16.01 - Panelboards Breaker Type, rating as indicated.

3 Execution

3.1 INSTALLATION

.1 Install service equipment as indicated.
.2 Connect to incoming service as indicated.
.3 Connect to outgoing load circuits as indicated.
.4 Make grounding connections in accordance with Section 26 05 28 - Grounding – Secondary and Utility requirements.

END OF SECTION

This page intentionally left blank

1 General

1.1 SECTION INCLUDES

.1 Service equipment and installation.

1.2 RELATED WORK

.1 Section 26 05 21 - Wires and Cables (0-1000V).
.2 Section 26 05 28 - Grounding Secondary.
.3 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
.4 Section 26 24 03 - Surge Protection Equipment
.5 Section 26 28 13.01 - Fuses - Low Voltage.
.6 Section 26 28 23 - Disconnect Switches - Fused and Non-Fused.

2 Products

2.1 EQUIPMENT

.1 Service Rated disconnect: in accordance with Section 26 28 23 - Disconnect Switches - Fused and Non-Fused, rating as indicated.
.2 Enclosed Fuse: in accordance with Section 26 28 13.01 - Fuses - Low Voltage, rating as indicated.
.3 Surge Protection Equipment: in accordance with Section 26 24 03 - Surge Protection Equipment, rating as indicated.
.4 Meter Cabinet: to Utility requirements.
.5 Meter Socket: to Utility requirements.

3 Execution

3.1 INSTALLATION

.1 Coordinate incoming service with Utility on site.
.2 Install service equipment.
.3 Connect to incoming service. Size and quantity of secondary voltage cables to be supplied and installed by Division 26. Connection of secondary voltage cables to new Utility pole mounted transformer to be completed by Utility.
.4 Install surge protection equipment.
.5 Make grounding connections in accordance with Section 26 05 28 - Grounding - Secondary.
.6 Make provision for connection and installation of utility metering. Coordinate with utility on site.

END OF SECTION

This page intentionally left blank

1 General

1.1 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE).
  .1 ANSI / IEEE C62.41 IEEE Guide on the surge environment in low voltage AC power circuits.
.2 Canadian Underwriters Laboratories (ULC)
  .1 UL 1449. 4th Edition.
.3 Canadian Standard Association.
  .1 CSA 22.2 No. 269.2-13 - Surge protection devices (Type 2) permanently connected.

1.2 RELATED WORK

.1 Not Applicable.

1.3 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.
  .1 Written functional description of transient voltage surge suppressor (TVSS) components, configuration and performance.
  .2 Means of connection of the TVSS to the electrical distribution system, including all wiring diagrams showing field and factory connections and associated wire circuit breakers/fuse sizes.
  .3 CSA 22.2 No.269-13 information including the following, but not limited to:
    .1 Short circuit current rating (SCCR).
    .2 Voltage protection rating for all modes.
    .3 Maximum continuous operating voltage rating (MCOV)
    .4 I-nominal rating.

1.4 WARRANTY

.1 Ten (10) year warranty on unit from date of substantial completion.

2 Products

2.1 SURGE PROTECTION DEVICES

.1 Surge protection device for operation on a 120/240 V, 1 phase, 3 wire system to provide surge protection in accordance with and listed by C62.41 and CSA C22.2 No 269-13.
.2 A nameplate showing the electrical ratings, including UL1449 Surge Suppression ratings and the UL and CSA monograms is to be permanently affixed to the unit.
.3 200 kA SCCR minimum, and equal or greater to short circuit current available at the system being protected.
.4 TVSS device shall meet NEMA 3R requirements, when stand alone.
.5 TVSS devices shall be MOV based, and surge current should equally distributed to all MOV components.
.6 TVSS to be complete with a surge counter, push to test diagnostics switch, per phase and status LED's and Form 'C' alarm output contact rate at 1A and 120V for remote annunciator of TVSS status.
.7 SPD shall be CSA C22.2 No. 269.2-13 or cUL labelled with 20kA I-nominal (I-n).
.8 SPD shall provide surge current diversion paths for all modes of protection; L-N, L-G, N-G, and L-L in SPLIT PHASE and WYE systems, and L-L, L-G in High Resistive Ground and DELTA Systems.
.9 Minimum Single Impulse Surge Current Capability (single pulse rated) per phase shall be:
  .1 Single Impulse Surge Current Capacity is to be 300kA.

.10 CSA C22.2 No. 269.2-13 or UL/cUL 1449 4th Edition Listed Voltage Protection Ratings (VPRs) shall not exceed the following:

VOLTAGE	L-N	L-G	N-G	L-L
240Y/120V	700V	700V	700V	1200V

.11 CSA C22.2 No. 269.2-13 or UL/cUL 1449 Listed Maximum Continuous Operating Voltage (MCOV) for L-N, L-G, and N-G modes of protection (verifiable at www.csagroup.org or www.UL.com):

System Voltage	Allowable System Voltage Fluctuation (%)	MCOV
240Y/120V	25%	150V

3 Execution

3.1 INSTALLATION

.1 Contractor to allow for a 30 A, two pole breaker in distribution panel. Wire to unit in accordance with manufacturers wiring instructions.

.2 SPD shall be installed per manufacturer's installations instructions with lead lengths as short (less than 24") and straight as possible. Gently twist conductors together.

.3 Installer may reasonably rearrange breaker locations to ensure short and straightest possible leads to SPDs.

.4 Before energizing, installer shall verify service and separately derived system Neutral to Ground bonding jumpers are present per CEC C22.1-21, 25th Edition, Rule 10-204, 10-212, and 10-642(4).

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 Materials and installation for standard breaker type panelboards.

1.2 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results - Electrical.
.2 Section 26 28 16.02 - Moulded Case Circuit Breakers.

1.3 REFERENCES

.1 Canadian Standards Association (CSA)
  .1 CSA C22.2 No.29, Panelboards and enclosed Panelboards.

1.4 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.
.2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity, interrupting capacity, incoming feeder location, and enclosure dimensions.

2 Products

2.1 PANELBOARDS

.1 Panelboards: to CSA C22.2 No.29 and product of one manufacturer.
  .1 Install circuit breakers in panelboards before shipment.
  .2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.
.2 250 V panelboards: bus and breakers rated for 10,000 A (symmetrical) minimum interrupting capacity respectively or as indicated on electrical drawings.
.3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.
.4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.
.5 Two keys for each panelboard and key panelboards alike.
.6 Tin plated aluminum bus with neutral of same ampere rating as mains. Panelboards are to be supplied fully bussed.
.7 Mains: suitable for bolt-on breakers.
.8 Trim and door finish: baked grey enamel with concealed front bolts and hinges.
.9 Minimum tub width of 500 mm.

2.2 BREAKERS

.1 Breakers: to Section 26 28 16.02 - Moulded Case Circuit Breakers.
.2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.
.3 Main breaker: separately mounted on top of panel to suit cable entry. When mounted vertically, down position should open breaker.
.4 Lock-on devices are to be installed and branch circuit breakers are to be painted red for fire alarm, emergency, door supervisory, exit light and night light circuits as indicated.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 – Common Work Results - Electrical.
.2 Nameplate for each panelboard size 4 engraved as indicated.
.3 Nameplate for each circuit in distribution panelboards size 2 engraved as indicated.
.4 Complete circuit directory with typewritten legend showing location and load of each circuit.

2.4 MANUFACTURERS

.1 Acceptable material:
- .1 Schneider.
- .2 Siemens.
- .3 Cutler-Hammer.
- .4 Eaton
- .5 Square D

3 Execution

3.1 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.

.2 Install surface mounted panelboards on plywood backboards in accordance with Section 06 10 00 - Rough Carpentry. Where practical, group panelboards on common backboard.

.3 Install 25mm spare conduit up to accessible ceiling spac of Corridor 102 from each flush mounted panelboard. Terminate these conduit in a 152mm x 152mm x 102mm junction box located in the accessible ceiling space above the panelboard.

.4 Mount panelboards to height specified in Section 26 05 00 – Common Work Results - Electrical or as indicated.

.5 Connect loads to circuits.

.6 Connect neutral conductors to common neutral bus with respective neutral identified.

.7 Balance phase loading and complete testing in accordance with Section 26 05 00 - Common Work Results - Electrical.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results - Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
- .1 CSA-C22.2 No.42, General Use Receptacles, Attachment Plugs and Similar Devices.
- .2 CSA-C22.2 No.42.1, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
- .3 CSA-C22.2 No.111, General-Use Snap Switches (Bi-national standard, with UL 20, twelfth edition).

1.3 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.

2 Products

2.1 SWITCHES

.1 15 A, 120 V, single pole, double pole, three-way switches as indicated to: CSA-C22.2 No.55 and CSA-C22.2 No.111.

.2 Manually-operated general purpose AC switches with following features:
- .1 Terminal holes approved for # 10 AWG conductor.
- .2 Silver alloy contacts.
- .3 Suitable for side wiring.
- .4 White decora.
- .5 Commercial specification grade.

.3 Toggle operated fully rated for LED drivers/lamps and up to 80% of rated capacity of motor loads.

.4 Switches of one manufacturer throughout project.

.5 Acceptable material:
- .1 Hubbel #D5115 WHI.
- .2 Leviton #5691-W.
- .3 Pass and Seymour #2601-W.
- .4 Cooper.

2.2 RECEPTACLES

.1 Duplex receptacles, tamper resistant, CSA type as indicated, U ground, to: CSA-C22.2 No.42 with following features:
- .1 White thermoplastic moulded housing.
- .2 Suitable for # 10 AWG conductor for side wiring.
- .3 Break-off links for use as split receptacles.
- .4 Four side wiring screws.
- .5 Triple wipe contacts and rivetted grounding contacts.
- .6 Commercial specification grade.
- .7 Acceptable material:
  - .1 Decora Duplex, CSA type 5-15R and CSA type 5-20R:
    - .1 Cooper #DR15WTR, #DR20-WHTR.
    - .2 Hubbell #DR15-WHITR, #DR20-WHTRI.
    - .3 Leviton #DR15-WHTR, #DR20-WHTR.
    - .4 Pass & Seymour #26352WTR, #DR20-WHTR.

.2 Single receptacle, CSA type as indicated, to CSA-C22.2 No. 42 with the following features:

.1 White thermoplastic moulded housing.
.2 Suitable for back and side wiring.
.3 Acceptable material:
.1 Single, CSA.14-30R, 14-50R:
.1 Cooper #CW1430R, CW1450R.
.2 Hubbell #HBL 9430A, #HBL 9450A.
.3 Leviton #278, #279.
.4 Pass & Seymour #3864, #3894.

.3 Duplex ground fault circuit interrupter (GFCI) tamper resistant receptacles to have the following features:
.1 White thermoplastic housing.
.2 Suitable for side wiring.
.3 0.025s trip-time and 10,000 A maximum interrupting capacity.
.4 Integral test button and indicator light.
.5 Acceptable material:
.1 Decora Duplex CSA type 5-15R and CSA type 5-20R.
.1 Cooper #VGF15-W.
.2 Hubbell #GF15WLA.
.3 Leviton #N7599-WH.
.4 Pass & Seymour #1595W.

.4 Receptacles of one manufacturer throughout project.

2.3 COVER PLATES

.1 Cover plates for wiring devices to: CSA-C22.2 No.42.1.
.2 Cover plates from one manufacturer throughout project.
.3 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.
.4 Stainless steel cover plates as indicated, thickness 2.5 mm for wiring devices mounted in flush-mounted outlet box.
.5 Sheet metal cover plates with turned-in corners for wiring devices mounted in surface-mounted FS or FD type conduit boxes.
.6 Weatherproof double lift spring-loaded cast aluminum cover plates, complete with while-in-use gaskets for GFCI duplex receptacles indicated as weatherproof.
.1 Acceptable manufacturer or approved equal.
.1 Hubbell Taymac MM Series.
.7 Weatherproof spring-loaded cast aluminum cover plates complete with gaskets for single receptacles or switches.
.8 All wiring device cover plates to be labeled using clear, self adhesive vinyl strips with black type lettering identifying panel and circuit number for each device. White vinyl strips will not be permitted.

3 Execution

3.1 INSTALLATION

.1 Switches:
.1 Install single throw switches with handle in "UP" position when switch closed.
.2 Install switches in gang type outlet box when more than one switch is required in one location.
.3 Mount switches at height in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Receptacles:
.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
.2 Mount receptacles at height in accordance with Section 26 05 00 - Common Work Results - Electrical.

.3 Do not use back entrances for connecting wiring devices to circuits. Wrap conductors around screw terminals and tighten. Tighten all unused screw terminals.

.3 Cover plates:

.1 Protect cover plate finish with paper or plastic film until painting and other work is finished.

.2 Install suitable common cover plates where wiring devices are grouped.

.3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

.4 Do not install outlet boxes back-to-back in wall; allow 150 mm horizontal clearance between boxes.

3.2 TESTING

.1 All receptacles to be tested for voltage drop and results recorded where branch circuit voltage drop exceeds 3% from branch circuit panelboard to the point of utilization, in accordance with the Canadian Electrical Code, branch circuit wiring will have to be modified to meet the 3% requirement unless otherwise approved by the Authority Having Jurisdiction.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results - Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
  .1 CSA C22.2No.248.12, Low Voltage Fuses Part 12: Class R (Bi-National Standard with, UL 248-12 (1st Edition).

1.3 SUBMITTALS

.1 Submit fuse performance data characteristics for each fuse type and size above 600 A. Performance data to include: average melting time-current characteristics.

1.4 DELIVERY AND STORAGE

.1 Ship fuses in original containers.
.2 Do not ship fuses installed in disconnect switch.

1.5 MAINTENANCE MATERIALS

.1 Provide maintenance materials in accordance with Division 01 - General Requirements.
.2 Six spare fuses of each type and size installed up to and including 600 A.

2 Products

2.1 FUSES GENERAL

.1 Fuse type references L1, L2, J1, R1, etc. have been adopted for use in this specification.
.2 Fuses: product of one manufacturer for entire project.

2.2 FUSE TYPES

.1 Class J fuses (formerly HRCI- J).
  .1 Type J1, time delay, capable of carrying 500% of its rated current for 10 s minimum.
  .2 Type J2, fast acting.
.2 Class R -R fuses (formerly HRCI- R). For UL Class RK1 fuses, peak let-through current and its' peak let-through values not to exceed limits of UL 198E-1982, table 10.2.
  .1 Type R1, (UL Class RK1), time delay, capable of carrying 500% of its rated current for 10 s minimum, to meet UL Class RK1 maximum let-through limits.
  .2 Type R2, time delay, capable of carrying 500% of its rated current for 10 s minimum.
  .3 Type R3, (UL Class RK1), fast acting Class R, to meet UL Class RK1 maximum let-through limits.

3 Execution

3.1 INSTALLATION

.1 Install fuses in mounting devices immediately before energizing circuit. Ensure correct fuses fitted to physically matched mounting devices.
  .1 Install Class R rejection clips for HRCI-R fuses.
.2 Ensure correct fuses fitted to assigned electrical circuit.
.3 Where UL Class RK1 fuses are specified, install warning label "Use only UL Class RK1 fuses for replacement" on equipment.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results - Electrical.

1.2 REFERENCES

.1 American National Standards Institute (ANSI) / Institute of Electrical and Electronics Engineers (IEEE)
  .1 ANSI/IEEE C37.13, Low Voltage AC Power Circuit Breakers Used in Enclosures.
.2 Canadian Standards Association (CSA)
  .1 CSA C22.2 No. 5, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).

1.3 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.
  .1 Include time-current phase protection co-ordination characteristic curves for breakers with ampacity 100 A and over or breakers with interrupting capacity of 22,000 A (symmetrical) and over at system voltage.

2 Products

2.1 MOULDED BREAKERS GENERAL

.1 Moulded-case circuit breakers, to CSA C22.2 No. 5.
.2 Bolt-on moulded-case circuit breaker: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40 deg. C ambient.
.3 Common-trip breakers: with single handle for multi-pole applications.
.4 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection. Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
  .1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.
.5 Circuit breakers with interchangeable trips on units over 225 A as indicated.
.6 Breakers are to be by the same manufacturer as the panelboard in which they are being installed.
.7 Circuit breakers to match panelboard interrupting capacity with minimum 10 kA at 240 V.
.8 Breakers must be new, complete with original factory warranty and supplied from an authorized manufacturer's distributor.

2.2 OPTIONAL FEATURES

.1 Lockout devices.
.2 Padlocking provision.

3 Execution

3.1 INSTALLATION

.1 Connect main secondary service to line terminals of breaker.
.2 Connect load terminals of breaker to feeders.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance Section 26 05 00 – Common Work Results - Electrical

.2 Check factory made connections for mechanical security and electrical continuity.
.3 Check trip unit settings and to ensure proper working operation and protection of components.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results - Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
  .1 CAN/CSA C22.2 No. 4-89 (R2000), Enclosed Switches.

1.3 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.

2 Products

2.1 DISCONNECT SWITCHES

.1 Fusible and non-fusible, horsepower rated disconnect switch in CSA Enclosure type 1, or type 3R as indicated on the drawings, to CAN/CSA C22.2 No. 4, size as indicated.
  .1 Provide service rated disconnect switch complete with neutral bus and sprinkler proof enclosure for main service.
.2 Provision for padlocking in on-off switch position by three locks.
.3 Mechanically interlocked door to prevent opening when handle in ON position.
.4 Fuses: size as indicated, to Section 26 28 13.01 - Fuses - Low Voltage.
.5 Fuseholders: suitable without adaptors, for type and size of fuse indicated.
.6 Quick-make, quick-break action.
.7 ON-OFF switch position indication on switch enclosure cover.

2.2 MANUFACTURERS

.1 Acceptable material:
  .1 Schneider.
  .2 Siemens.
  .3 Cutler-Hammer.
  .4 Eaton.
  .5 Square D.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 – Common Work Results - Electrical.
.2 Indicate name of load controlled on size 4 nameplate.

3 Execution

3.1 INSTALLATION

.1 Install disconnect switches complete with fuses as indicated.
.2 Ensure proper working operation, protection of components and work space clearances around disconnect switch.
.3 In finished areas mount disconnect switches on top of flush mounted junction box with conduit nipple on its coverplate into the back of the switch.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results - Electrical.

1.2 REFERENCES

.1 International Electrotechnical Commission (IEC)
  .1 IEC 947-4-1-1990, Part 4: Contactors and motor-starters.

1.3 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.
.2 Product data to indicate:
  .1 Mounting method and dimensions.
  .2 Starter size and type.
  .3 Layout of identified internal and front panel components.
  .4 Enclosure types.
  .5 Wiring diagram for each type of starter.
  .6 Interconnection diagrams.

2 Products

2.1 MATERIALS

.1 Starters: to IEC 947-4 with AC4 utilization category.

2.2 MANUAL MOTOR SWITCHES

.1 Manual switch, 1, 2 or 3 poles as required. Mounted in CSA 1 Enclosure with quick-make, quick-break toggle switch.
.2 Rated for 30 A at 250 V AC.
.3 Shielded toggle with provision to be padlocked in ON or OFF positions.
.4 Acceptable material:
  .1 Cutler-Hammer #B230AG.
  .2 Square D Class #2510, Type K.
  .3 Hubbell No. #7832.
  .4 Siemens Class 12.

2.3 ENCLOSURE

.1 Enclosure: CSA type 1 unless indicated otherwise.

2.4 FINISHES

.1 Apply finishes to enclosure in accordance with Section 26 05 00 - Common Work Results - Electrical.

2.5 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.
.2 Manual switch designation label, white plate, black letters, size 1, engraved as indicated.

3 Execution

3.1 INSTALLATION

.1 Prior to installation verify motor sizes with division supplying motor to ensure starter and overload relay match equipment being supplied.
.2 Install starters, connect power and control as indicated.
.3 Ensure correct fuses and overload devices elements installed. Adjust overload relay settings or install new thermal overload onsite to match motor nameplate.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical and manufacturer's instructions.
.2 Operate switches, contactors to verify correct functioning.
.3 Perform starting and stopping sequences of contactors and relays.
.4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.

END OF SECTION

1 General

1.1 REFERENCES

.1 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE).
  .1 ANSI/IEEE C62.41, Surge Voltages in Low-Voltage AC Power Circuits.
.2 Illuminating Engineering Society of North America (IESNA).
  .1 LM-79, Photometric Measurements of Solid State Lighting Products.
  .2 LM-80, Measuring Lumen Maintenance of LED Light Sources.
  .3 TM-21, Projecting Long Term Lumen Maintenance of LED Light Sources.
.3 United States of America, Federal Communications Commission (FCC).
  .1 FCC (CFR47) EM and RF Interference Suppression.

1.2 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results - Electrical.

1.3 SUBMITTALS

.1 Submit complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Owner’s Representative.
.2 Photometric data to include: VCP Table and spacing criterion and luminaire coefficient of utilization (CU) tables and/or electronic IES files.
.3 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
.4 Quality assurance submittals: provide the following in accordance with Division 01 - General Requirements.
  .1 Manufacturer's instructions: provide manufacturer's written installation instructions and special handling criteria, installation, wiring, operation and cleaning procedures.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Division 01 - General Requirements.
.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

1.5 ACCEPTABLE MATERIAL

.1 Luminaires described in the Luminaire Schedule identify the minimum standard of quality and performance criteria which is acceptable for product. Named fixtures are acceptable with modifications and accessories as indicated.
.2 Fixtures from other manufacturers may be acceptable provided:
  .1 Appearance and lighting performance are similar.
  .2 Quality is equal or better.
  .3 Luminaire performance is equal or better.
  .4 The fixture is provided with modifications and accessories to provide a complete product in keeping with the intent of the project.
  .5 Approval in writing is obtained from the Consultant to the Contractor five (5) days prior to tender closing date.

2 Products

2.1 LED DRIVERS

.1 Power supply units including drivers:
  .1 Minimum efficiency of 85%.
  .2 Operate between -40°C and +50°C.
  .3 120 V (±10%) input voltage; UL Class 1 or 2 output.

.4 Dimmable where indicated in Luminaire Schedule
.5 Power factor greater than or equal to 0.90; total harmonic distortion less than or equal to 20%.
.6 Located with luminaire housing or remote as indicated.
.7 Minimum five (5) year warranty.

2.2 LED LUMINAIRES

.1 Proposed equal fixtures not listed in the Luminaire Schedule must meet or exceed the overall performance requirements of the specific space without requiring changes to designed branch circuiting due to higher power consumption.
.2 Luminaire efficacy to be a minimum of 90 lumens/watt, unless noted otherwise in the Luminaire Schedule.
.3 Color rendering index to be a minimum 80 for all lighting.
.4 Color temperature as indicated in the Luminaire Schedule.
.5 Luminaire shall be tested using IESNA LM-79-08, in situ temperature measurement test (ISTMT) and IESNA LM-80-08 in an EPA recognized laboratory.
.6 A minimum of L70 = 50,000 hours or L90 = 36,000 hours as calculated using IESNA TM-21-11 standard.
.7 Luminaire distribution to be as indicated on the Luminaire Schedule.
.8 Minimum five (5) year warranty on complete LED system including LED modules and driver.

2.3 FINISHES

.1 Light fixture finish as indicated in Luminaire Schedule. Finish to meet ULC listings and CSA certifications related to intended installation.

2.4 LUMINAIRES

.1 As indicated in Luminaire Schedule on drawings. Provide 10% spare Type A1 & A2 luminaires.

3 Execution

3.1 INSTALLATION

.1 Locate and install luminaires as indicated on the drawings and in accordance with manufacturers installation instructions.
  .1 Provide adequate support to suit ceiling system.

3.2 WIRING

.1 Connect luminaires to lighting circuits.
  .1 Install flexible conduit for vertical power supply drop to luminaires as indicated. Horizontal wiring using flexible conduit is not permitted.

3.3 LUMINAIRE SUPPORTS

.1 For suspended ceiling installations support luminaires from ceiling grid in accordance with local inspection requirements.
.2 Provide additional supports connected directly to building structure as required by manufacturer. Coordinate installation of additional support infrastructure with General Contractor prior to installation of suspended ceiling grid.

3.4 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted in continuous rows to form straight uninterrupted line.
.2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

3.5 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 – Common Work Results - Electrical

3.6 CLEANING

.1 Luminaire lenses, housings, louvers, etc., are to be cleaned upon completion of construction in accordance with Division 01 - General Requirements.

END OF SECTION

This page intentionally left blank

1 General

1.1 SECTION INCLUDES

.1 Materials and installation for emergency lighting systems.

1.2 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results – Electrical.
.2 Section 26 05 21 - Wires and Cables (0-1000 V).
.3 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

1.3 REFERENCES

.1 Canadian Standards Association (CSA)
  .1 CSA C22.2 No.141, Unit Equipment for Emergency Lighting.

1.4 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements. Product data to indicate system components, mounting method, source of power and special attachments.

1.5 WARRANTY

.1 For batteries, the ten years warranty period is extended to 120 months, with no-charge replacement during the first 5 years and pro-rate charge on the second 5 years from the date of Substantial Completion.

2 Products

2.1 EMERGENCY LIGHTING

.1 Emergency lighting equipment: to CSA C22.2 No.141.
.2 Supply voltage: 120 V, AC.
.3 Output voltage: 24 V DC , 50W.
.4 Operating time: 30 minutes to NBCC 2015.
.5 Battery: sealed, maintenance free.
.6 Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01V for plus or minus 10% input variations.
.7 Solid state transfer circuit.
.8 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.
.9 Signal lights: solid state, for 'AC Power ON'.
.10 Lamp heads: integral on unit and remote, 345 degrees horizontal and 180 degrees vertical adjustment. Lamp type: 4W MR16 LED.
.11 Cabinet: suitable for direct mounting to wall and c/w knockouts for conduit. Removable or hinged front panel for easy access to batteries.
.12 Finish: standard.
.13 Auxiliary equipment:
  .1 Test switch.
  .2 AC input and DC output terminal blocks inside cabinet.
  .3 RFI suppressors.
.14 As an alternate to emergency lighting battery packs and remote heads throughout the rooms, Contractor to provide for a minimum of two (2) lighting fixtures throughout the rooms and four (4) lighting fixtures throughout Corridor 102 and 103, complete with built-in emergency lighting and one (1) 150W emergency lighting battery pack located in Mech / Elec 118. Confirm alternate proposal to emergency lighting with Consultant prior to purchase.

2.2 MANUFACTURER

.1 Acceptable material (Emergency Lighting Battery Pack):
- .1 Aimlite #EBST12-12V050W-2MD4WLRWHT
- .2 Ready-Lite #LDX12-72-2-LD7.
- .3 Lumacell #RG12C722ld7
- .4 Stanpro #SLA12-4LR-2M4WLRWH

.2 Acceptable material (Remote Heads):
- .1 Aimlite #RMMD1[2]-6-24-4WLRWHT.
- .2 Lumacell #MGM1[2]LD7.
- .3 Ready-Lite #RM1[2]LD7.
- .4 Stanpro #S1[2]-6-24-4WLRWH.

2.3 WIRING OF REMOTE HEADS

.1 Conduit: type EMT, in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

.2 Conductors: RW90 type in accordance with Section 26 05 21 - Wires and Cables (0-1000 V) sized as indicated in accordance with manufacturer's recommendations.

3 Execution

3.1 INSTALLATION

.1 Install unit equipment and remote mounted fixtures.

.2 Direct heads.

.3 Connect exit lights to unit equipment.

.4 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results - Electrical.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
  .1 CSA C22.2 No.141, Unit Equipment for Emergency Lighting.
  .2 CSA C860, Performance of Internally-Lighted Exit Signs.
.2 National Fire Protection Association (NFPA)
  .1 NFPA 101, Life Safety Code.

1.3 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements:
  .1 Product data to include performance criteria, physical size, finish and limitations.
.2 Manufacturer’s Instructions: Provide to indicate special handling criteria, installation sequence, cleaning procedures and disposal.

2 Products

2.1 EXIT SIGNS

.1 Exit signs: to CSA C22.2 No.141 and CSA C860.
.2 120 VAC normal power.
.3 Housing: plastic c/w white powder coat finish.
.4 Face: Edge lit acrylic with pictorial white running man on green face with chevrons as indicated on drawings.
.5 Lamps: multiple - LED - 120 V input, 4 W.
.6 10 years unconditional Parts and Labour Warranty.
.7 Double or single face, universal wall or ceiling mounted as indicated on the drawings.
.8 Acceptable material:
  .1 Lumacell #LP Series.
  .2 Ready-Lite #RP Series.
  .3 Aim-Lite #RPSP Series.
  .4 Stanpro #RMPS Series.

3 Execution

3.1 INSTALLATION

.1 Install exit lights to manufacturer's recommendations, listing requirements, code and local regulatory requirements.
.2 Connect fixtures to exit light circuits using RW90 wire in EMT conduit.
.3 Ensure that exit light circuit breaker is locked in on position.
.4 Provide tests in accordance with Section 26 05 00 - Common Work Results - Electrical.

3.2 CLEANING

.1 Clean Exit signs upon completion of construction in accordance with Division 01 - General Requirements.
.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results – Electrical.
.2 Section 26 05 28 – Grounding – Secondary.

1.2 REFERENCES

.1 American National Standards Institute.
  .1 ANSI J-STD-607-D, Joint Standard - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
.2 Telecommunications Industries Association (TIA)/Electronic Industries Alliance (EIA).
  .1 TIA/EIA-606-C, Administration Standard for the Commercial Telecommunications Infrastructure.

1.3 SYSTEM DESCRIPTION

.1 Telecommunications grounding and bonding system consists of, but not limited to grounding busbars, bonding backbones, and other bonding conductors.
.2 Provides ground reference for telecommunications systems within building and bonding to it of telecommunications rooms.
.3 Metallic pathways, cable shields, conductors, and hardware within telecommunications spaces are bonded to telecommunications grounding and bonding system.

2 Products

2.1 TELECOMMUNICATIONS MAIN GROUNDING BUSBAR (TMGB)

.1 Predrilled copper busbar, listed by NRTL, electrotin plated with holes 1/3" diameter for use with standard-sized lugs to: ANSI J-STD-607-A.
.2 Dimensions 1/4" thick, 4" wide, 12" long on insulated supports to: ANSI J STD-607-D.
.3 Acceptable material:
  .1 Erico #TMGB-A14L15PT

2.2 BONDING CONDUCTOR FOR TELECOMMUNICATIONS (BCT)

.1 Copper stranded conductor, green insulated marked to: ANSI J-STD-607-A.

2.3 WARNING LABELS

.1 Non-metallic warning labels adjacent to all backbone and bonding conductor terminations in English to: ANSI J-STD-607-D.
.2 Identify labels with wording "If this connector is loose or must be removed, please call the building telecommunications manager".

3 Execution

3.1 TELECOMMUNICATIONS MAIN GROUNDING BUSBAR (TMGB)

.1 Install TMGB in Mech/Elec Room 118 at location indicated.
.2 Install #1/0 AWG copper bonding conductor in 21mmC from TMGB to alternating current equipment ground at service entrance.
.3 Use 2 hole compression lugs for grounding connections.

3.2 BONDING CONDUCTORS GENERAL

.1 Ensure all data/ telephone system conduits are properly grounded. For conduit drops at workstation locations and for sleeves, install ground bushings and a #14 AWG green insulated bonding conductor to closest grounded raceway or junction box. Use #6 AWG green

insulated bonding conductor for connections in Mech/Elec Room 118.

3.3 BONDING FOR TELECOMMUNICATIONS

.1 Bond metallic raceways in Mech/Elec Room 118 to TMGB using #6 AWG green insulated copper conductor.

.2 For cables within Mech/Elec Room 118 having shield or metallic member, bond shield or metallic member to TMGB using #6 AWG green insulated copper conductor.

.3 Bond equipment rack and cabinets located in Mech/Elec Room 118 to TMGB using #6 AWG green insulated copper conductor.

3.4 LABELLING

.1 Apply warning labels to telecommunications bonding and grounding conductors.

.2 Apply additional administrative labels to: TIA/EIA-606.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results - Electrical.
.2 Section 26 05 31 - Junction and Pull Boxes.
.3 Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.
.4 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
.5 Section 27 05 26 - Grounding and Bonding for Communications Systems.

1.2 REFERENCES

.1 American National Standards Institute:
  .1 ANSI/TIA-569-E, Telecommunications Pathways and Spaces.
  .2 ANSI/TIA-606C, Administration Standard for Commercial Telecommunications Infrastructure.

1.3 SYSTEM DESCRIPTION

.1 Telecommunications pathway system consists of, but not limited to outlet boxes, conduits, pull boxes, fish wires, and J-hooks.

1.4 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.

2 Products

2.1 MATERIAL

.1 Conduits: type, in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.
.2 Outlet boxes: 4" sq. with single device cover and fittings: in accordance with Section 26 05 32 – Outlet Boxes, Conduit Boxes and Fittings.
.3 J-hook support clips: Caddy “CableCat Clip”.
  .1 Acceptable material:
    .1 Caddy "Cable CAT Clip".
    .2 Cooper B-Line.
.4 Velcro cable ties:
  .1 Acceptable material:
    .1 Panduit #HLS-15RO.

3 Execution

3.1 INSTALLATION

.1 Install raceway system, including outlet boxes, conduit, miscellaneous and positioning material to constitute complete system.
.2 Install conduit from data/telephone outlet box locations to accessible corridor ceiling space. Use 21mm EMT conduit for communications outlet complete with two (2) or less drops and 27mm EMT conduit for communications outlet complete with three (3) or more drop. Use 100mm x 100mm x 50mm device boxes with single gang plaster rings at outlet box locations.
.3 Ensure all data/ telephone system conduits are properly grounded. Where required, install ground bushings and a #14 AWG bare bonding conductor to closest grounded raceway or junction box, or #6 AWG, where indicated.
.4 Communications conduits in telecommunications rooms are to be bonded to ground in accordance with Section 27 05 26 - Grounding and Bonding for Communications Systems.
.5 Dress cabling using Velcro cable ties. The use of nylon or plastic ties is not permitted.

.6 Cable management in accessible ceiling spaces.
  .1 J-hook supports as required to support loose cable bundles at 1000 mm maximum spacing to point of entry into conduit system.
  .2 Provide support for individual cables using velcro ties at 1000 mm maximum spacing to point of entry into conduit system.

.7 All zone conduit are to be identified and labelled at both ends and at pull boxes to TIA-606 and TIA-569. Tags are to identify start and finish of conduit runs.

.8 Pullboxes for communications cabling are to be installed at a reasonable height in an exposed location, such that access for installation of cables is not prohibited. Pullboxes are to not be installed above gypsum or inaccessible ceiling types unless immediately above a suitably sized access hatch. Provide indicator vinyl decals on ceiling T-bar rail identifying location of pullbox above.

.9 Cable fill capacities of conduit and raceways is to be maximum 40%.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results – Electrical.
.2 Section 27 05 26 – Grounding and Bonding for Communications Systems.
.3 Section 27 05 28 – Pathways for Communications Systems.

1.2 REFERENCES

.1 Canadian Standards Association
  .1 CSA-C22.2 No. 214-02, Communications Cables (Bi-National standard with UL 444).
.2 Telecommunications Industry Association (TIA)
  .1 ANSI/TIA-568.0-E Generic Telecommunications Cabling for Customer Premises.
  .2 ANSI/TIA-568.1-E Commercial Building Telecommunications Cabling Standard.
  .3 ANSI/TIA-568.2-D Balanced Twisted-Pair Telecommunications Cabling and Components Standards.
  .4 ANSI/TIA-569-E, Telecommunications Pathways and Spaces.
  .5 ANSI/TIA-606-C, Administration Standard for Commercial Telecommunications Infrastructure.
  .6 ANSI/TIA-607-D, Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.
  .7 ANSI/TIA-1152-A, Requirements for Field Test Instruments and Measurements for Balanced Twisted Pair Cabling.
  .8 Government of Canada Workplace Fit-up - Special Technical Standards Guidelines (Section A4), Telecommunications (Cable Networks) Pathways and Spaces - Planning and Implementation.
.3 BICSI - Building Industry Consulting Service International:
  .1 Telecommunications Distribution Methods Manual 13th Edition.
  .2 ANSI/NECA/BICSI-568-2006, Standard for Installing Commercial Building Telecommunications Cabling.

1.3 SYSTEM DESCRIPTION

.1 Structured telecommunications wiring system consist of unshielded-twisted-pair cables, terminations, connectors, cross-connection hardware, racks, and related equipment installed inside building for occupant's telecommunications systems.

1.4 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.
.2 The Contractor shall generate shop drawings for approval prior to commencement of work. Shop drawings shall include cable routes, conduit penetration locations, elevation drawings of equipment racks, patch panels, termination blocks, connection details, rack mounting details and other relevant details not included in the construction drawings.
.3 As-built Records and Drawings:
  .1 Provide and place one hard copy of as-built records in telecommunications room.

1.5 QUALITY ASSURANCE

.1 All cabling, termination hardware and connecting cords to be sourced from a certifying manufacturer to assure quality control.
.2 The system is to have an end-to-end 20-year warranty against defects in materials and labour. Certified system vendor to repair or replace any failed component, including labour at no cost to the Owner. Provide system test results, certificates and warranty in Maintenance Manuals.

.3 Contractor shall be a licensed to install telecommunications systems in the locale where work will be performed.

1.6 DELIVERY, STORAGE AND PROTECTION

.1 Materials and equipment furnished shall be delivered in new condition and be of current production lots.
.2 Contractor shall ensure that material deliveries to work site shall be coordinated with construction manager responsible for materials distribution to all trades. Handle in accordance with Manufacturer's recommendations and instructions to avoid damaging equipment, installed devices and finish.
.3 Contractor shall coordinate for the removal of all rubbish and packing materials produced by the Contractor's activities during the project.
.4 Contractor shall ensure materials are stored according to Manufacturer's recommendations. In addition, materials must be stored in a location protected from vandalism and weather.

2 Products

2.1 HORIZONTAL DATA/TELEPHONE CABLES

.1 100 OHM, 4 pair, 24 AWG U/UTP Balanced Twisted Pair Cable - CMR/FT4.
  .1 Cable shall comply with ANSI/TIA-568.2-D, ISO/IEC 11801, EN50173 Category 6, IEC 61156-5 standards and be RoHS Compliant.
  .2 Cable shall be 4pr 24 awg U/UTP construction and available in CMR/FT4 fire rating.
  .3 Cable to have an operating temperature range of -20°C to 75°C.
  .4 Cable to be available in 305 m reel in a box.
  .5 Cable to be compliant with Manufacturer's performance warranty criteria.
  .6 Jacket printed at intervals not exceeding 300 mm indicating cable code, AWG, UL and CSA designations and quarter and year of manufacture.
    .1 Jacket colour to be blue for data, white for telephone and yellow for WAP.
  .7 Acceptable material (CAT 6):
    .1 Leviton eXtreme #UTP6P-M*S *-color;
    .2 Belden #2412;
    .3 Panduit PUP6004;
    .4 Systimax 1071E.

2.2 DATA/TELEPHONE OUTLETS

.1 Category 6 Data and Telephone Outlets.
  .1 The modular connectors shall be independently tested and verified by a Nationally Recognized Testing Laboratory to meet or exceed the Category 6 component performance requirements of ANSI/TIA-568.2-D.
  .2 The connectors shall also be in compliance with US National Electrical Codes; compliant with ANSI/TIA-1096-A (formerly FCC Part 68); UL listed; and independently verified.
    .1 IEEE 802.3at (Type 1) Power over Ethernet (PoE) applications up to 15.4 watts.
    .2 IEEE 802.3bt (Type 4) Power over Ethernet (PoE+) applications up to 90 watts.
  .3 The connector module shall utilize an engineered method to prevent PoE arcing damage from occurring at the critical contact-mating zone between the plug and connector module tines.
  .4 The modular connector shall be individual snap-in style.
  .5 Termination of all connectors shall be 110-type insulation displacement connectors (IDC).
  .6 Rear termination field shall include pointed pair separation towers to promote easier installation.

.7 The connector module shall be designed for use at the work area, communications room and/or equipment room without modification.
.8 Connector wiring is universal and will accommodate installation color codes for T568A and T568B wiring schemes and incorporate Dual-layer T568B/T568A wiring labels.
.9 The termination field shall be 180° configuration such that the punch field is in the back, allowing for easy access rear terminations.
.10 The modular connector shall fit all other installed telecommunications wallplates, outlets and field-configurable patch panels and patch blocks.
.11 The connector module shall have an insulation displacement connection featuring insulation slicing of 22 to 24 AWG plastic-insulated solid copper conductors forming a gas-tight connection.
.12 All plastics used in construction of the connector bodies shall be fire-retardant with a UL flammability rating of 94V-0.
.13 Modular outlet color: blue for data, white for telephone and yellow for WAP.
.14 4-port white interface plate. Provide blanking fillers for unused ports. Interface plate to accept two (2) Category 6 data modular outlets and one (1) telephone modular outlet. Where required, provide interface plates that support additional modular outlets.
.15 Acceptable material:
.1 Belden PS6 modules c/w 4 port faceplate.
.2 Leviton Extreme 61110-RW6 module c/w 4 port 42080-4WS faceplate.
.3 Panuit CJ688TP modules c/w 4 port CFPE faceplate.
.4 Systimax MGS400 Series c/w 4 port M-Series modular faceplate.

2.3 TERMINATION EQUIPMENT FOR TELEPHONE CONDUCTORS

.1 Terminate backbone and telephone cables for fire alarm system on wall mount cross connect system. Provide quantity of components as required.
.2 Terminate new telephone cables on existing BIX field located in main electrical room with TIA/EIA-568-B.2 pin assignment.
.3 The cross-connect system shall be Category 6 110-style wiring bases, mountable to wall or backboard to provide 110 or BIX termination capable of supporting voice, security, and data applications, including high megabit and shared-sheath applications when used with Category 5e rated cabling.
.4 The components shall be UL listed and ANSI/TIA-568-D compliant.
.5 Bases shall support 50, 100 or 300 pair densities with provision for ANSI/TIA-606-C compliant labeling.
.6 Plastic bases and blocks shall be made of fire-retardant plastic rated UL 94V-0.
.7 Wall mount cross connect system comprised of the following components:
.1 Distribution connectors for 25 pair connections.
.2 Mounts for distribution connectors
.3 Designation labels
.4 Designation strips
.5 Distribution rings
.8 Quantities as required, plus 25% spare capacity.
.9 Acceptable Material:
.1 Belden;
.2 Leviton;
.3 Panduit;
.4 Systimax.

2.4 CABLE SUPPORTS

.1 Conduit in accordance with Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.
.2 J-hook and velcro ties in accordance with Section 27 05 28 – Pathways for Communications Systems.

2.5 UTP CROSS-CONNECT PATCH CORDS

.1 3' long, colour to match horizontal cabling jacket colour, with factory-installed male plug at one end to mate with RJ-45 jack and with factory-installed male plug at other end to mate with RJ-45 jack Category 6,, 4 pairs to: TIA/EIA-568.2-D

.2 Patch cords shall be UTP construction, stranded 24 AWG conductors, and an 8-position modular plug on each end.

.3 Patch Cords shall feature a narrow profile snagless strain relief boot.

.4 Patch cords shall meet UL 444 CM rating.

.5 The cords shall be available in 3', 5', 7', 10', 15', and 20' lengths.

.6 Acceptable material:

- .1 Belden GigaFlex PS6+.
- .2 Leviton eXtreme slimline patch cords #6D460-03 color.
- .3 Systimax GS8E XL Cat.6.
- .4 Panduit TX6 UTPSP.

.7 Provide 1 patch cord for each data drop and each telephone drop.

2.6 UTP WORK AREA CORDS

.1 7' long, colour to match horizontal cabling jacket colour, with factory installed male plugs on both ends to mate with RJ45 jack, Category 6 for data and telephone, 4 pairs: to TIA/EIA-568.2-D.

.2 Provide one patch cord for each data outlet and each telephone outlet.

.3 Specifications to meet UTP cross-connect patch cords above.

2.7 PATCH PANELS

.1 Category 6 for data modular patch panels, rack mounted, black in colour c/w mounting hardware.

.2 24 port patch panels as indicated with T568A-ISDN wiring assignment. Patch panels to be supplied fully populated with modular outlets.

.3 Mounts in two rack space units (1RU) of a 487mm EIA-310-D compliant rack.

.4 Front and rear port identification complete with labels.

.5 Connectors:

- .1 Punch down UTP connector, modular, insulation displacement connection type.
- .2 Quiet front, with fully recessed clips.
- .3 Built-in wire pair splitters.

.6 Acceptable material:

- .1 Belden 24 port FLEX Patch Panel.
- .2 Leviton 24 port Quickport patch panel.
- .3 Panduit 24 port CPP series patch panel.
- .4 Systimax 24 port Patchmax Patch Panel.

2.8 DATA RACK

.1 New 24 rack-unit wall mounted data rack for communications distribution equipment to be 23.4" (wide) x 49.1" (high) x 26" (deep), EIA compliant, with a weight capacity of 250 lbs.

.2 Enclosure to be 16-gauge steel, black powder coat finish with a lockable door c/w black plexiglass viewing panel.

.3 Rack to include D-Ring cable management c/w 1/2", 1" and 2" conduit knockouts at top and bottom of back pan.

.4 Acceptable material:

- .1 Mid Atlantic #DWR-24-26PD.

2.9 IDENTIFICATION

.1 Each modular jack to be identified with an alpha/numeric label.

.2 Each horizontal cable to have identification markers installed on both ends. Identification markers to be self adhesive vinyl, white background with printed black indelible block

lettering.

.3 Each patch panel or termination block to have corresponding labelling. Patch panels are to be labelled A, B, C, etc. with A being located near the top of the rack. The ports on each patch panel are to be labelled 1 to 24.

.4 Labelling to indicate rack number, patch panel letter and outlet number (i.e. 1A24 is rack 1, patch panel A, outlet 24).

3 Execution

3.1 INSTALLATION OF TERMINATION AND CROSS-CONNECT HARDWARE

.1 Install termination and cross-connect hardware on wall or in rack as indicated and according to manufacturers' instructions.

.2 Identify and label as indicated to: TIA/EIA-606-C.

3.2 INSTALLATION OF HORIZONTAL DATA AND TELEPHONE CABLES

.1 Cable shall be installed in accordance with ANSI/NECA/BICSI-568-2006 Standard manufacturer's recommendations and best industry practices.

.2 A plastic or nylon pull cord with a minimum test rating of 90 Kg (200 lb.) shall be co-installed with all cable installed in any conduit.

.3 Cable raceways shall not be filled greater than the ANSI/TIA-569-E maximum fill for the particular raceway type.

.4 Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.

.5 The cable's minimum bend radius and maximum pulling tension shall not be exceeded. Refer to manufacturer's requirements.

.6 If J-hooks are used to support cable bundles the J hooks shall be properly sized to accommodate the immediate need and future growth of the cable pathway. J Hooks shall be designed to control bend radius requirements of the cable categories being installed. J hooks shall be installed at intervals of 1m apart to effectively support and distribute the cable's weight and be randomly spaced.

.7 Cable supports shall utilize independent wires, support rods and associated hardware for suspension. At no point shall cable(s) rest on acoustic ceiling grids, T-bars, ceiling support wires, acoustical panels or other components of the suspended ceiling.

.8 The bundle size recommendations of ANSI/TIA TSB-184-A shall be followed as it pertains to current or future support for POE applications.

.9 Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

.10 Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the Contractor prior to final acceptance at no cost to the Owner.

.11 Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA-568.0-E document, manufacturer's recommendations and best industry practices.

.12 Leave a minimum of 12" of slack for twisted pair cables at the work area outlet. Cables shall be coiled in the in-wall box or surface-mount box if adequate space is present to house the cable coil without exceeding the manufacturers bend radius. In hollow-wall installations where box-eliminators are used, excess wire can be stored in the wall. Excess slack shall be loosely coiled and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable.

.13 When cables are being installed, slack (service loops) shall be provided at both ends to accommodate future changes in the structured cabling system. Slack should be included in all length calculations to ensure that the permanent link does not exceed 90 m (295 ft). The amount of cable slack required will depend on the size and layout of the connecting hardware.

.1 The recommended amount of cable slack shall be:

.1 2m in telecom spaces.
.2 30cm at work area outlet.

.14 Cables shall be neatly dressed at their respective termination device. Each terminating device shall be fed by an individual cable group separated and dressed back to the point of cable entrance into the rack or frame.

.15 Cables shall not be painted.

.16 Each cable shall be clearly labeled on the cable jacket behind the termination device at a location that can be viewed without removing the bundle support ties. Cables labeled where the label is obscured from view shall not be acceptable.

.17 Comply with TIA-569-D recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.

3.3 INSTALLATION OF VOICE AND DATA MODULAR JACKS

.1 8-position, 8-contact (8P8C) modular jacks shall be installed in accordance with manufacturer's recommendations and installation guides, and best industry practices.

.2 Pair untwist at the termination shall not exceed 13 mm (0.5 inch).

.3 Data jacks, unless otherwise noted in Drawings shall be located in the bottom position(s) of each faceplate. Data jacks in horizontally oriented faceplates shall occupy the right-most position(s).

.4 Termination wire map shall be 568A unless otherwise stated in drawings.

.5 Data jacks shall be plenum rated when installed above ceilings or under raised floors.

3.4 INSTALLATION OF PATCH PANELS

.1 Cables shall be dressed and terminated in accordance with the recommendations made in ANSI/TIA-568.0-E and/or ANSI/TIA-568.1-D, ANSI/NECA/BICSI-568-2006 and manufacturer's recommendations and best industry practice.

.2 Cables shall be separated into groups of twelve and routed symmetrically from both sides of the patch panel (e.g. split panel).

.3 Cables shall be properly supported vertically in the rack or cabinet and supported at the rear of the patch panel using a cable management bar or a rear horizontal cable management to retain terminations.

.4 Pair untwist at the termination shall not exceed 12mm for Cat 6 cabling.

.5 Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

.6 Termination wire map shall be 568A unless otherwise stated in drawings.

3.5 INSTALLATION OF TERMINATION BLOCKS

.1 Cables shall be dressed and terminated in accordance with the recommendations made in ANSI/TIA-568.0-E, ANSI/TIA-568.1-E, ANSI/NECA/BICSI-568-2006 standard, manufacturer's recommendations and best industry practice.

.2 Pair untwist at the termination shall not exceed 12mm.

.3 Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

.4 Cables shall be neatly bundled and dressed to their respective termination block. Each termination block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

.5 Each cable shall be clearly labeled on the cable jacket within 12" of the termination block at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

.6 Wall mounted termination block fields shall be mounted on communications backboard.

.7 Wall mounted termination block fields shall be installed as per the requirements specified by the manufacturer's installation guidelines.

3.6 PATCH CORD INSTALLATION

.1 Patch cords shall be installed at IT room end and at workstation end with cords of appropriate length such that cables are routed through proper cable management ducts and patch ways in a consistent manner. Cords should be routed so as not to block panel labels where possible.

.2 Patch cords shall be installed with the proper color to match the adopted color scheme for the organization.

.3 Patch cords shall be labeled at both ends according to the adopted labeling scheme for the organization. Labeling scheme shall adhere to ANSI/TIA-606-C labeling standard.

.4 Patching schedules and or records shall be updated by the Structured Cabling Plant Administrator after patching has been completed.

.5 Patch cords that are no longer in use shall be removed from the patching frame and properly stored. Patch cords to be harvested for reuse shall have unique ID labeling removed and be retested prior to being made available for re-use.

3.7 IMPLEMENT CROSS-CONNECTIONS

.1 Implement cross-connections using jumper wires as specified.

3.8 FIELD QUALITY CONTROL

.1 Test backbone UTP cables as specified below and correct deficiencies. Provide a record of results both hard copy and electronic on CD.

.2 Contractor to provide map of the data and telephone outlet numbering and cable pathway on 11" x 17" (or larger) copy of the building floor plan for each associated rack. Submit marked up floor plans in accordance with Division 01 - General Requirements.

.3 Test 100 percent of all new and modified communications cable runs for defects in installation and verify cabling system performance under installed conditions in accordance with ANSI/TIA-568.0-D standards.

.4 Defects in cabling system installation, including but not limited to cables, connectors, patch panels, and connector blocks shall be repaired or replaced to ensure 100 percent useable conductors in all cables installed.

.5 Performance Certification Testing of Twisted-Pair Cables: (NOTE: Permanent Link Test results are recommended and are the expected norm).

- .1 Test 100 percent of all new communications cable runs for defects in installation and verify cabling system performance under installed conditions in accordance with ANSI/TIA-568.0-D standards.
- .2 Test horizontal cabling using approved certification tester for Category 6 performance in accordance with ANSI/TIA-568.0-D. Level IIIe tester for Cat 6 shall be used
- .3 Basic Tests Required:
  - .1 Wire map.
  - .2 Length (feet).
  - .3 Insertion loss (dB), formerly attenuation.
  - .4 NEXT (Near end crosstalk) (dB).
  - .5 Return loss (dB).
  - .6 ELFEXT (dB).
  - .7 Propagation delay (ns).
  - .8 Delay skew (ns).
  - .9 PSNEXT (Power sum near-end crosstalk loss) (dB).
  - .10 PSELFEXT (Power sum equal level far-end crosstalk loss) (dB).
- .4 Test Category 6 by auto test to 250 MHz.
- .5 Submit fully functional version of tester software for use by the Owner in reviewing test results.

.6 Report in writing to the Owner immediately, along with copy of test results, failed test results that cannot be remedied through re-termination (as in the case of reversed or split pairs).

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 08 71 00 - Door Hardware.
.2 Section 26 05 00 - Common Work Results - Electrical
.3 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

1.2 REFERENCE STANDARDS

.1 National Fire Protection Association (NFPA)
  .1 NFPA 71- Standard from the Installation, Maintenance and Use of Signaling Systems for Central Station Services.
.2 Underwriter's Laboratories Canada (ULC)
  .1 CAN/ULC S304, Standard for control and monitoring station burglar alarm units.
  .2 CAN/ULC S561, Installation and Services for Fire Signal Receiving Centres and Systems.

1.3 DESCRIPTION OF SYSTEM

.1 Provide a complete access control system to continuously monitor and control access to the building.
.2 Provide the necessary hardware to communicate intrusion information to a certified monitoring agency.
.3 Access control system to consist of but is not limited to, door control panels, card readers, door contacts.
.4 Door hardware including electric strikes and electrified hardware is to be supplied and installed by Division 08. Refer to Section 08 71 00 and associated door hardware schedule for detailed information.
.5 Commission and provide programming of the system in accordance with the Owner's security and access control requirements.
.6 The access control system is to allow entry to restricted areas. When an authorized card is presented to the card reader, the electric strike is released and the card holder opens the door. Egress from these areas is to be unrestricted by the access control system.

1.4 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Division 01 - General Requirements.
  .1 Include wiring diagrams and riser schematics indicating location of controllers and devices for review and approval by the Consultant.

1.5 WARRANTY

.1 Submit manufacturer's warranty document executed by an authorized company or official stating that the access control system is warranted against defects in operation, material and workmanship for a period of one year from date of signed off substantial completion. Include system warranty document in Maintenance Manuals.

2 Products

2.1 DOOR CONTROLLER

.1 Each door, four (4) door controller to be capable of interfacing with a minimum eight (8) peripheral access control readers and a separate intrusion alarm system and/or other door controllers where indicated.
.2 Sixteen (16) monitored points, a minimum of four (4) form 'C' control relay outputs, and sixteen (16) open collector outputs.
.3 128 KB RAM and 256 KB of flash memory c/w battery backup.

.4 Integrated remote workstation interface through IP or RS-232 connection.
.5 Integral 16 V, 40 VA transformer with 12 V, 7 Ah supervised battery backup.
.6 Lockable CSA type 1 enclosure c/w tamper switch.
.7 Minimum eight (8) zone programmable input expansion module to monitor intrusion devices.
.8 Coordinate and establish communications between access control panel and with Owner's specified monitoring agency.
.9 12 V, 250 mA supervised door strike power output.
.10 System to provide a minimum of:
  .1 1,000 users.
  .2 20,000 events.
  .3 20 schedules.
  .4 25 holidays.
.11 Acceptable material:
  .1 Kantech #KT-400, complete with alarm panel integration kit, #KT-Tamper (tamper switch), #KT-BATT (battery).

2.2 DOOR CONTACTS

.1 Recess mounted in door frame for detection when door is open.
.2 Magnetic type, 30 VDC, 3 W max, double pole.
.3 Tamper switch.
.4 Acceptable material:
  .1 G.E. #1078CTW Series.

2.3 PROXIMITY CARD READERS

.1 Impact resistant polycarbonate housing suitable for interior and exterior installations.
.2 Capable of being mounted to single gang outlet box.
.3 Audible and visual operation through LED indicators and internal buzzer.
.4 125 kHz HiD operation capable of a 6" read range.
.5 Acceptable material:
  .1 Kantech ioProx #P325XSF.

2.4 CREDENTIALS FOR ACCESS CONTROL

.1 Capable of on site encoding.
.2 Rated operating temperature: -45°C to 70°C.
.3 Capable of being attached to any non-metallic surface.
.4 One hundred (100) self-adhesive round tags.
.5 Acceptable material:
  .1 Kantech #P50TAG.

2.5 WIRING

.1 Wiring and cables in accordance with the recommendations of the approved system manufacturer. Typical FT4 rated access control cabling as follows:

DESCRIPTION	WIRE TYPE	PART #
Door Controller Network Cable	2 Pair #24 Shielded	Provo #5402
Door Controller Power Cable	2C#16 AWG	Provo #9162
Card Readers	6C#22 AWG Shielded	Provo #6506
Door Contacts	4C#22 AWG	Provo #9222
Electric Strikes	6C#18 AWG	Provo #9182

2.6 FIRE ALARM INTEGRATION

.1 Provide connection between the fire alarm control panel and the fire alarm signal transmitting unit.

.2 Upon activation of the fire alarm system, the fire alarm control panel is to release locking mechanisms on all access controlled doors, and notify the central monitoring facility of the event.

3 Execution

3.1 INSTALLATION

.1 Install all wiring, raceway, outlet boxes, panels and devices including any miscellaneous material to constitute complete system as indicated.

.2 Install conduit from access control devices located in walls and door frames to door control panel location without splices where possible. Where splicing or junctions are required on access control cabling, use junction boxes with clearly identified terminal strips. Wire nuts will not be permitted. Rough-in device boxes for card readers and access control devices as required.

.3 All access control cabling is to be installed in conduit in accordance with Specification Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings. Conceal conduit in inconspicuous but accessible locations where possible.

.4 Supply and install access control cabling from field mounted devices to door control panels.

.5 Terminate access control cabling on field mounted devices in accordance with manufacturer's instructions.

.6 Supply and install network cable interconnecting all door control panels and to Owner supplied workstation in accordance with manufacturer's instructions.

3.2 VERIFICATION AND COMMISSIONING

.1 Arrange and include an 4-hour site visit by the Manufacturer's Technical Representative to verify, commission, program the system and demonstrate the operation of the system to the Owner. Provide manufacturer's verification certificate in the Maintenance Manuals. Verification to include but is not limited to:

- .1 Compliance with manufacturer's specification, product literature and installation instructions.
- .2 Operation of each device individually and within its environment.
- .3 Operation of each device in relation with programmable schedule and or/specific functions.

.2 Coordinate with Owner to determine exact system requirements such as scheduling, zone identification, etc., and program system to the Owner's specific requirements.

.3 On behalf of the Owner make all arrangements for 24 hour remote monitoring at location of Owner's choice and verify that alarm signal is received.

3.3 CLEANING AND ADJUSTING

.1 Remove protective coverings from control panels, detection accessories and components.

.2 Adjust all components for correct function.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results - Electrical.

1.2 SUMMARY

.1 Section Includes:
- .1 Materials and installation for fire alarm systems.
- .2 Manual alarm stations.
- .3 Automatic alarm initiating devices.
- .4 Audible signal devices.
- .5 End-of-line devices.
- .6 Visual alarm signal devices.
- .7 System operation.
- .8 Verification.
- .9 Fault isolators.
- .10 Addressable interface modules.

.2 General Requirements
- .1 Replacement of the interior modules and controller of the existing Siemens #FS-250C fire alarm control panel located in the existing main entry vestibule of the for the Kinkora Community Centre at 45 Anderson Street in Kinkora, PEI.
- .2 Modifications and additions to the existing fire alarm initiation and notification system for the new expansion. Refer to verifications report, attached as an Appendix 'C' to these specifications, for more information on notification and initiations circuiting.
- .3 The manufacturer is required to identify any areas of the specification where they do not completely comply.
- .4 The fire alarm system must include all the necessary electronic hardware, software, and memory for a completely operable system in accordance with these specifications and associated drawings, to perform the functions described herein.
- .5 Device and equipment locations are approximate only and must be field verified prior to tendering and the tender price adjusted to cover actual conditions.
- .6 Install all new wire, conduit, and fire alarm devices in accordance with the drawings and specifications. The actual device, equipment, and wiring layout will be the manufacturer's responsibility and detailed wiring and installation drawings must be provided.

1.3 REFERENCES

.1 Government of Canada
- .1 NBC-2015 National Building Code of Canada.
- .2 NFC-2015 National Fire Code of Canada.

.2 Underwriter's Laboratories of Canada (ULC)
- .1 CAN/ULC-S524: 2019, Standard for the Installation of Fire Alarm Systems.
- .2 CAN/ULC-S525: 2016, Audible Signal Device for Fire Alarm Systems.
- .3 CAN/ULC-S526: 2016, Visual Signal Devices for Fire Alarm Systems.
- .4 CAN/ULC-S527: 2019, Control Units.
- .5 CAN/ULC-S528-14, Manual Pull Stations for Fire Alarm Systems.
- .6 CAN/ULC-S529: 2016, Smoke Detectors for Fire Alarm Systems.
- .7 CAN/ULC-S536: 2019, Inspection and Testing of Fire Alarm Systems.
- .8 CAN/ULC-S537: 2019, Verification of Fire Alarm Systems.
- .9 CAN/ULC-S559: 2020, Equipment for Fire Signal Receiving Centres and Systems.
- .10 CAN/ULC-S561: 2020, Installation and Services for Fire Signal Receiving Centres and Systems.

.3 National Fire Protection Agency (NFPA)
- .1 NFPA 72-2022, National Fire Alarm Code.

.2 NFPA 90A-2021, Installation of Air Conditioning and Ventilating Systems.
.3 NFPA 101-2021, Life Safety Code.
.4 International Standard Organization (ISO)
.1 ISO 8201, Acoustics - Audible Emergency Evacuation Signal.

1.4 SHOP DRAWINGS

.1 Shop Drawings:
.1 Submit shop drawings and product data for all fire alarm equipment and devices in accordance with Division 01 - General Requirements.
.1 All fire alarm equipment and devices.
.2 Include:
.1 Layout of equipment.
.2 Zoning.
.3 Complete wiring diagram, including schematics of modules.
.3 Quality assurance submittals: submit following in accordance with Division 01 - General Requirements.
.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.2 Instructions: submit manufacturer's installation instructions.
.3 Manufacturer's Field Reports: manufacturer's field reports specified.
.4 Closeout Submittals:
.1 System wiring diagrams:
.2 Submit complete wiring diagrams of system showing points of connection and terminals used for electrical connections in the system.
.3 Show modules, relays, switches and lamps in control panel.
.4 Power Calculations:
.1 Submit design calculations for new work specified to substantiate that battery capacity exceeds supervisory and alarm power requirements.
.2 Show comparison of detector power requirements per zone versus control panel smoke detector power output per zone in both standby and alarm modes for zones affected by the renovations.
.3 Show comparison of notification appliance circuit alarm power requirements with rated circuit power output for notification circuits affected by the renovations.

1.5 QUALITY ASSURANCE

.1 Qualifications:
.1 Installer: company or person specializing in fire alarm system installations with five (5) years documented experience approved by manufacturer.
.2 Provide services of representative or technician from manufacturer of system, experienced in installation and operation of type of system being provided, to supervise installation, adjustment, preliminary testing, and final testing of system and to provide instruction to project personnel.
.3 System:
.1 In accordance with applicable Codes, Standards and the Authority Having Jurisdiction.
.4 Maintenance Service:
.1 Provide one (1) year's free maintenance based upon 24 hour emergency service with two inspections by manufacturer during warranty period. Inspection tests to conform to CAN/ULC-S536 and CAN/ULC-S561. Submit inspection report to Engineer.

2 Products

2.1 MATERIALS

.1 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.
.2 Audible signal devices: to CAN/ULC-S525.
.3 Visual signal devices: to CAN/ULC-S526.
.4 Control Panel: to CAN/ULC-S527.
.5 Manual pull stations: to CAN/ULC-S528.
.6 Smoke detectors: to CAN/ULC-S529.

2.2 DESCRIPTION OF WORK

.1 This specification details replacement of the interior modules and controller of the existing Siemens #FS-250C fire alarm control panel located in the existing main entry vestibule of the Kinkora Community Centre at 45 Anderson Street in Kinkora, PEI, additions and verification of the modified fire alarm system. Refer to verification report, attached as an Appendix 'C' to these specifications for more information on notification and initiation circuiting.
.2 Installation, commissioning and verification of modified fire alarm system devices and wiring.
.3 The existing fire alarm control panel location within the existing main entrance vestibule is to be verified on site.
.4 Installation to proceed on the basis that the building is fully occupied and retrofit of the existing fire alarm system will be implemented in a manner to minimize disruption of day-to-day operations and personnel within the building.
.5 During the retrofit, fire protection must be maintained throughout all areas of the building, and is to conform to the following standard: NFPA 101: 9.6.1.7 - Fire Alarm System Shutdown which states: "Where a required fire alarm system is out of service for more than 4 hours in a 24-hour period, the authority having jurisdiction is to be notified and the building must be evacuated or an approved fire watch must be provided for all parties left unprotected by the shutdown until the fire alarm system has been returned to service." As the building cannot be evacuated the Contractor must provide an approved fire watch when necessary and the fire watch must be provided using security cleared and qualified personnel. The Contractor is to carry the full cost for fire watch in the tender price.
.6 As required, the existing interior modules and controller of the existing fire alarm control panel to be replaced with new to allow for the installation of new fire alarm initiation and notification devices as the existing fire alarm control panel is discontinued. Existing recess mounted tub to be maintained in-situ. Contractor to provide for disconnecting existing initiation and notification loops associated with existing initiation and notification fire alarm devices located in the existing Kinkora Community Centre. Install temporary covers on existing spot type fire alarm detectors to prevent false alarms during supervised work.

2.3 SYSTEM OPERATION

.1 Actuation of any alarm initiating device to:
  .1 Indicate type of alarm and location at control panel and remote annunciators.
  .2 Cause audible signaling devices to sound throughout the building and at the control panel.
  .3 Cause visual signals to flash self-synchronizing strobes continuously throughout the building.
    .1 Where new devices are installed on existing notification loops, synchronizing devices are to be provided or additional conductors connected to provide synchronized notification throughout the visible area in accordance with CAN/ULC-5524 Article 5.4.5.2.
  .4 Transmit signal to fire receiving centre via central station and signal transmitting unit.
  .5 Cause air conditioning and ventilation fans to shut down or to function to provide required control of smoke movement.
.2 Acknowledging alarm: indicated at control panel.

.3 Possible to silence signals by "alarm silence" switch at control unit after 60 second period of operation.
.4 Subsequent alarm, received after previous alarm has been silenced, to re-activate signals.
.5 Actuation of supervisory devices to:
  .1 Indicate type of supervisory device and location at control panel and where applicable, at remote annunciator.
  .2 Cause audible signal at control panel to sound.
  .3 Activate common supervisory sequence.
.6 Resetting alarm or supervisory device not to return system indications/functions back to normal until control panel has been reset.
.7 Trouble on system to:
  .1 Indicate device and circuit in trouble at control panel.
  .2 Activate "system trouble" indication, buzzer and common trouble sequence. Acknowledging trouble condition to silence audible indication, whereas visual indication to remain until trouble is cleared and system is back to normal.
.8 Trouble on system: suppressed during course of alarm.
.9 Trouble condition of any circuit in system not to initiate alarm conditions.

2.4 CONTROL PANEL

.1 Central Control Unit:
  .1 Existing Siemens #FS-250C fire alarm control panel to be removed and replaced with new interior modules, controller, display, etc. to allow for the installation of new fire alarm initiation and notification devices throughout the addition. Existing recess mounted tub to be maintained in-situ. Contractor to provide for the disconnection and reconnection of the existing fire alarm initiation and notification loops associated with the existing initiation and notification devices throughout the existing building.
  .2 Suitable for Class A or B, data communication link style: to CAN/ULC-S524 with Class A or B wiring.
  .3 Features specified are minimum requirements for microprocessor-based system with digital data control and transmission.
  .4 Minimum capacity of 100 addressable input/initiation and 100addressable output/control points on one (1) integral Class A initiation circuit. Points may be divided between multiple communication channels in distributed system, each channel operating independently of the other. Faults on one communication channel not to affect operation of other channel.
  .5 System to provide a minimum of two (2) Class B or Class A integral notification appliance circuits with a combined output capacity of 2.5 A at 24 VDC.
  .6 System to provide for priority reporting levels, with fire alarm points assigned highest priority, supervisory and monitoring lower priority and third priority for troubles. Possible to assign control priorities to control points in system to guarantee operation or allow emergency override as required.
  .7 Provide a display interface with 80 character liquid crystal display. Use LCD technology and backlighting for high contrast visual clarity. In the normal mode, display the time, the total number of active points and the total number of disable points. In the alarm mode, display the current time, total number of messages waiting, type of event on display, location, message and event address.
  .8 Provide visual indicators for the following common control functions: AC power, alarm, supervisory, monitor, trouble, disable, ground fault, CPU fail test and both cellular/IP and telephone line active. Provide common control keys and visual indicators for: reset, alarm silence, trouble silence, drill and one custom programmable key/indicator. Provide four pairs of display control keys for selection of event display by type (alarm, supervisory, monitor and trouble) and forward/backward scrolling through event listings. Allow the first event of the highest priority to capture the LCD for display so that arriving fire fighters can view the first alarm event "hands free". Provide system function keys, status reports, enable, disable, activate, restore,

program and test. System to be complete with a QWERTY keypad.

.9 Integral power supply, battery charger and standby batteries.

.10 Basic life safety software retained in non-volatile Erasable Programmable Read Only Memory (EPROM). Random Access Memory (RAM) chips in panel to facilitate password protected field editing of simple software functions (e.g. zone labels, priorities) and changing of system operation software.

.11 Circuitry to continuously monitor communications and data processing cycles of microprocessor. Upon failure, audible and visual trouble indication to activate.

.12 A digital alarm communicator transmitter module to transmit alarm, supervisory and trouble signals to a central monitoring station conforming to NFPA 72. The communicator shall support communications with the fire alarm signal transmitting unit as well as a 20 PPS 4/2 telephone line configured for dual tone multi-frequency or pulse modes.

.13 RS-232-C I/O port: parallel ASCII with adjustable baud rates to allow interface of any commercially available printer, terminal or computer.

.14 Equipped with software routines to provide Event-Initiated-Programs; change in status of one or more monitor points, may be programmed to operate any or all of system's control points.

.15 Software and hardware to maintain time of day, day of week, day of month, month and year.

.16 Software to operate variable sensitivity addressable smoke detectors and annunciate their status and sensitivity settings at control panel.

.2 Enclosure: surface mounted CSA Type 1 enclosure. Provide a locking hinged door with viewing window, flush lock and two keys.

2.5 REMOTE ANNUNCIATORS

.1 Provide remote alpha-numeric display annunciators with supervised Class B serial connections to the control panel. Operate on nominal 24VDC with battery back-up.

.1 Provide a back-lit, alpha-numeric, 80 character, liquid crystal display. Coordinate point messages with the control panel.

.2 Display system normal, alarm, trouble and supervisory LED's. Provide a key switch to enable reset, alarm, trouble, silence, trouble silence and drill switches.

.3 Mount the annunciators as indicated on the plans.

.4 Wiring to be one pair of 2c#18 AWG for 24VDC power and two pair of 2c#18 AWG twisted shielded for data.

.5 Acceptable manufacturer:

.1 Siemens #FT2014.

2.6 INITIATING / INPUT CIRCUITS

.1 Receiving circuits for alarm initiating devices such as manual pull stations and smoke detectors to be, wired in a Class A configuration to control panel.

.2 Alarm receiving circuits: compatible with smoke detectors and open contact devices.

.3 Actuation of alarm initiating device: cause system to operate as specified in "System Operation".

.4 Actuation of supervisory initiating device: cause system to operate as specified in "System Operation".

2.7 ALARM OUTPUT CIRCUITS

.1 Alarm output circuits: connected to output or notification devices, wired in Class A, configuration to the control panel.

.1 Signal circuit operation to follow system programming, capable of sounding signals either continuously, at 20spm or using a temporal pattern as described by International Standard ISO 8201, Acoustics - Audible Emergency Evacuation Signal and continuously flashing visual signals. Each signal circuit rated at 6 A, 24 VDC, fuse protected from overloading/overcurrent.

.2 Manual alarm silence, automatic alarm silence and alarm silence inhibit to be provided by system's common control.

2.8 WIRING

.1 Wire type and number of conductors as recommended by fire alarm equipment manufacturer.
.2 To initiating circuits: Power limited fire alarm armoured cable or in conduit, twisted or untwisted, shielded or unshielded, copper conductors #18 AWG minimum, 300 V, FT4 rated to: CSA C22.2 No. 208-03, FAS 105°C.
.3 To signal circuits: 14 AWG, RW90 minimum and in accordance with manufacturer's requirements for voltage drop.
.4 To control circuits: 14 AWG, RW90 minimum and in accordance with manufacturer's requirements.

2.9 MANUAL ALARM STATIONS

.1 Addressable manual pull station: pull lever, surface semi-flush, wall mounted type, double action, single stage, English signage, and electronics to communicate station's status to addressable module. Station address to be set on station in field.

2.10 AUTOMATIC ALARM INITIATING DEVICES

.1 Addressable variable-sensitivity fire detectors:
  .1 Combination Photoelectric and fixed heat type.
  .2 Electronics to communicate detector's status to addressable module.
  .3 Detector address to be set on detector base in field.
  .4 Sensitivity settings: Five (5) settings, determined and operated by control panel. No shifting in detector sensitivity due to atmospheric conditions (dust, dirt) within certain parameters.
  .5 Ability to annunciate levels of detector contamination automatically with trouble condition at control panel.
  .6 Where detectors are concealed supply and install a remote mounted LED indicator at a visible location.

2.11 ADDRESSABLE INTERFACE MODULES

.1 Interface modules: facilitate control functions (e.g. door release); communicate with control panel over (minimum number of wires) or (specified by manufacturer) or (addressable devices loop).

2.12 AUDIBLE SIGNAL DEVICES

.1 Horns: electronic with backbox, 92dB, surface flush mounting 24 VDC.
.2 Combination with strobe as indicated.
.3 Do not exceed 80% of listed rating in amperes of notification appliance circuit. Provide additional circuits above those shown in required to meet this requirement.
.4 Output to be synchronized with all other notification devices on the notification circuit and all notification devices located in an observer's audible and visible range.
.5 Audible signal type in new addition to match existing audible signal type in existing Community Centre.
.6 Finish appliances in red.

2.13 VISUAL ALARM SIGNAL DEVICES

.1 Strobe type: 30 candela, self-synchronizing, 24 VDC, red in colour.
.2 Polycarbonate lens with FIRE/FEU imprinted on device.
.3 Designed for surface mounting on flush outlet box.
.4 For surface mounting provide appliance manufacturer's approved back box. Back box finish to match appliance finish.

2.14 FAULT ISOLATORS

.1 Provide line fault isolators in detector bases or separately mounted. The isolator relay is controlled by the detector or the loop controller.

.2 The isolator operates as follows:

.1 A short on the line causes all isolators to open within 23 msec.

.2 At 10 msec intervals, beginning nearest the loop controller, the isolators close to provide the next isolator down the line with power.

.3 When the isolator next to the short closes, it reopens within 10 msec.

2.15 END OF LINE DEVICES

.1 End-of-line devices to control supervisory current in alarm circuits and signaling circuits, sized to ensure correct supervisory current for each circuit. Open, short or ground fault in any circuit will alter supervisory current in that circuit, producing audible and visible alarm at main control panel and remotely as indicated.

2.16 MANUFACTURER

.1 Acceptable material:

.1 Siemens, to match existing.

3 Execution

3.1 INSTALLATION

.1 Install systems in accordance with CAN/ULC-S524.

.2 For signal, alarm and ancillary devices, wire in EMT conduit with wire counts to be approved by fire alarm equipment manufacturer prior to installation. Install alarm and signal circuits in separate conduits. Surface mounted devices to be installed on matching outlet boxes recommended by manufacturer.

.3 Install addressable loops.

.4 Surface mounted fire alarm conduit or boxes located in finished areas to be painted to match the associated surface color. Coordinate exact color(s) on-site.

.5 Locate and install manual alarm stations as indicated and connect to initiation circuit loops.

.6 Locate and install detectors as indicated and connect to initiation circuit loops. Do not mount detectors in direct airflow from supply or exhaust air outlets. Maintain at least 18" radius clear space on ceiling, below and around detectors in accordance with CAN/ULC-554.

.7 Confirm with manufacturer if supplied interface modules require separate DC power and if so, install DC power to interface module from control panel in accordance with manufacturers wiring instructions.

.8 Install signal devices as indicated and connect to signaling circuit.

.9 Install end-of-line devices as required.

.10 Coordinate with the Owner and manufacturer for the naming of all loop device locations. Provide a list to the Owner indicating all proposed naming prior to programming. Make changes as directed by Owner at no extra charge. Arrange with the manufacturer to have location names listed on charts with loop numbers and device addresses. During installation of devices, peel the serial number label from the device and stick to the location message chart beside the location name.

.11 Include system configuration and programming to meet the needs of the new and existing building designs as required. Include programming of detection devices, relays, signal devices and custom configuration.

3.2 FIELD QUALITY CONTROL

.1 Site Tests:

.1 Conduct tests to Section 26 05 00 - Common Work Results - Electrical and CAN/ULC-S537 for system modifications.

.2 Test each device and alarm circuit to ensure manual stations and smoke detectors transmit alarm to control panel and actuate general, first stage alarm and ancillary devices.
.3 Where applicable check annunciator panels to ensure zones are shown correctly.
.4 Simulate grounds and breaks on alarm and signaling circuits to ensure proper operation of trouble signals.
.5 Addressable circuits system:
.1 Test each conductor.
.2 Check to ensure zones are shown correctly.
.3 Simulate grounds and breaks on alarm and signaling circuits to ensure proper operation of trouble signals.
.4 Verify trouble and alarm signals are received at the remote supervised location via both non-interdependent communication channels in accordance with CAN/ULC-S561.

.2 Manufacturers Field Service:
.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 in accordance with this Section and the Contract Documents.
.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 in accordance with this Section and the Contract Documents.

.3 Certificates and Reports:
.1 Provide:
.1 A copy of the inspecting technician's report showing location of each device and certifying the test results of each device.
.2 A certificate of verification confirming that the inspection has been completed in accordance with CAN/ULC-S537 and CAN/ULC-S561, and showing the conditions upon which such inspection and certification have been rendered.
.3 Final test and acceptance of the system shall be witnessed by representatives of three parties: the Owner, the Contractor and the manufacturer.

3.3 TRAINING

.1 Arrange and pay for on-site lectures and demonstrations by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.

3.4 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

1 General

1.1 WORK INCLUDED

.1 Planning and executing measures to prevent and control soil erosion.
.2 Furnishing, installing and maintaining erosion control materials.

1.2 REFERENCE STANDARDS

.1 The requirements of the P.E.I. Department of Environment and as directed on site by Consultant.

1.3 PRODUCT CONDITIONS

.1 Schedule temporary seeding, mulching and other erosion control measures to take place as soon as possible, prior to beginning any work.
.2 When temporary seeding cannot be accomplished to have established or visible growth by October 15, the disturbed areas shall be covered with 150 mm mulch for the winter.

2 Products

2.1 MATERIALS

.1 Hay Bales: Securely tied baled at least 355 mm x 460 mm x 760 mm.
.2 Geotextile fabric, including means of anchoring.
.3 Mulch Material: Select mulch material for erosion control that will best meet the site conditions from the following:
  .1 Hay or Stray- Shall be dry, free to mold and weed seeds.
  .2 Wood chips - Shall be dry, free of soil and other foreign material.
.4 Mulch Anchoring: When mulch must be held in place, one of the following mulch anchoring materials shall be used:
  .1 Mulch Netting (plastic, or plastic and wood fiber); North American Green, SC 150 or equal.
.5 Fertilizer: Complete fertilizer 10-20-20 (standard product).
.6 Lime: Ground limestone containing not less than 95% total carbonates (calcium or magnesium).
.7 Temporary Seed Mixture: as follows: - 30% Regent Kentucky Bluegrass - 30% Park Kentucky Bluegrass - 30% Creeping Red Fescue - 10% Fiesta 2 Perennial Ryegrass

3 Execution

3.1 EROSION AND SEDIMENT CONTROL

.1 Provide sediment protection measures as indicated on design drawings and as specified under this Section and in accordance with PEI Department of Transportation and Infrastructure, PEI Department of Environment.
.2 Install geotextile fabric over top of new and existing catch basins to eliminate sediment from entering into sanitary or storm sewer system. Maintain as required.
.3 Install sediment control berm, silt fences and silt screens where required to prevent siltation. Construct and install silt fences as indicated just up-slope of the area to be protected in order to prevent silt from being conveyed to an adjacent property or watercourse/wetland.
.4 Maintain erosion control structures to coordinate with the schedule and sequence of the site work. Adjust erosion control structures as required.
.5 Construct and maintain ditch dams properly designed to prevent migration of silt caused by the construction activities.
.6 Maintain sediment control features throughout the construction period. Repair damage to original condition.

.7 Remove accumulated sediment from behind berm and fences as necessary. Trapped sediment shall be removed when it has accumulated to a level half the height of the fence/barrier and shall be disposed of at a location outside the buffer zone of a watercourse and such that it cannot enter a watercourse or other environmentally sensitive area.
.8 Do not remove any control features until authorized by Consultant.
.9 Remove berm and fences when reinstatement has been well established and there will be no further erosion

3.2 GENERAL CONSTRUCTION SEQUENCE TO MINIMIZE EROSION

.1 Erect hay bale dikes and/or silt fences as shown on Drawings and as may be required in the field to protect property, waterways, grassed areas, roadways, parking lots, existing features and springs.
.2 Commence excavation. Stockpile soil so that erosion is minimized. Extra precautions shall be taken when soil is saturated.
.3 Backfill excavation to grade. Grade site so that soil erosion caused by runoff will be minimized.
.4 Seed and mulch exposed ground.

3.3 SEEDING AND MULCHING

.1 All areas which will remain open shall be seeded and mulched within five (5) days of being stripped or backfilled and graded.

3.4 HAY BALES

.1 Embed hay bales into soil and anchor in place with stakes as shown on the drawings. Butt hay bales together tightly.
.2 Hay bales shall be replaced when they become clogged with soil particles or as directed by the Consultant.

3.5 DAMAGE AND REPAIR

.1 Repair all damages caused by soil erosion or construction equipment at or before the end of each working day.

END OF SECTION

1 General

1.1 SCOPE OF WORK

.1 The work of this Section comprises the furnishing of all equipment, labour and materials necessary for the excavation, trenching and backfilling, as specified in this Section and indicated on the drawings, which includes, but is NOT necessarily limited to:

- .1 Building:
  - .1 All excavation, as required, through compacted structural fill and/or undisturbed in-situ material for building foundations, including all related backfilling and compaction.
  - .2 Supply and installation of all structural fill, vapour barrier and granular base for concrete floor slab.
  - .3 Supply and installation of both vertical and/or horizontal perimeter insulation.
  - .4 All excavation, trenching, bedding, backfilling and compaction required for the work of Mechanical and Electrical Divisions inside the building.
- .2 Outside of building:
  - .1 All excavation, as required, through compacted structural fill and/or undisturbed in-situ material for concrete aprons, including all related backfilling and compaction.
  - .2 Supply and installation of all structural fill, polyethylene vapour barrier and granular base for concrete aprons.
  - .3 All excavation, trenching, bedding, backfilling and compaction required for the work of Mechanical and Electrical Divisions outside the building.
  - .4 All areas under sidewalks, aprons, slabs and roadways.
  - .5 All excavation and backfill for miscellaneous items such as bollards.

.2 The work of this Section comprises the furnishing of all labor, materials, and equipment necessary for the control of dust and other airborne pollutants or contaminants generated by the work of this project.

.3 It is the responsibility of the Contractor to perform the entire work of this project in a manner which will reduce airborne dust to an absolute minimum and prevent the blowing of dust beyond the limits of construction area. This will require the strict observance of all control measures specified in this Section and other restrictions as may be deemed necessary by the Contractor, Consultant or Owner's representative during the course of construction, including the requirement to cease operations.

.4 The requirements of the following Prince Edward Island, Department of Transportation and Infrastructure Specifications are to be followed for all work relating to the material specifications for fill materials and bedding sand within the foundation walls for the Building.

- .1 401 - Aggregate
- .2 402 - Bedding Sand

1.2 RELATED SECTIONS

.1 Section 31 22 19 - Finish Grading.
.2 Section 33 05 13 - Manholes and Structures.
.3 Section 33 11 13 - Public Water Utility Distribution Piping.
.4 Section 33 31 13 - Public Sanitary Utility Sewerage Piping.
.5 Section 33 41 13 - Public Storm Utility Drainage Piping.

1.3 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

- .1 ASTM C117-03, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C136-01, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .3 ASTM D422-632002, Standard Test Method for Particle-Size Analysis of Soils.

.4 ASTM D698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3) (600 kN-m/m3).
.5 ASTM D1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2,700 kN-m/m3).
.6 ASTM D4318-00, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Canadian Standards Association (CSA International)
.1 CAN/CGSB-51.20-M87, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
.2 CAN/CGSB-51.34-M86, Vapor Barrier, Polyethylene Sheet for Use in Building Construction.

1.4 DEFINITIONS

.1 Dust as defined in this Section is any airborne particulate that may result from the work of this project, which includes, but is not limited to:
.1 Soil particles.
.2 Fertilizer.
.3 Limestone.
.4 Soil additives.
.5 Sand.

.2 Rock:
.1 Any solid material in excess of 1.00 m3 and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m3 bucket. Frozen material not classified as rock.

.3 Common excavation:
.1 Excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.4 Topsoil:
.1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
.2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.

.5 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.6 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.7 Cohesionless soil: For compaction purposes, cohesionless soil is:
.1 Materials having less than 20% passing 75 micrometres sieve, regardless of plasticity of fines.

.8 Cohesive soil: For compaction purposes, cohesive soil is soil not having properties to be classified as cohesionless.

.9 Unsuitable materials:
.1 Weak, chemically unstable, and compressible materials.
.2 Frost susceptible materials:
.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422.
.2 Sieve sizes to CAN/CGSB-8.1.
.3 Table:

SIEVE DESIGNATION	% PASSING
2.00mm	100
0.10mm	45-100
0.02mm	10-80

SIEVE DESIGNATION	% PASSING
0.005mm	0-45

1.5 VEHICLE REQUIREMENTS

.1 All trucks bringing fill materials to site and removing surplus materials from site are to have a heavy-duty tarpaulin covering the truck box, properly tied down, to prevent the spillage of materials or blowing of dust during transportation.

.2 Vehicles not equipped with a tarpaulin will not be allowed on site.

1.6 WORK RESTRICTIONS

.1 Contractor will be required to stop work when wind speed, or unusually dry conditions are such, that in the Contractor's, Consultant's or Owner's representative's opinion, the control measures required under this Section are, or will be, unable to prevent the blowing of dust beyond the limits of the site.

1.7 AFTER WORKDAY REQUIREMENTS

.1 During unusually dry conditions and when predicted wind speed is of a velocity, that in the Contractor's, Consultant's or Owner representative's opinion will result in dust being blown beyond the limits of the site, the Contractor will continue the control measures specified in this Section throughout non-working hours, as required to prevent the blowing of dust.

1.8 PROTECTION OF EXISTING FEATURES

.1 Existing buried utilities and structures:

- .1 Size, depth and location of existing utilities and structures as indicated are for guidance only; completeness and accuracy are not guaranteed.
- .2 Prior to commencing any excavation work, notify applicable Utility or authorities, establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during work.
- .3 Confirm locations of buried utilities by careful test excavation.
- .4 Maintain and protect from damage, water, sewer, gas, electric or other utilities encountered.
- .5 Obtain direction of Consultant before moving or otherwise disturbing utilities or structures.
- .6 Where indicated, re-route existing lines in area of excavation.
- .7 Pay costs for such work.
- .8 Record in accordance with requirements of Division 01 - General Requirements, locations of maintained, re-routed and abandoned underground services.
- .9 Make good and pay for damage to any lines resulting from work.

.2 Existing surface features:

- .1 Protect existing surface features, which may be affected by work from damage while work is in progress and repair damage resulting from work.
- .2 Where excavation necessitates root or branch cutting do so only under direct control of Consultant.
- .3 Provide protection around bench markers, layout markers, survey markers, geodetic monuments and signage.

1.9 SHORING BRACING AND UNDERPINNING

.1 Comply with Division 01 - General Requirements and applicable local regulations and to protect existing features.

.2 Whenever shoring, sheeting, timbering and bracing of excavations or underpinning is required engage services of a Professional Engineer registered in Prince Edward Island, Canada, to design and assume responsibility for adequacy of shoring, bracing and underpinning.

.3 Design and supporting data submitted to bear the stamp and signature of qualified Professional Engineer registered in Canada.

1.10 COMPACTION DENSITIES

.1 Compaction densities indicated are Standard Proctor Maximum Dry Densities.

1.11 GENERAL REQUIREMENTS

.1 Following the removal of the 600 mm of topsoil and rootmat under the work of Section 31 14 00 -Earth Stripping and Stockpiling, the Owner's Geotechnical Engineer will visually inspect the exposed underlying material and issue instructions with respect to the extent of the excavation, backfilling and compaction work required within the foundation walls.

.2 Do not proceed with any excavation work until instructions with respect to the extent of the work have been received from the Consultant. The cost of any geotechnical investigation work resultant from the Consultant's visual inspection will be borne by the Owner.

.3 For bidding purposes include for the removal of all existing in-situ material within the limits of the foundation walls down to the bottom of the new footings.

.4 For bidding purposes include for the supply, installation and compaction of Type 5 fill from the bottom of the new footings, up to the underside of the granular base for the floor slab.

.5 If, resultant from the Consultant's inspection, the underlying material is found to be acceptable, or acceptable in part, as a sub base for the structural fill and granular base for the floor slabs, the Contractor shall submit a credit quotation for the deletion or partial deletion of the excavation, backfilling and compaction work.

1.12 SUBMITTALS

.1 Samples:

.1 Submit samples in accordance with Division 01 - General Requirements.

.2 Inform Consultant at least 2 weeks prior to beginning Work, of proposed source of fill materials and provide analysis if requested.

1.13 DELIVERY, STORAGE AND HANDLING

.1 Storage and Protection:

.1 Protect existing features in accordance with Division 01 - General Requirements and applicable local regulations.

1.14 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material in appropriate on-site bins in accordance with Waste Management Plan.

.2 Place materials defined as hazardous or toxic in designated containers.

.3 Ensure emptied containers are sealed and stored safely.

.4 Divert excess aggregate materials from landfill for reuse.

2 Products

2.1 MATERIALS

.1 Type 1 Fill: Crushed rock composed of hard sound, durable uncoated, cubical fragments of consistent quality produced from non-sedimentary bedrock or non-sedimentary boulders, to comply with the P.E.I. Department of Transportation and Infrastructure Specification 401 - Aggregate, for Class 'A' material graded within the following limits:

ASTM SIEVE SIZE	PERCENT PASSING
31.55mm	100
25.0mm	95-100
12.5mm	50-83
4.75mm	30-60
1.18mm	15-40

ASTM SIEVE SIZE	PERCENT PASSING
600mm	10-32
300mm	5-22
75mm	3-9

.2 Type 2 Fill: Crushed rock composed of hard sound, durable uncoated, cubical fragments of consistent quality produced from non-sedimentary bedrock or non-sedimentary boulders, to comply with the P.E.I. Department of Transportation and Infrastructure Specification 401 - Aggregate, for Class 'B' material graded within the following limits:

ASTM SIEVE SIZE	PERCENT PASSING
31.55mm	100
25.0mm	95-100
12.5mm	50-83
4.75mm	30-60
1.18mm	15-40
600mm	10-32
300mm	5-22
75mm	3-9

.3 Type 3 Fill: imported, classified as Common Fill, or material from excavation or other sources, approved by Consultant for use intended, unfrozen, free from rocks larger than 75mm, cinders, ashes, sods, refuse or other deleterious materials.

.4 Type 4 Fill: natural sand or crushed rock screening, free from clay, shale or organic matter, to comply with P.E.I. Department of Transportation and Infrastructure Specification 402 - Bedding Sand, graded with the following limits:

ASTM SIEVE SIZE	PERCENT PASSING
9.5mm	100
4.75mm	87-98
2.36mm	55-95
1.18mm	30-90
600mm	10-70
300mm	0-35
150mm	0-15
75mm	0-8

.5 Type 5 Fill: to requirements of Prince Edward Island, Department of Transportation and Infrastructure 1998 Specification #206.02.02 - Select Borrow as follows:

.1 Borrow shall be non-plastic and composed of clean, uncoated particles free from lumps of clay or other deleterious material with a maximum particle size of 100mm, and a maximum of 30% of the material passing the 4.75 sieve shall pass the 0.075 mm sieve.

.6 Type 6 Fill: clean, washed coarse sand free from clay, shale and organic matter and graded within the following limits:

SIEVE SIZE	PERCENT PASSING
12.5mm	100
4.75mm	90-100
0.85mm	40-100
0.35mm	0-75
0.25mm	0-38
0.75mm	0-8

.7 Type 7 Fill: Crushed rock, composed of hard, sound, durable, uncoated, cubical fragments of consistent quality produced from non-sedimentary bedrock or non-sedimentary boulders, graded within the following limits, to comply with the P.E.I. Department of Transportation and Infrastructure Specification 401 - Aggregate for Class 'D' Material.

ASTM SIEVE SIZE	PERCENT PASSING
50.0mm	100
38.0mm	60-100
31.5mm	50-100
25.0mm	35-70
19.0mm	20-50
12.5mm	10-35
9.5mm	5-25
4.75mm	0-10

.8 Underslab Vapor Retarder: polyolefin film to meet ASTM E-1745 Class A, B and C.
- .1 Acceptable Material:
  - .1 Moistop Ultra 10 manufactured by Fortifiber Building Systems Group.
  - .2 Perminator, Sealtight distributed by W.R. Meadows.

.9 Insulation: Rigid insulation, Board insulation adhesive: Type A to CGSB 71-GP-24M, Type 2 (trowel applied), Class A.
- .1 Acceptable Material:
  - .1 Dow Styrofoam SM.10.
  - .2 Celfort Celfortec 300.
  - .3 Owens Corning Foamular C-300.

.10 Foundation drainage:
- .1 100mm diameter perforated PVC foundation drainage pipe with integral filter fabric wrap.
- .2 150 mm perforated and non perforated drain tile, c/w geotextile membrane wrap on perforated sections.

.11 Filter Fabric:
- .1 Filter light-weight, non-woven polypropylene fiber fabric, needle punched and heat set.

.12 Dampproofing:
- .1 Emulsified asphalt, mineral colloid type, unfilled: to CAN/CGSB-37.2, and to Section 07 11 13 - Bituminous Dampproofing.

.13 Polyethylene film: 6 mil and 10 mil thickness.

.14 Soflomax corrugated wall catch basin. 600 mm Iron grate and frame including 600 mm diameter corrugated wall catch basin, high density polyethylene pipe.

.15 Corrugated Plastic Culvert
- .1 ASTM F 405- [93], Specification for Corrugated Polyethylene (HDPE) Tubing and Fittings.
- .2 Corrugated Polyethylene (HDPE) open-profile sewer pipe to CSA B182.8 (non-perforated) with integral swap-type bell end and double bell silt tight integrated gasket. Size as indicated.
- .3 Acceptable Material:
  - .1 Soleno Inc. Solflo Flowmax.

2.2 EQUIPMENT

.1 For application of water use pressurized distributor equipped with a spray system that will ensure even distribution of controlled quantities of water with means of shut-off to avoid dumping of excess water.

.2 Following final grading and seeding use only a water distribution vehicle with tires of sufficient size that any impression left by the tires can, if necessary, be repaired by a light hand raking.

3 Execution

3.1 GENERAL

.1 Carry out work to prevent blowing dust and debris during construction.

3.2 APPLICATION

.1 Apply water over entire area of operation in sufficient quantities to prevent blowing of dust, but not to create excess moisture that will prevent segregation of materials, or interfere with proper placement of materials. Application of water is required at all stages of work, which includes, but is not limited to, the following.
- .1 Stripping of topsoil.
- .2 Excavation Work.
- .3 Grading operations.
- .4 Placement of fill materials.
- .5 Placement of topsoil.
- .6 Removal of surplus materials.

3.3 PROTECTION OF STOCKPILES

.1 Apply water to materials during stockpiling operations and either cover stockpile at end of day or continue with application of water both during workday and after hours in to ensure acceptable dust control.

3.4 TRANSPORTATION OF MATERIALS

.1 Leave tarpaulins in place during dumping of fill materials being brought to the site.
.2 Water materials being loaded onto trucks for removal from site and secure tarpaulins before leaving loading area.

3.5 SITE PREPARATION

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly in accordance with Section 02 41 13 - Selective Site Demolition.

3.6 STRIPPING OF TOPSOIL

.1 Begin topsoil stripping of areas as indicated after area has been cleared of brush and removed from site.
.2 Strip topsoil to depths as indicated. Do not mix topsoil with subsoil.
.3 Stockpile in locations as indicated or directed by Consultant. Stockpile height not to exceed 2 m and should be protected from erosion.
.4 Dispose of unused topsoil to location as indicated.

3.7 STOCKPILING

.1 Stockpile fill materials in areas designated by Consultant. Stockpile granular materials in manner to prevent segregation.
.2 Protect fill materials from contamination.
.3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.8 SHORING, BRACING AND UNDERPINNING

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods.
.2 Obtain permit from authority having jurisdiction for temporary diversion of water course.
.3 Construct temporary Works to depths, heights and locations as indicated.
.4 Upon completion of substructure construction:

.1 Remove shoring and bracing.
.2 Remove excess materials from site.

3.9 DEWATERING AND HEAVE PREVENTION

.1 Keep excavations free of water while Work is in progress.
.2 Protect open excavations against flooding and damage due to surface run-off.
.3 Dispose of water in accordance with Division 01 - General Requirements to approved collection and in manner not detrimental to public and private property, or portion of Work completed or under construction.
.4 Provide settling basins, or other facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

3.10 EXCAVATION

.1 Excavate to lines, grades, elevations and dimensions as indicated.
.2 Remove concrete and other obstructions encountered during excavation.
.3 Excavation must not interfere with normal 45° bearing splay of adjacent foundations.
.4 Following completion of excavation work and prior to placement of any structural fill material proof roll existing sub-grade exposed by excavation with a large vibratory roller (CAT CS-563E or equivalent). Remove 'soft' material and replace with new structural fill in accordance with requirements of this Section compacted to 100% density.
.5 Do not disturb soil within branch spread of trees or shrubs that are to remain.
  .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
.6 For trench excavation, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 5m at end of day's operation.
.7 Keep excavated and stockpiled materials safe distance away from edge of trench.
.8 Restrict vehicle operations directly adjacent to open trenches.
.9 Dispose of surplus and unsuitable excavated material in approved location on site.
.10 Do not obstruct flow of surface drainage or natural watercourses.
.11 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
.12 Notify Consultant when bottom of excavation appears unsuitable.
.13 Obtain Consultant's approval of completed excavation.
.14 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Consultant.
.15 Correct unauthorized over-excavation as follows:
  .1 Fill under bearing surfaces and footings with Type 2 fill compacted to not less than 98% of corrected Standard Proctor maximum dry density.
.16 Hand trim, make firm and remove loose material and debris from excavations.
  .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
.17 Rock excavation:
  .1 For the purpose of bidding it is to be assumed that solid sandstone bedrock, as defined under Par. 1.4 above, will not be encountered during the work of this Section.

3.11 FILL TYPES AND COMPACTION

.1 Dimensions specified in following paragraphs are minimum dimensions of fill after compaction.
.2 Interior side of perimeter foundation walls of addition:
  .1 Backfill with Type 5 (structural) fill up to underside of granular base for floor slabs. Compact to 100% density, in lifts not exceeding 300mm.
  .2 Refer to Par. 1.8 above for general requirements relating to the extent of back filling within the foundation walls and other limitations and requirements.
  .3 At excavation through new Type 5 Fill for interior foundation walls and footings, backfill with Type 5 Fill to underside of granular base for floor slabs. Compact to 100% density, in lifts not exceeding 300mm.

.4 Excavated material may be used if uncontaminated and approved by testing laboratory.
.5 Install Type 1 fill (granular base) to thickness indicated, directly over structural fill, compacted to 100% density.
.6 Level granular base to accommodate full thickness of concrete floor slab.
.7 Install sheet vapour retarder in accordance with Par. 3.9 below.

.3 Exterior Concrete Sidewalks:
.1 Backfill with Type 5 fill up to underside of granular base for concrete slab at building exterior.
.2 Install Type 1 fill to thickness indicated, directly over structural fill, compacted to 100% density.
.3 Level granular base to accommodate full thickness of concrete aprons.

.4 Underground services:
.1 Use Type 4 Fill (bedding sand) to provide bedding and cover as indicated compacted full width of trench to minimum 95% density.
.2 Use excavated material to underside of granular base for floor slab at interior of addition, compacted to 100% density.
.3 Use Type 3 Fill to underside of topsoil at landscaped areas compacted to density at least equal to adjacent undisturbed soil or minimum 95%.

.5 Interior Concrete Slab on Grade:
.1 Backfill with Type 5 Fill (select borrow) to a minimum thickness of 300 mm and to suit grade. Compact to 100% SPDD.
.2 Install Type 1 to depth as indicated compact to 100% SPDD, Class "A".

3.12 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Place and compact granular material for bedding and surround of underground services as indicated.
.2 Place bedding and surround material in unfrozen condition.

3.13 PERIMETER INSULATION

.1 Install horizontal and vertical perimeter board insulation to width and thickness indicated, directly under floor slabs, adjacent to exterior perimeter walls, as indicated.
.2 Install boards on walls using a Type A adhesive to temporarily support boards tight against face of wall until backfilling is complete.
.3 Install boards to tight fit against abutting boards.

3.14 PERIMETER FOUNDATION INSULATION (VERTICAL)

.1 Install polystyrene boards to depth and thickness indicated against inside face of exterior perimeter foundation walls, as indicated.
.2 Install boards on walls using a Type A adhesive to temporarily support boards tight against face of wall until backfilling is complete.
.3 Install boards to tight fit against abutting boards.

3.15 BACKFILLING

.1 Do not proceed with backfilling operations until Consultant has inspected and approved installations.
.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
.3 Do not use backfill material which is frozen or contains ice, snow or debris.
.4 Backfilling around perimeter foundation walls.
.1 Do NOT place fill material against perimeter foundation walls until:
.1 Concrete has cured for a minimum of 14 days.
.2 Floor structures are permanently in place, unless approved by Consultant. Provide bracing as directed by Consultant and leave in place until removal is approved by Consultant.

.3 Exercise care not to damage insulation at interior face of foundation walls and polyethylene slip sheet at exterior face of the foundation walls.

.5 Backfilling around site installations.

.1 Place bedding and surround material as specified and indicated in applicable Section for service or utility to be installed.

.2 Do not backfill around or over cast-in-place concrete within 24 hours after placing.

.3 Place layers simultaneously on both sides of installed work to equalize loading.

.4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:

.1 Permit concrete to cure for minimum of 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval has been obtained from Consultant or:

.2 If approved by Consultant erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Consultant.

.5 Place material by hand under, around and over installations until 600mm of cover is provided, except where specifically permitted otherwise. Dumping material directly on installations will not be permitted.

.6 Place backfill material in uniform layers not exceeding 150mm up to grades indicated. Compact each layer before placing succeeding layer. Use methods to prevent damage to installations.

3.16 SLIP SHEET/BOND BREAKER

.1 Polyethylene Slip Sheet/Bond Breaker

.1 Install 10mil polyethylene slip-sheet at exterior face of all foundation walls from top of footing to future finished grade. Provide temporary support until backfilling is completed.

.2 Use 10mil polyethylene sheet as bond breaker between foundation walls and slabs-on-grade and slabs on steel floor decking. Provide temporary support until slabs are placed. Trim flush with top of slab.

3.17 UNDERSLAB VAPOUR BARRIER

.1 Install underslab vapor barrier over entire area of granular base. Lap all joints minimum 300 mm and seal with water impermeable adhesive tape.

.1 Turn vapour barrier, minimum 100mm, up face of existing foundation walls, perimeter Insulation at exterior foundation walls and interior piers.

.2 Seal punctures in sheets before concrete is placed. Use patching material minimum 150 mm larger than puncture, and seal.

3.18 TESTING AND INSPECTION

.1 The responsibilities for test and payment will be as outlined in Division 01 - General Requirements.

3.19 RESTORATION

.1 Upon completion of work, remove surplus materials and debris, trim slopes and correct defects noted by Consultant.

.2 Clean and reinstate areas affected by work to satisfaction of Consultant.

3.20 SURPLUS MATERIAL

.1 Remove all surplus material from site, and pay all fees as may be charged at disposal site.

.2 Remove all soil contaminated with oil, gasoline, calcium chloride or other toxic or dangerous materials resulting from the work of this contract and dispose of in manner to minimize danger at site and in a manner and to a location off site approved by Provincial Authority governing such disposal.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED SECTIONS

.1 Section 32 17 23 - Pavement Markings.

1.2 DESCRIPTION OF WORK

.1 This Section specifies the requirements for the materials, equipment and methods to be followed for production, placement and compaction of hot mix, hot laid asphalt concrete for pavement construction for the parking areas, including access driveways.

.2 The following Prince Edward Island Department of Transportation, Infrastructure & Energy Specifications will be followed for all work related to Hot Mix Asphalt Concrete Paving.

- .1 501 Asphalt Cement
- .2 502 Asphalt Prime
- .3 503 Asphalt Emulsions
- .4 601 Tack Coat Application
- .5 602 Prime Coat Application
- .6 603 Hot Mix Asphaltic Concrete
- .7 705 Cold Plane Construction Joint
- .8 907 Vehicle Configurations and Restrictions

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

- .1 ASTM D995-95b(2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
- .2 ASTM D1559-89, Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus, was withdrawn in 1998 with no replacement.

.2 Asphalt Institute (AI)

- .1 AI MS-2-1993, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.

.3 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-16.1-M89, Cutback Asphalts for Road Purposes.
- .2 CAN/CGSB-16.3-M90, Asphalt Cements for Road Purposes.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse in accordance with Waste Management Plan.

.2 Divert unused asphalt materials from landfill.

.3 Divert unused aggregate materials from landfill for reuse as approved by Consultant.

.4 Unused protective coating material must be disposed of at an official hazardous material collections site as approved by Consultant.

.5 Unused protective coating material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

2 Products

2.1 MATERIALS

.1 Asphalt paving mixture: The current Prince Edward Island Department of Transportation, Infrastructure & Energy Specifications 603 and 501 for hot-mixed, hot-laid asphalt concrete shall govern the materials and composition of the asphalt concrete pavements.

- .1 Base: Mix designation 'A' - as per Specification 501
- .2 Seal: Mix designation 'C' - as per Specification 501

.2 Asphalt prime: In accordance with the PEI Department of Transportation, Infrastructure & Energy Specification 502.

.3 Asphalt emulsions: In accordance with the PEI Department of Transportation, Infrastructure & Energy Specification 503.

3 Execution

3.1 ASPHALT PRIME

.1 Apply asphalt prime over imported granular base in accordance with the requirements of PEI Department of Transportation, Infrastructure & Energy Specification 602, Paragraphs 602.01 to 602.04 inclusive.

3.2 ASPHALT CONCRETE PAVING

.1 Place and compact asphalt concrete base and seal courses in accordance with the requirements of PEI Department of Transportation, Infrastructure & Energy Specification 603 to thickness indicated on drawings.

3.3 ASPHALT TACK

.1 Apply asphalt tack between base and seal courses and elsewhere as applicable in accordance with the requirements of PEI Department of Transportation, Infrastructure & Energy Specification 601.

3.4 JOINTS

.1 Provide cold plane joint at intersection with existing roads and elsewhere as required in accordance with PEI Department of Transportation, Infrastructure & Energy Specification 705, Paragraphs 705.01 and 705.02.

3.5 VEHICLE REQUIREMENTS

.1 In accordance with PEI Department of Transportation, Infrastructure & Energy Specification 907.

3.6 TESTING AND INSPECTION

.1 Testing of asphalt materials and inspection and testing of placement and compaction to be carried out by testing laboratory engaged and paid by the Contractor, in accordance with Division 01 - General Requirements. Frequency of tests to be determined by the testing laboratory.

3.7 SURPLUS MATERIALS

.1 Remove all surplus materials from site.
.2 Dispose off site at a location approved by Provincial Authority governing such disposal and pay all fees that may be charged to dispose of materials.

3.8 PROTECTION

.1 Keep vehicular traffic off newly paved areas until paving surface temperature has cooled below 38 degrees C. Do not permit stationary loads on pavement until 24 hours after placement.
.2 Provide access to buildings as required. Arrange paving schedule so as not to interfere with normal use of premises.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 03 10 00 - Concrete Forming and Accessories.
.2 Section 03 20 00 - Concrete Reinforcing.
.3 Section 03 30 00 - Cast-in-Place Concrete.
.4 Section 03 35 00 - Concrete Finishing
.5 Section 32 12 00 - Flexible Paving.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)
  .1 ASTM D698-91(1998), Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft3) (600kN-m/m3).
.2 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-1.2-98, Boiled Linseed Oil.
  .2 CAN/CGSB-3.3-99, Kerosene.
.3 Canadian Standards Association (CSA)
  .1 CAN/CSA-A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

1.3 TESTING AND INSPECTION

.1 Testing and inspection of concrete and concrete materials will be carried out by testing laboratory engaged and paid by the Contractor in accordance with Division 01 - General Requirements. Frequency of tests will be determined by the testing laboratory.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials and place in on-site bins in accordance with Waste Management Plan.
.2 Place materials defined as hazardous or toxic waste in designated containers.
.3 Ensure emptied containers are sealed and stored safely.

2 Products

2.1 MATERIALS

.1 Concrete mixes and materials: to Section 03 30 00 - Cast-in-Place Concrete.
.2 Reinforcing steel: to Section 03 20 00 - Concrete Reinforcing.
.3 Welded wire mesh: to CSA G30.5. Provide in flat sheets only.
  .1 All 152 x 152 x 18.7 x 18.7
.4 Joint filler: 20mm preformed, non-extruding, resilient, bituminous type.
.5 Granular base: to Section 31 23 00 - Excavation and Fill, type fill.
.6 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water soluble soap.
.7 Fill material: to Section 31 23 00 - Excavation and Fill, type fill.
.8 Forms:
  .1 Use minimum 38 mm thickness lumber x maximum practical length at sides of walks and curbs staked to ensure level, straight, undeviating edges over length of walk or
  .2 Provide temporary 2 piece wood shut-offs to allow for continuity of welded wire fabric reinforcing.

3 Execution

3.1 CONSTRUCTION

.1 Construction method:

.1 Curb and sidewalk shall be constructed on a prepared smooth sub-grade of uniform density. All large rocks, roots, sods, rubbish and soft or spongy material shall be removed from subgrade and the excavations filled with material conforming to that of the remainder of the sub-grade. The sub-grade shall then be brought to a smooth surface and thoroughly compacted by rolling or power tamping to finished grade.

.2 Excavation and filling:

.1 Provide sand and preparation of sub-grade for curbs and sidewalks. Grade and compact the sub-grade as specified above.

.3 Concrete material:

.1 Concrete supplied for the construction of curbs and sidewalks shall meet the following guidelines:

.1 The minimum allowable 28 day compressive strength shall be 35 MPa.

.2 The maximum size of course aggregate shall be 25mm minimal.

.3 The concrete shall have a minimum 25mm slump, with a maximum of a 75mm slump.

.4 Concrete shall have a total air content of 5-7%.

.5 Unless otherwise permitted by the Consultant, only ready mix concrete is to be used for the curb and sidewalk construction. Hand mixing will not be permitted except with the approval of the Consultant.

.4 Mixing and delivering of concrete:

.1 Delivery and discharge of concrete by a truck mixer shall be completed within 1 1/2 hours of the introduction of cement and other materials. This period may be reduced by the Consultant during hot weather or under conditions to rapid stiffening on the concrete. Mixing shall begin within thirty minutes of the introduction of cement to the aggregates. Addition of water after the initial introduction of the mixing water will not be permitted, if as a result, the specified 28 day strength will not be obtained.

.5 Forms:

.1 Forms shall be of sturdy construction using dressed lumber. Sidewalk forms shall be placed such as the surface of the walk will grade downwards toward the street at a slope of 1:50.

.2 Curb face forms shall be left in place until the concrete is hardened sufficiently so that they can be removed without damaging the curb. The exposed surfaces shall then be finished to give a granular or matted texture. The remaining forms shall not be removed for at least 24 hours after the concrete has been placed. The edges shall be rounded with an edging tool and no marks shall be left on exposed edges before final finishing.

.6 Construction details

.1 All sidewalks construction shall be 1.5 meters constructed to dimensions as indicated.

.2 All sidewalks bordering the street asphalt surface shall have an integral curb with a finished face of approximately 150mm showing on the street side. The sidewalk portion of the construction shall be 125mm thick in these sections.

.3 Sidewalk crossing driveways and entrance ramps shall be 150mm thick rather than 125mm. 150 x 150mm steel mesh shall be placed in these sections.

.4 No sidewalk blocks shall have a dimension greater than 1500mm. Reinforced steel dowels 12mm in diameter, 610mm long shall be encased in the concrete at 300mm intervals between adjacent blocks to prevent differential movement of the blocks.

.5 Saucer-type curbs shall be provided at crosswalks, driveways and other areas as directed by the Consultant.

.7 Joints:

.1 Expansion joints shall be provided every 7500mm of sidewalk, along the face of abutting buildings or structures and between adjacent curb and sidewalk section. Expansion joint material shall be approved premolded bitumen filler 6mm in thickness.

.2 Control joints shall be provided every 1500mm of sidewalk.

.3 Curbs shall be provided with contraction joints of 6mm at intervals of 3000mm and at the beginning and end of every curve.

.8 Placing Concrete:
- .1 All concrete placing methods shall be subjected to the approval of the Consultant and placing shall not commence until a representative has inspected and approved of all preparations including forms, reinforcing and all spreading, compacting, finishing and curing equipment.
- .2 The concrete shall be deposited on the sub-grade immediately after mixing and shall be screeded to a level surface within thirty minutes after discharge from the mixer.

.9 Sidewalk finishing:
- .1 Screeding shall be carried out immediately after consolidation of the concrete to give the surface its approximate shape and grade. This shall be accomplished by moving a straight edge with a sawing motion along the top of the forms.
- .2 After the screeding operation and the water sheen has disappeared from the surface of the concrete it shall be floated with a wooden float. The Contractor shall exercise care so as to not overwork the concrete, thus avoiding bring access water and fines to the surface.
- .3 A pebble finish shall be applied when the concrete is sufficiently hard to retain marking. This finish shall be applied using a suitable metal roller. The edges of the exposed surfaces shall be rounded off with an edging tool and the top portion of joints adjacent to buildings shall be filled with bitumen compound to seal the filler.

.10 Protection and curing:
- .1 The Contractor shall have available at all time a supply of tarpaulins, polyethylene of other suitable covering which may be placed over the fresh concrete to protect it from damage in event of rain.
- .2 Should the surrounding air temperature fall below 3 degrees Celsius or if there is any likelihood of the temperature falling to this level within forty-eight hours of the placing of the concrete, the contractor shall protect the concrete from damage from frost by covering all exposed surfaces as soon as possible after finishing the tarpaulins or other suitable insulating material. This protection shall remain in place until such time as, in the opinion of the Consultant, the concrete will not be damaged by frost. Well consolidated within the forms.
- .3 An approved concrete curbing compound "Rite Cure" or equal shall be supplied to the concrete immediately following finishing. Rate of application shall be as recommended by the manufacturer.
- .4 Approximately thirty days after the application of an approved curing compound, the Contractor shall apply an application of linseed oil and kerosene, the mixture shall consist of 50% linseed oil and 50% kerosene. One week after the first application the procedure shall be repeated using an identical mixture.

.11 Pedestrian protection:
- .1 Place barricades to warn and keep motor vehicle traffic a safe distance from the working area. Also place barricades to warn pedestrian and other such traffic of the work area. If redirecting pedestrian traffic, make sure the alternate route is protected from any vehicle traffic. This may require a double row of barricades. Also make sure the alternate route is as mobility accessible as possible. Keep in mind wheelchairs and visually impaired person, temporary walking shall be Class A, minimum 50mm and shall be properly compacted by hand tamping floating, or vibrating.

3.2 GRADE PREPARATION

.1 Do grade preparation work in accordance with Section 31 23 00 - Excavation and Fill.

.2 Construct embankments using excavated material free from organic matter or other objectionable materials. Dispose of surplus and unsuitable excavated material in approved location on site.

.3 When constructing embankment provide for minimum 300mm shoulders, where applicable, outside of neat lines of concrete.

.4 Place fill in maximum 150 mm layers and compact to at least 95% of maximum density to ASTM D698.

3.3 GRANULAR BASE

.1 Obtain Consultant's approval of subgrade before placing granular base.
.2 Place granular base material to lines, widths, and depths as indicated.
.3 Compact granular base to at least 95% of maximum density to ASTM D698.

3.4 CONCRETE

.1 Obtain Consultant's approval of granular base and reinforcing steel prior to placing concrete.
.2 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
.3 Immediately after floating, give sidewalk surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to center line.
.4 Provide edging as indicated with 10 mm radius edging tool.
.5 Slip-form pavers equipped with string line system for line and grade control may be used if quality of work acceptable to Consultant can be demonstrated. Hand finish surfaces when directed by Consultant.

3.5 TOLERANCES

.1 Finish surfaces to within 3 mm in 3 m as measured with 3 m straight edge placed on surface.

3.6 EXPANSION AND CONTRACTION JOINTS

.1 Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, at intervals of 1500mm.
.2 Install expansion joints as indicated at intervals of 7500mm max or as directed by Consultant.
.3 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

3.7 ISOLATION JOINTS

.1 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.
.2 Install joint filler in isolation joints in accordance with Section 03 30 00 - Cast-in-Place Concrete.
.3 Seal isolation joints with sealant approved by Consultant.

3.8 CURING

.1 Finish, cure concrete and protect concrete walks in strict accordance with the requirements of Section 03 35 00 - Concrete Finishing and as noted in this Section.

3.9 BACKFILL

.1 Allow concrete to cure for seven (7) days prior to backfilling.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 31 22 13 - Rough Grading.
.2 Section 31 22 19 - Finish Grading.

1.2 SOIL STABILIZATION

.1 Hydroseeding is to be used for soil stabilization only as required for erosion control.
.2 Sodding will be used as a permanent finish to all disturbed areas.

1.3 SUBMITTALS

.1 Product Data.
  .1 Submit product data in accordance with Division 01 - General Requirements.
  .2 Provide product data for:
    .1 Seed.
    .2 Mulch.
    .3 Tackifier.
    .4 Fertilizer.
  .3 Submit in writing to Consultant 5 days prior to commencing work:
    .1 Volume capacity of hydraulic seeder in liters.
    .2 Amount of material to be used per tank based on volume.
    .3 Number of tank loads required per hectare to apply specified slurry mixture per hectare.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

1.5 SCHEDULING

.1 Schedule hydraulic seeding to coincide with preparation of soil surface.
.2 Schedule hydraulic seeding using grass mixtures and mixtures containing Crownvetch between dates recommended by the Provincial Agricultural Department.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and waste materials in accordance with Waste Management Plan.
.2 Divert unused fertilizer from landfill to official hazardous material collections site.
.3 Do not dispose of unused fertilizer into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

2 Products

2.1 MATERIALS

.1 Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.
  .1 Grass mixture: "Certified", "Canada No. 1 Lawn Grass Mixture" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".
.2 Mulch: specially manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green coloring, free of germination and growth inhibiting factors with following properties:

.1 Type I mulch:
.1 Made from wood cellulose fiber.
.2 Organic matter content: 95% plus or minus 0.5%.
.3 Value of pH: 6.0.
.4 Potential water absorption: 900%.
.3 Tackifier: water dilutable, liquid dispersion.
.4 Water: free of impurities that would inhibit germination and growth.
.5 Fertilizer:
.1 To Canada "Fertilizers Act" and "Fertilizers Regulations".
.2 Complete synthetic, slow release with 35% of nitrogen content in water-insoluble form.
.6 Inoculants: inoculant containers to be tagged with expiry date.

3 Execution

3.1 WORKMANSHIP

.1 Do not spray onto structures, signs, guide rails, fences, plant material, utilities and other than surfaces intended.
.2 Clean-up immediately, any material sprayed where not intended, to satisfaction of Consultant.
.3 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.
.4 Protect seeded areas from trespass until plants are established.

3.2 PREPARATION OF SURFACES

.1 Fine grade areas to be seeded free of humps and hollows. Ensure areas are free of deleterious and refuse materials.
.2 Cultivated areas identified as requiring cultivation to depth of 25mm.
.3 Ensure areas to be seeded are moist to depth of 150mm before seeding.
.4 Obtain Consultant's approval of grade and topsoil depth before starting to seed.

3.3 FERTILIZING PROGRAM

.1 Apply lime at a rate of 50kg per 100m2 or at a rate determined by soil analysis.

3.4 PREPARATION OF SLURRY

.1 Measure quantities of materials by weight or weight-calibrated volume measurement satisfactory to Consultant. Supply equipment required for this work.
.2 Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.
.3 After all materials are in the seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

3.5 SLURRY APPLICATION

.1 Hydraulic seeding equipment:
.1 Slurry tank.
.2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and/or mechanical agitation method.
.3 Capable of seeding by 50 m hand operated hoses and appropriate nozzles.
.4 Tank volume to be certified by certifying authority and identified by authorities "Volume Certification Plate".
.2 Slurry mixture applied per hectare.
.1 Seed: Grass mixture 2.0 kg, or as recommended by seed manufacturer.
.2 Mulch: Type 10 kg.
.3 Water: Minimum 100 L.

.4 Fertilizer: 500 kg, of nitrogen.

.3 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.
- .1 Using correct nozzle for application.
- .2 Using hoses for surfaces difficult to reach and to control application.

.4 Blend application 300 mm into adjacent grass areas or sodded areas to form uniform surfaces.

.5 Re-apply where application is not uniform.

.6 Remove slurry from items and areas not designated to be sprayed.

.7 Protect seeded areas from trespass satisfactory to Consultant.

.8 Remove protection devices as directed by Consultant.

3.6 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following operations from time of seed application until acceptance by Consultant.

.2 Grass Mixture:
- .1 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
- .2 Mow grass to 50 mm whenever it reaches height of 70 mm. Remove clippings which will smother grass as directed by Consultant.
- .3 Fertilize seeded areas after first cutting in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles; water in well.
- .4 Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices.
  - .1 If chemical means are used, comply with manufacturers written instructions and environmental regulations.
- .5 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.

.3 Repair and Maintenance:
- .1 Repair minor dead and bare spots as determined by Consultant to allow establishment of seed prior to acceptance.
- .2 Negotiate repair of major dead and bare spots as determined by Consultant.
- .3 Mow grass to 100mm whenever height reaches 200 mm and as follows:
  - .1 Do not mow within period commencing 3 weeks before and ending 3 weeks after first severe, average fall frost date and 3 weeks after actual severe fall frost.
  - .2 When mowing after first severe fall frost, mow at a height of not less than 300 mm.
- .4 Remove clippings which will smother plants as directed by Consultant.
- .5 Water seeded areas to maintain optimum soil moisture level for germination and continued growth. Control watering to prevent washouts.

3.7 ACCEPTANCE

.1 Seeded areas will be accepted by Consultant provided that:
- .1 Plants are uniformly established.
- .2 Areas have been mown at least twice.
- .3 Areas have been fertilized.

.2 Areas seeded in fall will achieve final acceptance in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

3.8 MAINTENANCE DURING WARRANTY PERIOD

.1 Perform following operations from time of acceptance until end of warranty period:
- .1 Repair and reseed dead or bare spots to satisfaction of Consultant.
- .2 Mow areas seeded, remove clippings, as directed by Consultant.

3.9 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 03 20 00 - Concrete Reinforcing.
.2 Section 03 30 00 - Cast-in-Place Concrete.
.3 Section 31 23 00 - Excavation and Fill.
.4 Section 33 31 13 - Public Sanitary Utility Sewerage Piping.
.5 Section 33 32 13 - Public Storm Utility Drainage Piping.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM International)
  .1 ASTM C139-17, Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.
  .2 ASTM C478M-19, Specification for Precast Reinforced Concrete Manhole Sections Metric.
.2 Canadian Standards Association (CSA International)
  .1 CAN/CSA-A3000-13, Cementitious Materials Compendium. Includes:
    .1 CAN/CSA-A5-98, Portland Cement.
    .2 CAN/CSA-A8-98, Masonry Cement.
    .3 CAN/CSA-A23.5-98, Supplementary Cementing Materials.
  .2 CSA-A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
  .3 CAN/CSA-G30.18-09(R2014), Billet Steel Bars for Concrete Reinforcement.
  .4 CAN/CSA-G164-2018, Hot Dip Galvanizing of Irregularly Shaped Articles.

1.3 SUBMITTALS

.1 Submittals in accordance with Division 01 - General Requirements.
.2 Submit manufacturer's drawings, information and shop drawings.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate for disposal waste material and place in appropriate on-site bins in accordance with Waste Management Plan.
.2 Divert unused concrete materials from landfill.
.3 Divert unused aggregate materials from landfill.

2 Products

2.1 MATERIALS

.1 Materials
  .1 Precast sanitary and storm manhole sections: to ASTM C478M, circular or oval. Top sections eccentric cone with opening offset for vertical ladder installation. Units to have integral precast base section with benching at sanitary manholes and performed gasketed openings for pipes.
  .2 Provide openings in walls of manholes as required to suit size and inverts of lines. Confirm size and invert before fabrication.
  .3 Acceptable Material:
    .1 Campbells' Concrete Ltd.
    .2 L.E. Shaw Limited.
  .4 Frames, gratings, covers to plan dimensions and following requirements:
    .1 Manhole frames and cover: heavy duty municipal type for road service. Cover cast without perforations and complete with two - 1 inch square lifting holes.
    .2 Acceptable Material:
      .1 Hall and Stavert No. 26 or equal.

.5 Cast-in-place base slab: use permitted only where use of integral base in not practical and when approved by Consultant.
.6 Concrete Grout:
.1 Non shrink, non metallic, grout capable of developing compression strength of 50mPa at 28 days.
.2 Acceptable Material: Meadows "Sealtight CG-86"

.2 Precast catch basin sections: to ASTM C139, ASTM C478M.
.1 Acceptable material:
.1 Campbells' Concrete Ltd.
.2 L.E. Shaw Limited.

.3 Joints: to be made watertight using rubber rings, bituminous compound, epoxy resin cement or cement mortar.
.4 Ladder rungs: to CAN/CSA-G30.18, No.25M billet steel deformed bars, hot dipped galvanized to CAN/CSA-G164. Rungs to be safety pattern (drop step type).
.5 Adjusting rings: to ASTM C478M.
.6 Drop manhole pipe: to be same as sewer pipe.

3 Execution

3.1 EXCAVATION AND BACKFILL

.1 Excavate and backfill in accordance with Section 31 23 00 - Excavation and Fill and as indicated.
.2 Obtain approval of Consultant before installing outfall structures, manholes or catch basins.

3.2 CONCRETE WORK

.1 If required, do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
.2 Place concrete reinforcement in accordance with Section 03 20 00 - Concrete Reinforcing.
.3 Position metal inserts in accordance with dimensions and details as indicated.

3.3 INSTALLATION

.1 Construct units in accordance with details indicated, plumb and true to alignment and grade.
.2 Complete units as pipe laying progresses. Maximum of three units behind point of pipe laying will be allowed.
.3 Dewater excavation to approval of Consultant and remove soft and foreign material before placing concrete base.
.4 Installation of units:
.1 Set precast concrete base section to ensure proper alignment and invert elevations, on minimum 150mm of imported granular material compacted to 100% corrected maximum dry density. When use of cast-in-place base slab approved set bottom section of manhole in bed of cement mortar and bond to concrete slab.
.2 When cast-in-place slab approved set bottom section of manhole in bed of cement mortar and bond to concrete slab.
.3 Make each successive joint watertight with approved rubber ring gaskets or bituminous compound. If bituminous compound used, apply to CGSB 56-GP-9A.
.4 Clean surplus grout and joint compounds from interior surface of unit as work progresses.
.5 Plug lifting holes with precast concrete plugs set in cement mortar or mastic compound.

.5 For sanitary sewers:
.1 When use of cast-in-place base slab approved by Consultant bench to provide a smooth U-shaped channel. Side height of channel to be full diameter of sewer. Slope adjacent floor at 1 in 10 toward channel. Curve channels smoothly. Slope invert to establish sewer grade.
.6 Compact granular backfill to 95% corrected maximum dry density.

.7 Place frame and cover on top section to elevation as indicated. If adjustments required use concrete rings to suit finished grade elevations.
.8 Clean units of debris and foreign materials. Remove fins and sharp projections. Prevent debris from entering system.
.9 Install safety platforms in manholes having depth of 5 m or greater, as indicated.

3.4 NEW CONNECTION AT EXISTING STORM/SANITARY MANHOLE

.1 Core drill opening in wall of existing manhole to suit diameter and invert of new storm/sanitary line connection, complete with rubber ring.
.2 Fit rubber ring on pipe to place it at the center of the wall of the manhole. Grout line in place from both sides and make watertight.
.3 Provide cast-in-place concrete saddle to support existing piping where new pipe crosses an existing pipe and where the distance is less than 300mm.

3.5 LEAKAGE TEST

.1 Install watertight plugs or seals on inlets and outlets of each new sanitary sewer manhole and fill manhole with water. Leakage not to exceed 0.3% per hour of volume of manhole.
.2 If permissible leakage is exceeded, correct defects. Repeat until approved by Consultant.

END OF SECTION

This page intentionally left blank

1 General

1.1 RELATED SECTIONS

.1 Section 31 23 00 - Excavation and Fill.
.2 Section 33 05 13 - Manholes and Structures.
.3 Section 33 41 13 - Public Storm Utility Drainage Piping.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
  .1 ASTM C14M-99, Standard Specification for Concrete Sewer, Storm Drain and Culvert Pipe (Metric).
  .2 ASTM C76M-02, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe (Metric).
  .3 ASTM C136-01, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  .4 ASTM C443M-02, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).
  .5 ASTM D2680-01, Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.
  .6 ASTM D3034-00, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  .7 ASTM D3350-02, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
.2 Canadian Standards Association (CSA International)
  .1 CAN/CSA-A257 Series-M92(R1998, Standards for Concrete Pipe.
  .2 CSA B1800-02, Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).
    .1 CSA B182.2-02, PVC Sewer Pipe and Fittings (PSM Type).
    .2 CSA B182.6-02, Profile Polyethylene Sewer Pipe and Fittings for Leak-Proof Sewer Applications.
    .3 CSA B182.11-02, Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings.

1.3 DEFINITIONS

.1 Pipe section is defined as length of pipe between successive manholes and/or between manhole and any other structure which is part of sewer system.

1.4 SUBMITTALS

.1 Submit shop drawings in accordance with Division 01 - General Requirements.
.2 Indicate proposed method for installing carrier pipe for undercrossings.
.3 Inform Consultant at least 4 weeks prior to beginning Work, of proposed source of bedding materials and provide access for sampling.
.4 Ensure certification is marked on pipe.
.5 Submit manufacturers information data sheets and instructions in accordance with Division 01 - General Requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Division 01 - General Requirements.

1.6 SCHEDULING OF WORK

.1 Schedule work to minimize interruptions to existing services and to maintain existing flow during construction.

.2 Submit schedule of expected interruptions for approval and adhere to approved schedule. Notify Consultant 72 hrs in advance of any changes to said schedule.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate into on site bins waste materials in accordance with Waste Management Plan.
.2 Place materials defined as hazardous or toxic in designated containers.
.3 Divert unused aggregate materials from landfill to quarry for reuse.
.4 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
.5 Fold up metal banding, flatten and place in designated area for recycling.

2 Products

2.1 PLASTIC PIPE AND FITTINGS

.1 Type PSM Polyvinyl Chloride (PVC): to ASTM D3034.
  .1 Standard Dimensional Ratio (SDR): 35.
  .2 Locked-in steel reinforced gasket and integral bell system.
  .3 Nominal lengths: 4 m.
.2 Size as indicated.
.3 Color coded Green.
.4 Tee connections and fittings to the PVC sanitary main to be PVC pipe DR35 to ASTM D3034 and CSA B1800 complete with integral gaskets.
.5 Saddles shall be PVC gasketed and strap on type of the size as indicated on the Drawings, meeting the same requirements as the sanitary pipe or Rubber "Inserta-tee" or "Quick Seal" type connectors.
.6 Bends shall be of the long radius type only.
.7 Caps for ends of laterals shall be PVC.
.8 Acceptable material:
  .1 IPEX "Ring Tite"

2.2 CEMENT MORTAR

.1 Portland cement: to CAN/CSA-A5, normal type 10.
.2 Mix mortar one part by volume of cement to two parts of clean, sharp sand mixed dry.
  .1 Add only sufficient water after mixing to give optimum consistency for placement.
  .2 Do not use additives.

2.3 PIPE BEDDING AND SURROUND MATERIALS

.1 Granular material to Section 31 23 00 - Excavation and Fill and following requirements:
  .1 Crushed or screened stone, gravel or sand.
  .2 Gradations to be within limits specified when tested to ASTM C136. Sieve sizes to CAN/CGSB-8.1.
.2 Concrete mixes and materials for cradles, encasement, supports: to Section 03 30 00 - Cast-in-Place Concrete.

2.4 PIPE INSULATION

.1 Extruded polystyrene to CAN/ULC-5701-1997, Type IV, RS1 value of 0.87 per 25mm thickness (R-50), ship-lapped edges to thickness indicated.
.2 Standard of Acceptance:
  .1 Dow Styrofoam SM
  .2 Celfort Celfortec 300

2.5 BACKFILL MATERIAL

.1 As indicated.

.2 Type 3, in accordance with Section 31 23 00 - Excavation and Fill.

3 Execution

3.1 PREPARATION

.1 Clean pipes and fittings of debris and water before installation. Carefully inspect materials for defects before installing. Remove defective materials from site.

3.2 TRENCHING

.1 Do not allow contents of any sewer or sewer condition to flow into trench.
.2 Trench line and depth require approval prior to placing bedding material and pipe.
.3 Do not backfill trenches until pipe grade and alignment have been checked and accepted by Consultant.

3.3 GRANULAR BEDDING

.1 Place bedding in unfrozen condition.
.2 Place granular bedding materials in uniform layers not exceeding 150 mm compacted thickness or as directed by Consultant.
.3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.
  .1 Do not use blocks when bedding pipe.
.4 Shape transverse depressions as required to suit joints.
.5 Compact each layer full width of bed to at least 95 % corrected maximum dry density.
.6 Fill excavation below bottom of specified bedding adjacent to manholes or structures with compacted bedding material.

3.4 INSTALLATION

.1 Do installation in conformance with applicable standards.
.2 Lay and join pipes to: ASTM C12.
.3 Lay and join pipes in accordance with manufacturer's recommendations and to approval of Consultant.
.4 Handle pipe by methods recommended by pipe manufacturer. Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.
.5 Lay pipes on prepared bed, true to line and grade with pipe inverts smooth and free of sags or high points. Ensure barrel of each pipe is in contact with shaped bed throughout its full length. To establish grade of gravity sewer pipe, pipe will be laid using surveyor's level or laser equipment designed for this purpose.
.6 Commence laying at lower end and proceed in upstream direction with bell ends of pipe facing upgrade.
.7 Do not exceed maximum joint deflection recommended by pipe manufacturer.
.8 Do not allow water to flow through pipes during construction except as may be permitted by Consultant.
.9 Whenever work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
.10 Joints:
  .1 Join plastic pipe in strict accordance with manufacturer's recommendations.
  .2 Use only adapters and/or joint connectors recommended by plastic pipe manufacturer for connection to sanitary sewer line at building foundation wall.
.11 Cut pipes as required for drops in manholes, special inserts, fittings or closure pieces in a neat manner, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
.12 Make watertight connections to manholes and catch basins. At existing units or where gaskets are not integral with opening in wall of manhole or catch basin use rubber ring stretched over pipe grouted solidly in wall with non-shrink grout.
.13 Use prefabricated saddles or other approved field connections for connecting pipes to existing sewer pipes. Joint to be structurally sound and watertight, and where applicable acceptable

to Provincial or Municipal authority.

.14 Upon completion of pipe laying and after Consultant has inspected pipe joints, place specified granular material to dimensions indicated or directed by Consultant. Leave joints exposed until ex-filtration test results are completed.
  .1 Install pipe insulation where shown to width and thickness indicated with underside 150mm above top of pipe. Extend minimum 600mm wide around manhole at same elevation.

.15 When test results are acceptable to Consultant backfill remainder of trench.

3.5 BACKFILL

.1 Place backfill material in unfrozen condition.

.2 Place backfill material, above pipe surround in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.

.3 Under paving and walks, compact backfill to at least 95 % corrected maximum dry density.
  .1 In other areas, compact to at least 90 % corrected maximum dry density.

3.6 SERVICE CONNECTIONS

.1 Install pipe to CSA B182.11 manufacturer's instructions and specifications.

.2 Maintain grade for 100 and 125 mm diameter sewers at 1 vertical to 50 horizontal unless directed otherwise by Consultant.

.3 Service connections to main sewer: standard.
  .1 Do not use break-in and mortar patch-type joints.

.4 Service connection pipe: not to extend into interior of main sewer.

.5 Make up required horizontal and vertical bends from 45 degrees bends or less, separated by straight section of pipe with minimum length of four pipe diameters.
  .1 Use long sweep bends where applicable.

.6 Plug service laterals with water tight caps or plugs as approved by Consultant.

.7 Place location marker at ends of plugged or capped unconnected sewer lines.
  .1 Each marker: 38 x 89 mm stake extending from pipe end at pipe level to 0.6 m above grade.
  .2 Paint exposed portion of stake red with designation SAN SWR LINE in black.

3.7 FIELD TESTING

.1 Repair or replace pipe, pipe joint or bedding found defective.

.2 When directed by Consultant, draw a tapered wooden plug with a diameter of 50mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction.

.3 Remove foreign material from sewers and related appurtenances by flushing with water.

.4 Perform ex-filtration testing as soon as practicable after jointing and bedding are complete.

.5 Do ex-filtration testing as directed. Perform tests in presence of Consultant. Notify Consultant twenty-four (24) hours in advance of proposed tests.

.6 Carry out tests on each section of sewer between successive manholes including service connections.

.7 Install watertight bulkheads in suitable manner to isolate test section from rest of pipeline.

.8 Ex-filtration test:
  .1 Fill test section with water in such a manner as to allow displacement of air in line. Maintain under nominal head for twenty-four (24) hours to ensure absorption in pipe wall is complete before test measurements are commenced.
  .2 Immediately prior to test period add water to pipeline until there is a head of 1020mm over interior crown of pipe measured at highest point of test solution.
  .3 Duration of ex-filtration test to be two hours.
  .4 Water loss at end of test period not to exceed maximum allowable ex-filtration over any section of pipe between manholes.

.9 Infiltration test:
  .1 Conduct infiltration test in lieu of ex-filtration test where static ground water level is 750mm or more above top of pipe measured at highest point in line to be used.

.2 Do not interpolate a head greater than 750mm to obtain an increase in allowable infiltration rate.
.3 Install a watertight plug at upstream end of pipeline test section.
.4 Discontinue any pumping operations for at least 3 days before test measurements are to commence and during this time keep thoroughly wet at least one third of pipe invert perimeter.
.5 Prevent damage to pipe and bedding material due to flotation and erosion.
.6 Place a 90° V-notch weir, or other measuring device approved by Consultant in invert of sewer at each manhole.
.7 Measure rate of flow over a minimum of one (1) hour with recorded flows for each five (5) minute interval.

.10 Infiltration and ex-filtration not to exceed following limits in L per hour per 100m of pipe, including service connections.

Nominal Pipe Diameter (mm)	**Plastic Pipe**	**Concrete Pipe**
1	3.88	15.5
2	4.62	30.0
3	5.51	34.0
4	7.45	41.5
5	9.39	49.5
6	11.33	56.5
7	13.27	63.5
8	14.91	70.0
9	16.84	76.0
10	18.78	81.5
11	20.72	87.0
12	22.80	92.5
13	26.53	102.0
14	30.11	110.5
15	33.69	118.0
16	37.56	124.5
17	41.29	130.0
18	45.01	135.0
*Values shown in Columns 2 & 3 are in liters per hour per 100m of pipe.		

.11 Low pressure air testing:
.1 Low pressure air testing may be employed as an alternate to ex-filtration test. The Contractor shall furnish all facilities and personnel for conducting the air-acceptance test under the observation of the Consultant. The equipment and personnel shall be subject to the approval of the Consultant. Air shall be slowly supplied to the plugged pipe installation until the internal air pressure reaches 0.2813 kg/cm2 (4 psi) greater than the average back pressure of any groundwater that may submerge the pipe. At least two minutes shall be considered acceptable, when tested at an average pressure of 0.211 kg/cm2 (3 psi) greater than the average back pressure of any groundwater that may submerge the pipe, if:
.1 The total rate of air loss from any section tested in its entirety between manhole and cleanout structure does not exceed 0.06 m3
.2 The section under test does not lose air at a greater rate than 0.000093 m3 per minute per square foot of internal pipe surface.

.12 Deflection testing:
.1 Measure defection by pulling a deflection gauge through each pipe section from manhole to manhole after backfilling.

.1 Provide deflection gauges to measure a 5% and 7½% defection. Gauges to be a "Go-No-Go" device similar to Standard Detail 02702-4 (Detail attached).

.2 Within thirty days after installation, pull a deflection gauge measuring 5% deflection through the installed section of pipeline. If this test fails proceed with at 7½% deflection test. If 7½% deflection test fails, locate defect and repair. Retest.

.3 Thirty days prior to completion of Period of Maintenance, pull a deflection gauge measuring 7½% deflection through the installed section of pipeline. If 7½% deflection fails, locate defect and repair. Retest.

.13 CCTV Inspection:

.1 Carry out closed circuit television inspection immediately after construction completion of the sanitary sewer main. Each road or block shall be tested before proceeding to the next road. Submit to Consultant two (2) copies of colour DVD of the inspection together with a written report of the inspection. Carry out repairs to rectify any deficiency in the pipe and to the satisfaction of the Consultant.

.14 Repair and retest sewer line as required, until test results are within limits specified.

.15 Repair visible leaks regardless of test results.

END OF SECTION

APPENDIX A

Geotechnical Investigation Report

This page intentionally left blank

☎ 877.635.1566 ✉ fundy@fundyeng.com 🖱 www.fundyeng.com

Bio-Resources | Building Systems | Environmental | Geotechnical | Project Management

GEOTECHNICAL INVESTIGATION REPORT REVISION 1.1

Kinkora Community Centre Expansion
Kinkora, PE

Prepared for:

Duffy Construction Ltd.
3 Anderson Road
Kinkora, PE
C0B 1N0

May 12, 2023

Project No: 16548

FUNDY Engineering

Serving Our Clients' Needs First

OFFICES IN SAINT JOHN AND CLYDE RIVER

JOB FILE:	16548		
PROJECT TITLE:	Geotechnical Investigation – Kinkora Community Centre Expansion		
VERSION	**ISSUANCE DATE**	**PREPARED BY**	**REVIEWED BY**
1.0	April 10th, 2023	Patrick MacDonald, *EIT*	Alex Mouland, *P.Eng., PMP*
1.1	May 12th, 2023	Patrick MacDonald, *EIT*	George Thambi, *P.Eng., PMP, MBA*

FUNDY Engineering

Serving Our Clients' Needs First

This report was prepared for the sole use of the Client. The material and observations presented reflects Fundy Engineering & Consulting Ltd.'s opinion and best judgment based on the information available. Fundy Engineering & Consulting Ltd. accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon the material, observations, and / or opinions by any third-party or for any damages suffered by any third-party resulting from the use of this report.

PROFESSIONAL SEAL:

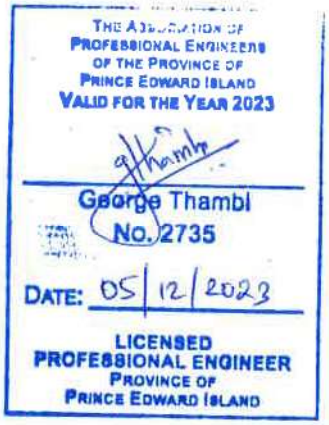


TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICIES

1.0 INTRODUCTION

Fundy Engineering & Consulting Ltd. (Fundy Engineering) was retained by Duffy Construction Ltd. (the Client) to undertake a geotechnical investigation for a proposed building addition for the Kinkora Community Centre, located at 45 Anderson Road in Kinkora, Prince Edward Island.

The area of interest for this investigation is located at the site of the existing Kinkora Fire Department / Community Centre. The site is bounded by Anderson Road to the South, a commercial property to the West, and undeveloped/agricultural properties to the North and East, respectively.

The objective of the geotechnical investigation was to assess the subsurface conditions over the property, below the proposed building and parking area footprints and make recommendations for the geotechnical components of construction.

1.1 *SCOPE OF WORK COMPLETED*

In agreement with the Client, Fundy Engineering has completed the following scope of work:

- Four (4) test pits were extended to a depth necessary to provide the required soils information for the intended project (Figure 1).
- A Geotechnical Engineering report including an introduction, comments on the site, results of the field investigation, interpretation of the results & findings, and recommendations for foundation and bearing capacity options.

1.2 *LIMITATIONS*

The observations made and facts presented in this report are based on the geotechnical investigation carried out on April 5th, 2023. While every effort has been made to determine the geotechnical concerns pertaining to the subject site as defined herein, discovery or development of additional geotechnical concerns cannot be precluded. Further investigation may reveal additional information that may influence the recommendations included herein. Should such information be revealed, Fundy Engineering should be notified in a timely fashion so that any required amendments to our recommendations can be made.

These results are reported confidentially to the Client, who is advised to take appropriate action to rectify any areas of concern. No professional responsibility is assumed for the use or interpretation of these findings by others.

The area of Fundy Engineering's investigation was limited to a total of four (4) test pits.

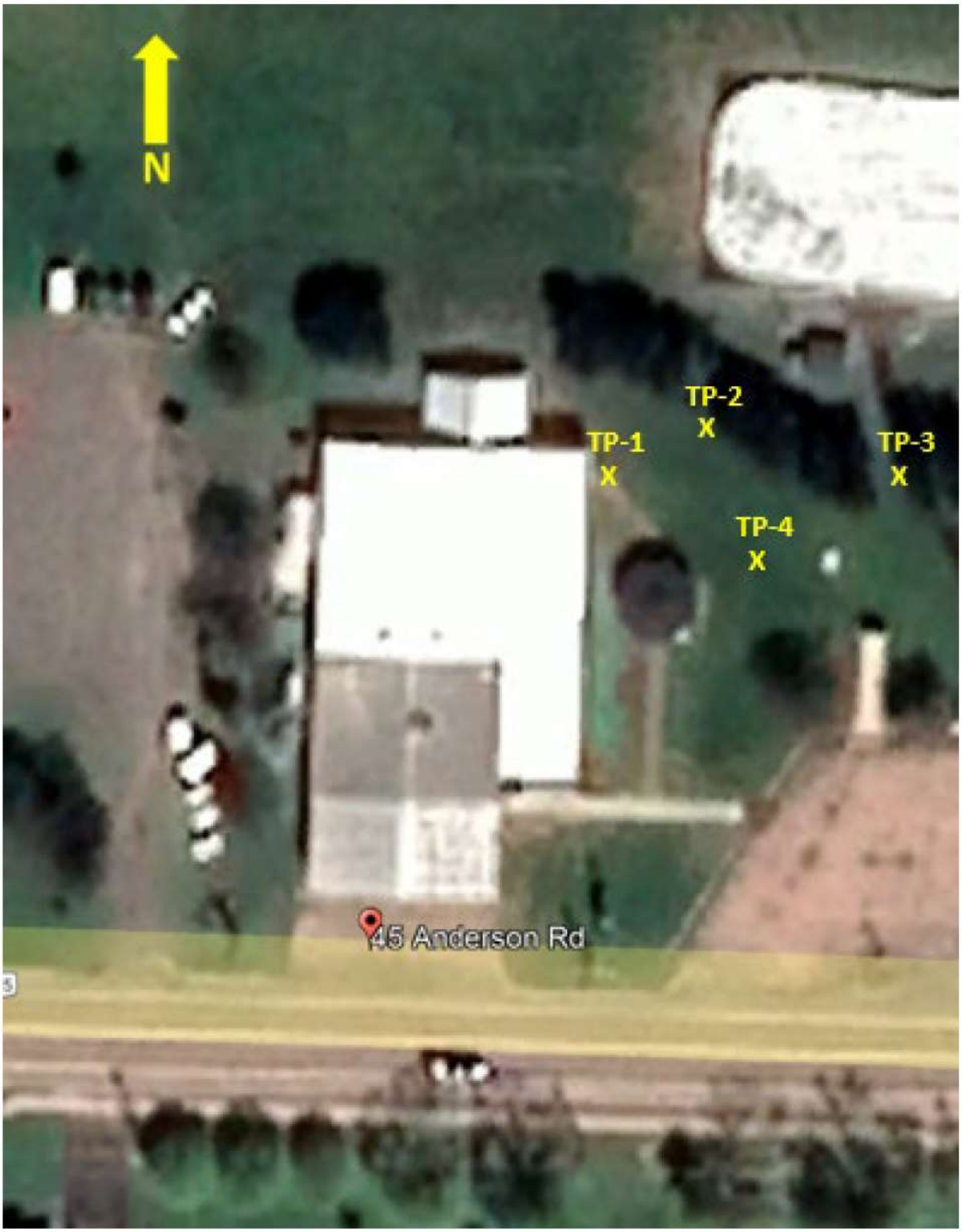


Figure 1 - Approximate test pit location plan (source: Google Earth, 2023)

2.0 BACKGROUND

2.1 *SITE DESCRIPTION AND LOCATION*

The area of interest for this investigation is located at the site of the existing Kinkora Fire Department / Community Centre. The site is bounded by Anderson Road to the South, a commercial property to the West, and undeveloped/agricultural properties to the North and East, respectively.

It is our understanding that the Client proposes to construct a building addition on the Northeast corner of the existing structure.

2.2 *ASSUMPTIONS*

- The building addition foundation design will consist of a concrete slab on grade; and,
- The building addition design will not include a basement.

2.3 *REGIONAL SOIL AND GEOLOGY*

The bedrock geology of Prince Edward Island consists of relatively flat lying sedimentary deposits commonly referred to as the PEI Redbeds; a part of the Pictou Group that makes up a section of the Maritime Plane and lies within the Appalachian Mountain System. The PEI Redbeds can be broken down into four cyclic sequences generally comprised of conglomerate, sandstone, and siltstone, from the Late Pennsylvanian to Early Permian ages (*i.e.,* formed 286 million years ago to 320 million years ago) which fine upward (*i.e.,* conglomerate at the base and siltstone at the top), with the oldest deposits found along the south shore of the island and the youngest found along the north shore. The PEI Redbeds generally dip 1 – 3 degrees towards the northeast (Soils of Prince Edward Island, 1988, Agriculture Canada Research Branch).

Bedrock in Prince Edward Island is generally covered by a thin drift of Ground Moraine or Basal Till with occurrences of Residual, Ablation Till, and minor Glaciofluvial and Marine Deposits. Basal Till, which covers approximately 75% of the province, are often local in origin and can generally be described as reddish brown, strongly acidic, and compact to dense soils further defined by their Clay and Silt content (Soils of Prince Edward Island, 1988. Agriculture Canada Research Branch).

3.0 SITE WORK COMPLETED

3.1 *TEST PIT INVESTIGATION*

A geotechnical test pit investigation was completed at the subject site to collect information pertaining to the soils, bedrock, and groundwater, and to assess their suitability for the project's geotechnical requirements.

On April 5th, 2023, four (4) test pits were extended to obtain this information using a CAT 450 backhoe provided by the Client under the direction of Donnie Taweel, *Sr.Tech.*, of Fundy Engineering.

3.2 *SOILS ENCOUNTERED*

In general, the soils encountered can generally be described as **Loose Light Brown Silty Sand TOPSOIL** overlying **Loose Reddish Brown Silty Sand FILL with Rootmat and/or Construction Debris** overlying **Compact Reddish Brown Silty Sand & Gravel TILL**

with Trace Cobbles & Boulders (Figure 2). A detailed description of the soils encountered can be found in the test pit logs in Appendix II.

Figure 2 - Representative soils encountered (photo taken on 2023/04/05).

3.3 *BEDROCK*

Bedrock was not encountered in any of the test pits.

3.4 *GROUNDWATER*

Groundwater was not encountered in any of the test pits.

4.0 RECOMMENDATIONS

4.1 *GENERAL*

Based on the observations made during the geotechnical investigation and the assumptions listed in Section 2.2, it is recommended that the proposed building addition be founded on a 1.5 metre frost wall foundation founded on Compact Till, or imported Structural Fill.

4.2 *SITE PREPARATION*

Site preparation to permit the use of a frost wall foundation design will require, at a minimum, excavation of all Topsoil and any overburden materials to Compact Till elevation. Depending on the elevation of the Till, placement of approved Structural Fill (i.e., Select Borrow) may be required to raise the elevation to the underside of the building foundation.

Once the excavation is complete, the bottom of the excavation should be inspected by the Geotechnical Engineer. The Geotechnical Engineer may recommend additional excavation in any areas which are not deemed to be suitable to support anticipated building loads or ground improvement may be recommended.

Once the bottom of the excavation is prepared to the satisfaction of the Geotechnical Engineer, Structural Fill meeting the specifications outlined in the Prince Edward Island Department of Transportation, Infrastructure & Energy's (PEIDTIE) specifications for Select Borrow can be placed over the prepared pad.

Surface water should be directed away from any excavations.

Excavations exceeding 1.2 metres should be maintained as required by provincial occupational health & safety regulations, with a maximum slope of 1H:1V. Slopes may need to be trimmed back if soft soils, inclement weather conditions or groundwater seepage is encountered.

4.3 *STRUCTURAL FILLS*

If Structural Fills are required under the foundation, the in-situ subgrade should be proof rolled under the supervision of a Geotechnical Engineer. Once the excavation has been completed to the satisfaction of the Geotechnical Engineer, Structural Fill material meeting the current PEIDTIE specifications for Select Borrow may be placed within the building footprint to construct the building pad.

Any Fills placed under the footings must be constructed with a minimum slope of 1:1 from the edge of the pad to the in-situ bearing soils. The 1:1 slope should be protected with compacted materials having a slope no steeper than 2:1.

Structural Fill placed under the footings should be placed in lifts not exceeding 300mm (12 inches) or appropriate for the compaction equipment used to achieve compaction to 100% of its Standard Proctor Value (ASTM D698).

4.4 *BUILDING FOOTINGS*

Footings placed on Compact Till or Structural Fills may be designed with a Factored Ultimate Limit State (ULS) Geotechnical Resistance of 300kPa. A Serviceability Limit State (SLS) bearing for foundations founded on Engineered Fills of 150kPa may be used for design. Total settlements of less than 25mm and differential settlements of 12.5mm would be expected.

A resistance factor of 0.5 was used to develop the above bearing resistances.

It is recommended that the placement of the foundation fills be monitored and approved by the Geotechnical Engineer.

Structural Fills under the footings should meet the current PEIDTIE specifications for Select Borrow. Fill material should be placed in maximum 300mm lifts and compacted to 100% of its Standard Proctor Value (ASTM D698).

4.5 *FROST PROTECTION*

All footings should have a minimum of 1.5 metres (5 feet) of soil cover (or equivalent in soil and insulation) for frost protection. Should the design bottom of footing elevation be set at a shallower depth, a rigid foam insulation would be required. Additional information with regard to backfill material and foundation design would be required to determine the actual thickness of insulation required.

4.6 *BACKFILLING*

Once the footings and foundation walls have been installed, the excavation should be backfilled with Structural Fill consisting of an approved material which is free from Organics and deleterious materials. Fill material meeting the current PEIDTIE specifications for Select Borrow would be acceptable for use as backfill material.

All backfill is to be compacted in lifts to 100% of its Standard Proctor Density at optimum moisture content.

A maximum lift thickness of 300mm (12 inches) is recommended for Structural Fill material placed as backfill. The actual thickness of the lifts will be dependent on the equipment used. Lift thickness determination should be made by a Geotechnical Engineer.

Fill should be placed with a maximum differential of 600mm on either side of foundation walls. A walk behind compactor is recommended for compaction within 1.5 metres of the foundation walls.

It is recommended that the placement of backfill be monitored by a Geotechnical Engineer to observe compaction during placement.

4.7 *MATERIAL REUSE*

Any overburden material excavated at the site has limited reuse applications. These materials could only be used as non-structural Fill in landscaped areas.

4.8 *CONCRETE SLABS*

Concrete floor slabs may be cast over Structural Fill prepared as described above or in-situ Till. All concrete floor slabs should be placed over a minimum of 150mm of compacted granular material meeting the PEIDTIE specification for Class A Gravel.

A Subgrade Modulus of 35 MPa/m may be used for design of slabs on in-situ till or structural fill if prepared as described above. If the modulus of subgrade reaction will have

a significant effect on the slab design the above recommendation could be revisited once additional design details are available.

A vapour barrier is recommended under all concrete slabs.

It is recommended that measures to prevent radon gas ingress into indoor occupancies at grade elevation be taken into consideration as per sections 5.4.1.1; 9.13.4.2; 9.13.4.3; and 9.32.3.8.8 of the 2015 edition of the National Building Code of Canada (NBC).

4.9 *BUILDING DRAINAGE*

It is assumed that the proposed building addition will not include a basement level. Therefore, a drainage system installed at the bottom of footing elevation is not required.

The finished exterior grade surrounding the building addition should be shaped with a minimum positive 2% grade directing surface water away from the building for a minimum of 3 metres. The surface should consist of a vegetated, asphalt or concrete surface to limit infiltration into the soils adjacent to the building.

4.10 *SEISMIC SITE CLASSIFICATION*

Based on Table 4.1.8.4.A Site Classification for Seismic Site Response in the 2015 edition of the NBC and a review of the soil and bedrock information, the Site Classification for the project area is "D".

4.11 *NON-BUILDING AREAS*

It is recommended that any parking lots and roadways be constructed as described in Table 1.

Table 1 - Parking Lot and Roadway Recommended Construction

Material	Thickness	Comments
Asphalt B Seal	40 mm	Install as per PEIDTIE specifications
Asphalt A Base	60 mm	Install as per PEIDTIE specifications
Granular Base (Class A Gravel)	200 mm	Compacted to 100% Standard Proctor Density (ASTM D698)
Sub-Base (Select Borrow)	600 mm (minimum)	Compacted to 100% Standard Proctor Density (ASTM D698)

The above materials should meet the present PEIDTIE standard specifications. The granular sub-base and base layers should be compacted to 100% of their Standard Proctor Maximum Dry Densities (ASTM D698).

Prior to placement of any Structural Fills and after the excavation of unsuitable materials, the in-situ subgrade should be proof rolled under the supervision of the Geotechnical Engineer.

Any soft or highly deformable areas should be repaired as per the direction of the Geotechnical Engineer.

Surface water should be directed away from any exposed subgrade materials prior to placement of driveway and parking granular sub-base and base materials.

On site materials may not be reused in roadway or parking areas as base or sub-base.

Fill materials should be placed in lifts not exceeding 300mm (12 inches) or appropriate for the compaction equipment used to achieve compaction to 100% of its Standard Proctor Value.

Non-paved areas should be constructed such that overland water flows will be directed away from their surfaces during and after construction. It is recommended that grades be raised in relation to the surrounding areas. Ditches may be required in some sections if raising the grades in relation to the surrounding areas is not possible.

5.0 CONSTRUCTION CONTROL

Construction quality control should be provided by a Geotechnical Engineer. Quality control services should include: Inspection of the subgrade prior to placement of the Structural Fill, pipes, pipe bedding, site grading fill or backfill, to confirm that unsuitable materials (e.g., topsoil & organics, loose fill, construction debris) have been removed and that actual site conditions do not substantially differ from those observed as part of the geotechnical investigation. If construction occurs during winter conditions earthwork construction activities should be carried out following the recommendations included in Appendix III.

6.0 CLOSING REMARKS

The recommendations herein have been devised based on the findings in this geotechnical investigation. These recommendations are based on our current knowledge and understanding of the site in its present state. If there are any changes or discoveries identified in the future that may pertain to the geotechnical aspects of this undertaking, we must be notified immediately to make any necessary changes or adjustments to our recommendations.

We trust that the information herein is sufficient for your present needs. Please feel free to contact the undersigned for any additional information or clarification that may be required. This report has been prepared by Patrick MacDonald, *EIT,* and reviewed by George Thambi, *P.Eng., PMP, MBA*.

Sincerely,
Fundy Engineering & Consulting Ltd.

Mr. Patrick MacDonald, *EIT*

Mr. George Thambi, *P.Eng., PMP, MBA*
Geotechnical Engineer

APPENDIX I

SYMBOLS AND TERMS

FUNDY ENGINEERING SYMBOLS AND TERMS
Borehole, Test Pit, and Monitoring Well Logs

SOIL DESCRIPTION

Behavioural properties (i.e. plasticity, permeability) take precedence over particle gradation in describing soils.

Terminology describing soil structure:

Desiccated.....having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
Fissured..... having cracks, and hence a blocky structure
Varved..... .....composed of regular alternating layers of silt and clay
Stratified.....composed of alternating layers of different soil types, e.g. silt and sand or silt and clay
Well Graded.....having wide range in grain sizes and substantial amounts of all intermediate particle sizes
Uniformly Graded.....predominantly of one grain size

Terminology used for describing soil strata based upon the proportion of individual particle sizes present:

Trace, or occasional.....less than 10%
Some.....10-20%
Adjective (e.g. silty or sandy).....20-35%
And (e.g. silt or sand.....35-50%

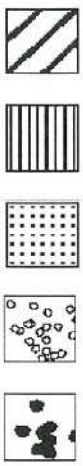
The standard terminology to describe cohesionless soils includes the relative density, as determined by laboratory test or by the Standard Penetration Test 'N' - value: the number of blows of 140 pound (64kg) hammer falling 30 inches (50.8mm) O.D. split spoon sampler one foot (305mm) into the soil.

RELATIVE DENSITY	N' VALUE	RELATIVE DENSITY %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by insitu vane tests, penetrometer test, unconfined compression tests, or occasionally by standard penetration tests.

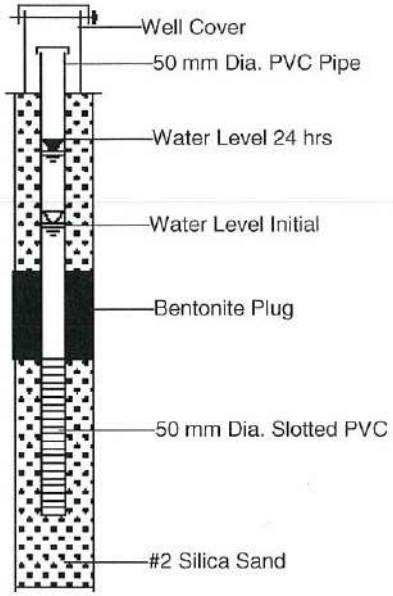
CONSISTENCY	UNDRAINED SHEAR STRENGTH		'N' VALUE
	kips/sq.ft.	kPa	
Very Soft	<0.25	<12.5	<2
Soft	0.25-0.5	12.5-25	2-4
Firm	0.5-1.0	25-50	4-8
Stiff	1.0-2.0	50-100	8-15
Very Stiff	2.0-4.0	100-200	15-30
Hard	>4.0	>200	>30

SOILS GRAPHIC LEGEND



Clay
Silt
Sand
Gravel
Boulders & Cobbles
Asphalt
Topsoil & Root Mat
Till
Peat & Organic Silts
Fill

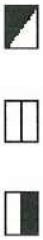
MONITORING WELL SCHEMATIC



BEDROCK GRAPHIC LEGEND

Sandstone
Limestone
Mudstone
Shale
Granite/Igneous
Metamorphic

SAMPLER SYMBOLS



Standard Penetration Test / Split Spoon
Rock Core
Auger / Grab

LABORATORY TESTS

MC	Moisture Content	P	Field Permeability	CD	Consolidation Drained Triaxial
SG	Specific Gravity	PF	Permeability Falling Head	CU	Consolidation Undrained Triaxial
HA	Hydrometer Analysis	PC	Permeability Constant Head	UU	Unconsolidated Undrained Triaxial
SA	Sieve Analysis	PR	Proctor	DS	Direct Shear

BEDROCK DESCRIPTION

The description of bedrock is based on the rock quality designation (RQD).

The classification is based on a modified core recovery percentage in which all pieces of sound core over 100mm long are expressed as a percentage of total recovery. The small pieces are considered to be due to close shearing, jointing, faulting, or weathering in the rock mass and are not counted. In most cases RQD is measured on NXL core.

RQD	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

FUNDY Engineering

APPENDIX II

TEST PIT LOGS

FUNDY Engineering

TEST PIT LOG
No. TP-1

PROJECT: Kinkora Community Centre Expansion

CLIENT: Duffy Construction Ltd. **PROJECT NO.:** 16548

PROJECT LOCATION: Kinkora, PE

EXCAVATION CONTRACTOR: Duffy Construction Ltd. **ELEVATION:** 100m Assumed

LOGGED BY: Patrick MacDonald **CHECKED BY:** Al Mouland

EXCAVATION METHOD: CAT 450 Backhoe **DATE:** 2023/04/05

DEPTH TO - WATER> INITIAL: ▽ N/A **AFTER 24 HOURS:** ▽ **CAVING>** C

Elevation (meters)	Depth (meters)	Description	Graphic	Groundwater	Sample Type	Sample No.	Remarks
100	0	Loose Light Brown Silty Sand TOPSOIL.					
	0.2	Loose Reddish Brown Silty Sand FILL.					
99.6	0.4						
	0.61	Compact Reddish Brown Silty Sand & Gravel TILL with Trace Cobbles & Boulders.					
99.2	0.8						
98.8	1.2						
98.4	1.6						
	1.83	Test Pit Terminated at 1.83 m					
98	2						
97.6	2.4						
97.2	2.8						
96.8	3.2						
96.4	3.6						
96	4						

FUNDY Engineering

TEST PIT LOG
No. TP-2

PROJECT: Kinkora Community Centre Expansion

CLIENT: Duffy Construction Ltd. **PROJECT NO.:** 16548

PROJECT LOCATION: Kinkora, PE

EXCAVATION CONTRACTOR: Duffy Construction Ltd. **ELEVATION:** 100m Assumed

LOGGED BY: Patrick MacDonald **CHECKED BY:** Al Mouland

EXCAVATION METHOD: CAT 450 Backhoe **DATE:** 2023/04/05

DEPTH TO - WATER> INITIAL: ▽ N/A **AFTER 24 HOURS:** ▽ **CAVING>** C

Elevation (meters)	Depth (meters)	Description	Graphic	Groundwater	Sample Type	Sample No.	Remarks
100	0	Loose Light Brown Silty Sand TOPSOIL with Rootmat.					
	0.2	Loose Reddish Brown Silty Sand FILL with Roots & Concrete Debris.					
99.6	0.4						
99.2	0.8						
98.8	1.2	Compact Reddish Brown Silty Sand & Gravel TILL with Trace Cobbles & Boulders.					
98.4	1.6						
98	2	Test Pit Terminated at 1.98 m					
97.6	2.4						
97.2	2.8						
96.8	3.2						
96.4	3.6						
96	4						

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

FUNDY Engineering

TEST PIT LOG
No. TP-3

PROJECT: Kinkora Community Centre Expansion

CLIENT: Duffy Construction Ltd. **PROJECT NO.:** 16548

PROJECT LOCATION: Kinkora, PE

EXCAVATION CONTRACTOR: Duffy Construction Ltd. **ELEVATION:** 100m Assumed

LOGGED BY: Patrick MacDonald **CHECKED BY:** Al Mouland

EXCAVATION METHOD: CAT 450 Backhoe **DATE:** 2023/04/05

DEPTH TO - WATER> INITIAL: ▽ N/A **AFTER 24 HOURS:** ▽ **CAVING>** C

Elevation (meters)	Depth (meters)	Description	Graphic	Groundwater	Sample Type	Sample No.	Remarks
100	0	Loose Light Brown Silty Sand TOPSOIL.					
	0.2	Loose Reddish Brown Silty Sand FILL.					
99.6	0.4						
	0.61	Compact Reddish Brown Silty Sand & Gravel TILL with Trace Cobbles & Boulders.					
99.2	0.8						
98.8	1.2						
98.4	1.6						
	1.83	Test Pit Terminated at 1.83 m					
98	2						
97.6	2.4						
97.2	2.8						
96.8	3.2						
96.4	3.6						
96	4						

FUNDY Engineering

TEST PIT LOG
No. TP-4

PROJECT: Kinkora Community Centre Expansion
CLIENT: Duffy Construction Ltd. **PROJECT NO.:** 16548
PROJECT LOCATION: Kinkora, PE
EXCAVATION CONTRACTOR: Duffy Construction Ltd. **ELEVATION:** 100m Assumed
LOGGED BY: Patrick MacDonald **CHECKED BY:** Al Mouland
EXCAVATION METHOD: CAT 450 Backhoe **DATE:** 2023/04/05
DEPTH TO - WATER> INITIAL: ▽ N/A **AFTER 24 HOURS:** ▽ **CAVING>** C

Elevation (meters)	Depth (meters)	Description	Graphic	Groundwater	Sample Type	Sample No.	Remarks
100	0	Loose Light Brown Silty Sand TOPSOIL.					
	0.2	Loose Reddish Brown Silty Sand FILL with Trace Debris.					
99.6	0.4						
	0.76	Compact Reddish Brown Silty Sand & Gravel TILL with Trace Cobbles & Boulders.					
99.2	0.8						
98.8	1.2						
98.4	1.6						
	1.98	Test Pit Terminated at 1.98 m					
98	2						
97.6	2.4						
97.2	2.8						
96.8	3.2						
96.4	3.6						
96	4						

APPENDIX III

GEOTECHNICAL RECOMMENDATIONS FOR WINTER CONSTRUCTION

Geotechnical Guidelines/Recommendations for Winter Construction

Construction during winter months exposes a construction project to freezing temperatures and other weather events, such as snow, which can have a detrimental effect on Engineered Fill and concrete construction activities. Therefore it is recommended that some extra work be undertaken to protect these construction elements during winter construction.

The following sections outline a set of guidelines for concrete and earthwork construction activities in cold weather.

Excavation

Insitu soils, such as root mat or topsoil can act as natural insulators and can protect the underlying soils from frost. Therefore excavation activities should be limited to sections which can be filled over before the end of the working day.

It is **NOT** recommended that Fills to be used at a later date be stockpiled on site during freezing conditions. They should be placed and compacted immediately.

Fill Type

A well-graded material with sand content of 30% or over is **NOT** recommended for use as Fills in freezing temperatures. Clear stone or rock fills are not as susceptible to freezing and are therefore recommended as they will remain workable for a longer period of time.

Fill Placement Methods

Fill placement should be conducted in small areas such that it can be completed in the area by the end of the working day. The area should be small enough to allow for the subsequent lift to be placed over compacted unfrozen material.

Material that contains snow and/or ice should not be allowed to be placed in a Fill. If a snow event occurs during Fill procedures the snow should be removed before any additional material can be placed. It is recommended that the surface of the Fill under the snow should be removed to ensure that all the snow and ice has been removed.

For areas that will require additional Fill but must be left for a long period of time (ex. overnight) frost protection should be provided to the placed Fill in the form of straw, insulated blankets, or some other approved measure. If frost protection is not available then any frozen material at or near the top of the lift should be removed and wasted before fill placement resumes.

Underside of slabs, footings and any other 'final' Fill surface should be protected from frost. If frost protection is not possible then the soil should be thawed prior to placing footings, slabs, etc. I it is suspected that the soil is frozen then some limited excavations should be undertaken to determine the temperature prior to pouring concrete or placing additional Fills. Any areas that have been determined to be frozen should be removed and replaced with new compacted materials.

All slopes and edges of Fills should be tamped or compacted to reduce frost penetration.

During compaction of Fills the soil temperature should be greater than 2°C. Any Fills below this temperature will not achieve the theoretical maximum compaction density and should therefore be removed.

Footings

Building footings should **NEVER** be placed on frozen Fill.

If the foundation design recommends that footings be placed on insitu soils, but those soils are fine grained, it is recommended that below the footings an over-excavation of approximately 6 inches be completed to allow for a base of 25mm clear stone be placed.

Once the footings have been placed they should be protected from cold weather with insulated blankets, hay or some approved means. The frost protection should extend beyond the footings to also protect the surrounding bearing soils.

During cold weather the depth of interior footings should be dropped to 1.5 metres below ground surface for frost protection. If lowering the footings is not possible then some other approved method of protecting the interior footings is recommended.

Foundations should be backfilled with free-draining granular materials that will not hold moisture.

Inspection and Testing

The above document is intended as a set of guidelines for geotechnical winter construction in general. A strategy for winter construction will be required for each individual site. It is recommended that prior to beginning any winter earthwork construction the services of a qualified geotechnical engineering company be engaged to develop a customized plan a specific site. Testing and inspection services by a geotechnical engineering company are especially important during winter geotechnical construction activities. A plan developed with the expertise of a Geotechnical Engineer will reduce harmful procedures and mistakes and will allow construction activities to continue during cold weather without unexpected delays and costs.

Serving Our Clients' Needs First

Fundy Engineering is proud to be one of the largest employee-owned, full-service multi-disciplinary engineering-consulting companies headquartered in New Brunswick and serving Atlantic Canada and New England

Top-Quality Engineering-Consulting Solutions

Bio-Resources | Building Systems | Environmental | Geotechnical | Project Management

☎ 877.635.1566
✉ fundy@fundyeng.com
www.fundyeng.com

FUNDY Engineering

Thank you for choosing our team for your engineering and consulting needs. We encourage you to visit our website and share your needs and concerns so that we can continue to provide you with top-quality technically sound solutions.

SAINT JOHN OFFICE
27 Wellington Row
PO Box 6626
Saint John, NB E2L 3H4

506.635.1566

Serving the Atlantic Region from Saint John and Clyde River

CLYDE RIVER OFFICE
945AA Upper Meadowbank Road
Clyde River, PE
C0A 1H1

902.675.4885

APPENDIX B

Material / Finish Schedule
Accessories Schedule

This page intentionally left blank

Kinkora Community Hall Expansion
Coles Associates Ltd. – 231053
Material / Finish Schedule
Date / Issue: Sep 21, 2023 /
Revision: R0 (Note: Items underlined have been revised)
Notes: Refer to the end of this schedule.

TAG	TYPE	MANUFACTURER / SUPPLIER (Standard of acceptance)	DESCRIPTION / FINISH / TEXTURE	COLOUR	LOCATION	COMMENTS
Acoustic Ceilings						
ACT-1	Ceiling Tile	Armstrong	Product: Fine Fissured Texture: Medium Square Lay-In Size: 610 x 610 x 16, Item 1728 NRC 0.55, CAC 33 Size: 610 x 1220 x 16, Item 1729 NRC 0.55, CAC 33 Fire Performance: Class A	White	Refer to reflected ceiling plans	
n/a	Suspension System	Armstrong	Prelude XL 24mm / 15/16"	White	Use with all ACT	
Aluminum						
AL-1	Aluminum	Kawneer	Anodized Aluminum	Clear Anodized	Curtain wall and entrance doors	
Concrete						
CO-1	Poured in place	See Spec		with clear sealer		
CO-2	Concrete topped insulation	Wall Guard	610mm x 1220mm panels, 8mm concrete bonded to 50mm insulation (R10)	natural colour	foundation at grade	Mechanically attach each panel with 3 concrete anchors, locate anchors 200mm below grade
Grout						
G-1	Grout	MAPEI	Ultracolor Plus FA Consultant to select grout widths	Select from standard range Colour may vary for different tile types	All Grout	
Glazing						
GL-1	Ceramic Safety Glass	FireLite	5mm Thick Smooth	Clear / Wireless	Provide in all rated doors and frames that are scheduled with glazing	
GL-2	Tempered Glass		6mm Thick Smooth	Clear		
GL-3	Insulated Glazing		Double Glazed Smooth	Clear		
Glazing Film						
GF-1	Window Film		50% opacity	White / transparent		
Pre-Finished Metal						
MT-1	Pre-finished metal		Smooth	select from standard range	Window Flashings	

AD010

Kinkora Community Hall Expansion
Coles Associates Ltd. – 231053
Material / Finish Schedule
Date / Issue: Sep 21, 2023 /
Revision: R0 (Note: Items underlined have been revised)
Notes: Refer to the end of this schedule.

TAG	TYPE	MANUFACTURER / SUPPLIER (Standard of acceptance)	DESCRIPTION / FINISH / TEXTURE	COLOUR	LOCATION	COMMENTS
MT-2	Pre-finished metal		Smooth	Graphite gray	Gutters, Downspouts,Fascia	
Paint						
P-1	Paint	Benjamin Moore	Confirm sheen with consultant	Match siding color	Exterior doors and frames and other locations as tagged	
P-2	Paint	Benjamin Moore	Confirm sheen with consultant	Chantilly Lace 2121-70	Primary paint	
P-3	Paint	Benjamin Moore	Scuff X	Trout Gray 2124-20	Door frames	
P-4	Paint	Benjamin Moore	Confirm sheen with consultant	Thundercloud Gray 2124-40	Doors	
P-5	Paint	Benjamin Moore	Confirm sheen with consultant	select from standard range	Accent	
Plastic Laminate						
PL-1	Plastic Laminate	Formica		Storm 912	All millwork countertops	
PL-2	Plastic Laminate	Formica	Natural grain	White Painted Wood 8902	Cabinet	
PVC						
PVC-1	Edge Banding		3mm Smooth	Closely match Laminate	All millwork exposed to view edges	Provide standard range for colour selection
Resilient Base						
RB-1	Rubber Base	Johnsonite	Height: 102mm with Toe, Vinyl	Medium Grey #28	Refer to room finish schedule	
Resilient Flooring						
RF-1	Luxury Vinyl Tile	Interface	Collection: Studio Set Design: n/a Shape: Plank Layout: Ashlar Size: 250mm x 1000mm x 4.5mm	Colour TBD	Refer to floor finish plans for all locations	
RF-2	Vinyl Composite Tile	Tarkett	Collection: VCT Shape: Tile Size: 305mm x 305mm	Colour TBD	Refer to floor finish plans for all locations	

Kinkora Community Hall Expansion
Coles Associates Ltd. – 231053
Material / Finish Schedule
Date / Issue: Sep 21, 2023 /
Revision: R0 (Note: Items underlined have been revised)
Notes: Refer to the end of this schedule.

TAG	TYPE	MANUFACTURER / SUPPLIER (Standard of acceptance)	DESCRIPTION / FINISH / TEXTURE	COLOUR	LOCATION	COMMENTS
Tile						
T-1	Porcelain Tile	Centura	Collection: Glocal Size: 305 x 610 Pattern: running bond Finish: Matte	Grey, Glocal Ideal Natural	Entry Vestibule	Provide 100mm high tile base to match floor tile
Transition strips						
TS-1	Resilient Transition Strip	Johnsonite	Consultant to select colour and profile from standard range		Resilient flooring to other floor materials	
Tile Trim						
TT-1	Tile Trim	Schluter Systems	Consultant to select profile from standard range	Clear anodized aluminum	Tile to GWB locations and Tile to other floor materials	
Vinyl						
VN-1	Vinyl Window	Kohltech	See Spec	White		Double Pane Glazing
VN-2	Vinyl Siding	Kaycan	Horizontal Lap Siding Profile: Richmond	White		
VN-3	Vinyl Siding	Kaycan	Horizontal Lap Siding Profile: Richmond	Colour TBD		
VN-4	Vinyl Siding	Kaycan	Trim Profile: 3" outside corner Profile: 1-3/8" inside corner	White		
Wall Covering						
WC-1	Plywood	Dricon	19mm Fire Retardant Plywood	Paint white	Service rooms	2440mm high, All Walls, 100mm above floor

Notes:

1. Contractor is to confirm that all product names and numbers correspond. If a discrepancy is found, the consultant is to be notified immediately for clarification.
2. The general location of materials is noted for convenience, refer to drawings for all tagged locations.

This page intentionally left blank

Kinkora Community Center Expansion
Coles Associates Ltd. – 231053
Accessories Schedule
Date / Issue: Sep 21, 2023 /
Revision: R0 (Note: Items underlined have been revised)
Notes: Refer to the end of this schedule.

TAG	TYPE	MANUFACTURER / SUPPLIER (Standard of acceptance)	DESCRIPTION	COLOUR	FINISH / TEXTURE	LOCATION	COMMENTS
Toilet Accessories							
CH	COAT HOOK	Bobrick	B-212 Coat hook with bumper solid cast aluminum		matte	(1) in room 114, mount on inside of door (1) at each of the washroom stalls, mount on inside of door	Contractor supply & install
GB1	GRAB BAR	Bobrick	B-5898.99 762mm x 762mm 32mm Diameter 90 Grab Bar, Peened 18ga, stainless steel tubing Concealed mounting flange		304 satin finish peened	Adjacent wall at barrier free toilets	Contractor supply & install
GB2	GRAB BAR	Bobrick	B-5806.99 x 610mm 32mm Diameter Straight Grab Bar, Peened 18ga, stainless steel tubing Concealed mounting flange		304 satin finish peened	Behind barrier free toilets (horizontal)	Contractor supply & install
JMS	JANITOR MOP STRIP	Bobrick	B-239-34 Janitor Mop Strip c/w Shelf & 3 clamps & 4 hooks Size: 865w x 330h		satin stainless steel	(1) at each mop sink	Contractor supply & install
MIR	MIRROR	Bobrick	B-290 Series One-piece, roll-fromed 19x19 angle frame Type 304 Stainless steel angle with satin finish No 1 quality, 6mm glass mirror Size: 610w x 915h		satin stainless steel	(1) at each sink	Contractor supply & install
ND	NAPKIN DISPOSAL	Bobrick	B-254 Surface-Mounted Sanitary Napkin Disposal Size: 270w x 385h x 105d		satin stainless steel	(1) at each toilet	Contractor supply & install
PTD	PAPER TOWEL DISPENSER	Bobrick	B-72860 Surface Mounted Touch free pull towel mechanism Size: 320w x 395h x 240d accommodates 205w x up to 205 dia rolls		high-impact resin, door is translucent dark grey	(1) in each of the following rooms: 106, 107 and 114	Contractor supply & install
SD	SOAP DISPENSER	Bobrick	B-2111 Series: Classic Series Surface Mounted Soap Dispenser Concealed wall fastening Size: 120w x 205h x 90d		satin stainless steel	(1) at each sink	Contractor supply & install

Kinkora Community Center Expansion
Coles Associates Ltd. – 231053
Accessories Schedule
Date / Issue: Sep 21, 2023 /
Revision: R0 (Note: Items underlined have been revised)
Notes: Refer to the end of this schedule.

TAG	TYPE	MANUFACTURER / SUPPLIER (Standard of acceptance)	DESCRIPTION	COLOUR	FINISH / TEXTURE	LOCATION	COMMENTS
SH	SHELF	Bobrick	B-295 Stainless Steel Shelf Size: 405w x 75h x 125d 18Ga Type 304 stainless steel		satin stainless steel	(1) at each sink	Contractor supply & install
SHD	SHARPS DISPOSAL	Bobrick	B-350169 Surface Mounted Size: 349w x 486h x 130d		satin stainless steel	(1) in each of the following rooms: 106, 107 and 114	Contractor supply & install
TPD	TOILET PAPER DISPENSER	Bobrick	B-2840 Toilet Tissue Dispenser with Utility Shelf Size: 405w x 100h x 125d Holds (2) rolls up to 140 dia		satin stainless steel	(1) at each toilet	Contractor supply & install
WR	WASTE RECEPTACLE	Bobrick	B-277 Series: Contura Surface Mounted Size: 385w x 585h x 215d		satin stainless steel	(1) in each of the following rooms: 106,107,114	Contractor supply & install

Notes:
1. Contractor is to confirm that all product names and numbers correspond. If a discrepancy is found, the consultant is to be notified immediately for clarification.

APPENDIX C

Fire Alarm Verification Report

This page intentionally left blank

FIRST SIGNAL FIRE ALARM INC.
3288 North Carleton Rd.
Albany, PE, C0B 1A0
(902) 855-FIRE(3473)

CFAA MEMBER

FIRE ALARM SYSTEM INSPECTION AND TEST REPORT

(Ref.: CAN/ULC-S536/13 & NFPA 101 Life Safety Code)

CUSTOMER: COMMUNITY OF KINKORA	DATE: MARCH 16, 2023
BILLING ADDRESS: 45 ANDERSON STREET	SITE: KINKORA COMMUNITY CENTRE
CITY: KINKORA PROVINCE: PE	ADDRESS: 45 ANDERSON STREET
POSTAL CODE: C1N 5C6 TELEPHONE: (902) 887-2868	KINKORA, PE
CONTACT: TINA HARVEY (email: communityofkinkora@eastlink.ca)	JOB#: 32214

SYSTEM MANUFACTURER: SIEMENS

MODEL #: FS250C

☑ SINGLE STAGE OPERATION

☐ TWO STAGE OPERATION

☑ This is to certify that the *fire alarm system* has been tested and inspected in accordance with Section 6, Periodic Inspection and Yearly Tests of the Fire Alarm Systems, CAN/ULC-S536/13, and NFPA 101 Life Safety Code, and these records document the results of testing performed, and

☑ The Fire Alarm System is now fully functional.

OR

☐ The fire alarm system has deficiencies summarized in the comments below and reported on the attached pages.

Summary Comments: _____

☑ A copy of this report will be given to TINA HARVEY who is the

☐ Owner or ☑ Owner's representative for this building.

FIRE ALARM DOCUMENTATION

(Ref.: CAN/ULC-S536/13 & NFPA 101 Life Safety Code)

☑ Yes ☐ No The fire alarm system has all required documentation.

Wayne J. Gallant	20-94413	
Primary Technician Conducting Test	CFAA Number	Primary Technician Signature
Technician Conducting Test	CFAA Number	Technician Signature

NOTIFIER® by Honeywell

FIRST SIGNAL FIRE ALARM INC.

CFAA MEMBER

EVERY LINE MUST HAVE THE APPROPRIATE MARKING
IN THE BOX PROVIDED

✓ - YES (Tested Correctly)

X - NO (Did Not Test Correctly)

N/A - NOT APPLICABLE (Function or Feature Not Provided)

CONTROL UNIT TEST

✓	Power "ON" visual indicator
✓	Common visual trouble signal
✓	Common audible trouble signal
✓	Trouble Signal Silence switch
✓	Main power supply failure trouble signal
✓	Ground fault tested on positive and negative trouble signal
✓	Alarm signal operation
N/A	Automatic transfer from alert signal to alarm signal
✓	Acknowledge switch operation
N/A	Alarm signal switch inhibit
✓	Alarm signal silence operation
✓	Alarm signal silence visual indication
✓	Alarm signal silence automatic cut-out timer
✓	Input circuit trouble operation
✓	Alarm signal, when silenced, automatically reinitiate upon subsequent alarm
✓	Input circuit, alarm and supervisory operation, including visual indicator
✓	Output circuit alarm operation
✓	Output circuit trouble operation
✓	Visual indicator test (lamp test)
N/A	Coded signal sequences operate not less than the required number of times and the correct alarm signal operates thereafter
N/A	Coded signal sequences are not interrupted by subsequent alarms
✓	Input circuit to output circuit operation, including ancillary device circuits, for correct matrix operation, as per design and specifications
✓	Reset operation
✓	Main power supply to emergency power supply transfer
N/A	Data Communication Link (DCL) supervision and operation
✓	Control unit interconnection to monitoring station
✓	Name of monitoring station: ARMSTRONG ACC.#12-01-8454 1(800) 561-5433

POWER SUPPLY INSPECTION

✓	Fused in accordance with the manufacturer's marked rating of the system
✓	Adequate to meet the requirements of the system

VOICE COMMUNICATION TEST

N/A	Power "ON" indicator
N/A	Common visual trouble signal
N/A	Common audible trouble signal
N/A	Trouble Signal Silence switch
N/A	All-call voice paging including visual indicator
N/A	Output circuits for selective voice paging, including visual indication
N/A	Output circuits for selective voice paging trouble operation, including visual indication
N/A	Microphone including press to talk switch
N/A	Operation of voice paging does not interfere with initial inhibit time of alert signal and alarm signal
N/A	All-call voice paging operates (on emergency power supply)
N/A	Emergency telephone verbal communication
N/A	Upon failure of one amplifier, system automatically transfers to back-up amplifier(s)
N/A	Circuits for emergency telephone call-in operation, including audible and visual indication
N/A	Emergency telephone operable or in-use tone at handset
N/A	Circuits for emergency telephones for operation, including two-way voice communication
N/A	Circuits for emergency telephones for operation, including visual indication

CONTROL UNIT INSPECTION

✓	Input circuit designations, correctly identified in relation to connected field devices
✓	Output circuit designations, correctly identified in relation to connected field devices
✓	Designations for common control functions and indicators
✓	Cabinet, plug-in components and modules securely in place
✓	Cleanliness
✓	Fuses in accordance with manufacturer's specification Control unit lock
✓	Termination points from wiring to field devices secure

Record the Date, Revision and Version of Firmware and Software:

Firmware: Date:_____ Revision No.:_____ Version No.:_____

Software: Date:_____ Revision No.:_____ Version No.:_____

EVERY LINE MUST HAVE THE APPROPRIATE MARKING
IN THE BOX PROVIDED

✓ - YES (Tested Correctly)

X - NO (Did Not Test Correctly)

N/A - NOT APPLICABLE (Function or Feature Not Provided)

EMERGENCY POWER SUPPLY TEST & INSPECTION

✓	Correct battery type as recommended by manufacturer Battery Size: 2 x 12Vdc @ 12Ah (2022)
✓	Correct rating as determined by calculations based on full system load
✓	Battery voltage (with main power supply 'ON') 27.55 Vdc
✓	Battery Voltage (with main power supply 'OFF' and fire alarm in supervisory condition) 26.80 Vdc
✓	Battery Current (with main power supply 'OFF' and fire alarm in supervisory condition) 270 ma
✓	Battery Voltage (with main power supply 'OFF' and fire alarm in full load condition) 26.10 Vdc
✓	Battery Current (with main power supply 'OFF' and fire alarm in full load condition) 425 ma
✓	Charging current 1730 ma
✓	Inspected for physical damage
✓	Terminals cleaned and lubricated
✓	Terminals clamped tightly
N/A	Correct electrolyte level
N/A	Specific gravity of electrolyte within manufacturer's specifications
✓	Check for electrolyte leaks
✓	Adequately ventilation
✓	Within manufacturer's rated life date code
✓	Disconnection causes trouble signal
✓	Will provide required power for its required duration under full load
N/A	Engine-Generator provides emergency power
N/A	Trouble condition at the emergency generator is indicated audibly and visibly at the annunciator

ANNUNCIATOR TEST AND INSPECTION

N/A	Power 'ON' indicator
N/A	Individual alarm and supervisory zone indication
N/A	Individual alarm and supervisory zone designation labels are properly identified
N/A	Common trouble signal
N/A	Visual indicator test (lamp test)
N/A	Input wiring from control unit is supervised
N/A	Alarm signal silence visual indicator
N/A	Switches for ancillary functions operate as intended
N/A	Other ancillary functions visual indicators
N/A	Manual activation of alarm signal and indication
N/A	Displays are visible installed location

SEQUENTIAL DISPLAY TEST & INSPECTION

✓	Alarm input overrides supervisory and trouble input
✓	Individual alarm, supervisory and trouble inputs are clearly indicated and separately designated
✓	Supervisory input overrides trouble input
✓	Individual alarm and supervisory input designated labels are properly identified
✓	Display can be manually advanced
✓	First alarm is continuously displayed until manually advanced
✓	First alarm clearly identified each time it is displayed
✓	Alarm and supervisory inputs can be retrieved until system is reset

REMOTE TROUBLE UNIT TEST & INSPECTION

N/A	Input wiring from control panel is supervised
N/A	Visual trouble signal
N/A	Audible trouble signal
N/A	Audible trouble signal silence

PRINTER TEST

N/A	Operation as intended
N/A	Zone of each alarm initiating device is correctly printed
N/A	Rated voltage present

PRINTERS IN A PROPRIETARY SYSTEM –TEST & INSPECTION

N/A	Events and acknowledgements are automatically printed
N/A	Time and date of each event are recorded by the printer
N/A	Each event is recorded as they occur, irrespective of event Acknowledgement
N/A	System records status changes without the loss of any data
N/A	Paper advances automatically such that printed record is visible
N/A	Printer operates under loss of main power supply
N/A	Printer is monitored for 'low paper' and 'paper out'

DEVICE TESTING – LEGEND AND NOTES

(Ref.: CAN/ULC-S536/13 & NFPA 101 Life Safety Code)

DEVICE	DESCRIPTION	TYPE	MODEL NO.
M	Manual Pull Station	SIEMENS	SMS-S
RHT	Heat Detector, Rate of Rise 135°	SIEMENS	SFPT-11
FHT	Heat Detector, Fixed		
S(I)	Smoke Detector Type Ionization		
S(P)	Smoke Detector Type Photoelectric	SIEMENS	SFP-11
SA	Heat Detector Fixed		
DS	Duct Smoke Detector		
RI	Remote Indicator Unit		
--	Other Type of Detector		
FS	Sprinkler Flow Switch		
TS	Sprinkler Supervisory Device		
--	Other Supervisory Devices (Low Pressure, Low Water, Low Temperature, Power Loss, etc.)		
B6	Bell – 6 inch		
B10	Bell – 10 inch		
H	Horn		
V	Visual Signal Appliance		
MH	Mini-Horn		
AV	Horn Strobe	SIEMENS	ZH-MC-R-B
SP	Cone Type Loudspeaker		
HSP	Horn Type Loudspeaker		
ET	Emergency Telephone		
AD	Ancillary Devices		
SFD	Supporting Field Device (Monitor)		
EM	Fault Isolation Module		
EOLR	End of Line Device		

CAUTION: The tests reported on these forms do not include the actual operational test of Ancillary Devices.

ANCILLARY DEVICE CIRCUIT TEST

(Ref.: CAN/ULC-S536/13 & NFPA 101 Life Safety Code)

The following specific circuits are connected to the fire alarm system:

_____	_____
_____	_____
_____	_____
_____	_____

FIRST SIGNAL FIRE ALARM INC.

CFAA MEMBER

FIRE ALARM DEVICE TEST AND INSPECTION REPORT
BUILDING LOCATION: KINKORA COMMUNITY CENTRE
DATE: MARCH 16, 2023

LOCATION	DEVICE	A	B	C	D	E	F	REMARKS
FIRE DEPARTMENT EAST EXIT	M	✓		✓	✓	002		
FIRE DEPARTMENT WEST EXIT	M	✓		✓	✓	003		
FIRE DEPARTMENT BAY NORTH	RHT	✓		✓	✓	004		
FIRE DEPARTMENT BAY CENTER	RHT	✓		✓	✓	005		
FIRE DEPARTMENT SOUTH	RHT	✓		✓	✓	006		
MAIN ENTRANCE	M	✓		✓	✓	010		
NORTHEAST EXIT BY SENIORS ROOM	M	✓		✓	✓	011		
KITCHEN EXIT	M	✓		✓	✓	012		
MAIN HALL EXIT	M	✓		✓	✓	013		
LIBRARY	S(P)	✓		✓	✓	014		
MAIN FOYER SOUTH	S(P)	✓		✓	✓	015		
MAIN FOYER NORTH	S(P)	✓		✓	✓	016		
SENIORS ROOM SOUTH	S(P)	✓		✓	✓	017		
SENIORS ROOM NORTH	S(P)	✓		✓	✓	018		
CORRIDOR BY WASHROOMS	S(P)	✓		✓	✓	019		
REAR UTILITY ROOM	S(P)	✓		✓	✓	020		
REAR ATTIC STORAGE SPACE	S(P)	✓		✓	✓	021		
HALL STORAGE ROOM	RHT	✓		✓	✓	022		
HALL DATA CLOSET	S(P)	✓		✓	✓	023		
HALL SOUTHEAST	S(P)	✓		✓	✓	024		
HALL SOUTHWEST	S(P)	✓		✓	✓	025		
HALL NORTHEAST	S(P)	✓		✓	✓	026		
HALL NORTHWEST	S(P)	✓		✓	✓	027		
KITCHEN	RHT	✓		✓	✓	028		
MECHANICAL ROOM	RHT	✓		✓	✓	029		

A – Correctly Installed
B – Requires Service, Repair, Missing or Cleaning
C – Alarm Operation Confirmed
D – Annunciation Indication Confirmed
E – Circuit Number or Device Address
F – Supervision and Ground Fault Detection of Wiring to Device Confirmed

NOTIFIER® by Honeywell

FIRST SIGNAL FIRE ALARM INC.

CFAA MEMBER

FIRE ALARM DEVICE TEST AND INSPECTION REPORT
BUILDING LOCATION: KINKORA COMMUNITY CENTRE
DATE: MARCH 16, 2023

LOCATION	DEVICE	A	B	C	D	E	F	REMARKS
FIRE DEPARTMENT WEST	AV	✓		✓		NAC2		
FIRE DEPARTMENT EAST	AV	✓		✓		NAC2		
HALL REAR	AV	✓		✓		NAC1		
MAIN CORRIDOR	AV	✓		✓		NAC1		
HALL FRONT	AV	✓		✓		NAC1		
BY WASHROOMS	AV	✓		✓		NAC1		

A – Correctly Installed
B – Requires Service, Repair, Missing or Cleaning
C – Alarm Operation Confirmed
D – Annunciation Indication Confirmed
E – Circuit Number or Device Address
F – Supervision and Ground Fault Detection of Wiring to Device Confirmed

APPENDIX D

Luminaire Schedule
Panel Schedules

This page intentionally left blank

	LUMINAIRE SCHEDULE		
TYPE	DESCRIPTION	LAMP	MOUNTING
A1	2' X 4' LED FLAT PANEL C/W STEEL HOUSING, EXTRUDED ALUMINUM DOOR FRAME, WHITE SMOOTH FROSTED ACYLIC LENS, 0-10VDC DIMMABLE TO 10%, 120V DRIVER.	LED 5000 LUMENS 40W L80 AT 60,000h 80 CRI 3500K	SURFACE MOUNTED TO DRYWALL CEILING. LUMINAIRES TO BE C/W SURFACE MOUNTED KIT TO ALLOW FOR THEIR SURFACE MOUNTING TO DRYWALL CEILING.
	METALUX #24CGTS-NUV C/W CGTSNUV-SURF24 (HIGH)		
	LITHONIA #CPX 2X4 AL08 SWW7 M2 C/W 2X4SMKSH (MEDIUM)		
	CFI #2SBP3550L8CS-4-UN3-DIM C/W FSK24(HIGH)		
	ELITE #24-FPL-BL-LED-4000/5000/6000L-DIM10-MVOLT-35K/40K/50K-85 C/W 24-FPL1-LED-SMK		
A2	2' X 4' LED FLAT PANEL C/W STEEL HOUSING, EXTRUDED ALUMINUM DOOR FRAME, WHITE SMOOTH FROSTED ACYLIC LENS, 0-10VDC DIMMABLE TO 10%, 120V DRIVER.	LED 4000 LUMENS 35W L80 AT 60,000h 80 CRI 3500K	RECESSED IN T-BAR CEILING OF CORRIDOR 102 AND SURFACE MOUNTHER ELSEWHERE. LUMINAIRE SURFACE MOUNTED TO DRYWALL CEILING TO BE C/W SURFACE MOUNTED KIT.
	METALUX #24CGTS-NUV (LOW) C/W CGTSNUV-SURF24		
	LITHONIA #CPX 2X4 AL07 SWW7 M4 (MEDIUM) C/W 2X4SMKSH		
	CFI #2SBP3550L8CS-4-UN3-DIM (LOW) C/W FSK24		
	ELITE #24-FPL-BL-LED-4000/5000/6000L-DIM10-MVOLT-35K/40K/50K-85 C/W 24-FPL1-LED-SMK		
A3	2' X 2' LED FLAT PANEL C/W STEEL HOUSING, EXTRUDED ALUMINUM DOOR FRAME, WHITE SMOOTH FROSTED ACYLIC LENS, 0-10VDC DIMMABLE TO 10%, 120V DRIVER.	LED 4000 LUMENS 35W L80 AT 60,000h 80 CRI 3500K	RECESSED IN T-BAR CEILING.
	METALUX #22CGTS-NUV (MEDIUM)		
	LITHONIA #CPX 2X2 AL07 SWW7 M4 (HIGH)		
	CFI #2SBP3040L8CS-2-UN3-DIM (HIGH)		
	ELITE #ELITE 22-FPL-BL-LED-4000/5000/6000L-DIM10-MVOLT-35K/40K/50K-85		

	LUMINAIRE SCHEDULE		
TYPE	DESCRIPTION	LAMP	MOUNTING
A4	1'X4' LED FLAT PANEL C/W STEEL HOUSING, EXTRUDED ALUMINUM DOOR FRAME, WHITE SMOOTH FROSTED ACYLIC LENS, 0-10VDC DIMMABLE TO 10%, 120V DRIVER.	LED 4000 LUMENS 35W L82 AT 60,000h 80 CRI 4000K	RECESSED IN DRYWALL CEILING.
	METALUX #14CGTS-NUV (MEDIUM)		
	LITHONIA #CPX 1X4 AL07 SWW7 M4 (HIGH)		
	CFI #1SBP3040L8CS-4-UN3-DIM (HIGH)		
	ELITE #ELITE 14-FPL-BL-LED-3000/4000/5000L-DIM10-MVOLT-35K/40K/50K-85		
B1	4' LONG, SURFACE MOUNTED LED STRIP FIXTURE C/W FROSTED ACRYLIC ROUND LENS AND WIDE DISTRIBUTION, WHITE POWDER COAT FINISH, 120V DRIVER.	LED 5000 LUMENS 44W L70 AT 100,000h 80 CRI 3500K	CHAIN SUSPENDED AT 8'-0" AFF. COORDINATE EXACT LOCATION AND SUSPENSION HEIGHT ON SITE PRIOR TO ROUGH-IN.
	AIMLITE #S20LS-48LA4A-4/35K/BKT347-A		
	LITHONIA #CSS L48 AL03 MVOLT 35K 80CRI HC36 M12		
	CFI #SDS42448L8CST-UNV-DIM-FKR-126		
	ELITE #4-OEC-LED-5000L-DIM10-MVOLT-40K-85-OCGSS		
B2	4' LONG, SURFACE MOUNTED LED STRIP FIXTURE C/W FROSTED ACRYLIC ROUND LENS AND WIDE DISTRIBUTION, WHITE POWDER COAT FINISH, 120V DRIVER.	LED 3000 LUMENS 44W L70 AT 100,000h 80 CRI 3500K	SURFACE MOUNTED TO DRYWALL CEILING
	AIMLITE #S20LS-48LA2A-4/35K		
	LITHONIA #CSS L48 AL03 MVOLT 35K 80CRI		
	CFI #SDS42448L8CST-UNV-DIM		
	ELITE #4-OEC-LED-3000L-DIM10-MVOLT-40K-85		

	LUMINAIRE SCHEDULE		
TYPE	DESCRIPTION	LAMP	MOUNTING
C1	6" DIAMETER, RECESS MOUNTED LED DOWNLIGHT C/W MEDIUM WIDE DISTRIBUTION, SELF-FLANGED AND SEMI-SPECULAR CLEAR REFLECTOR, 0-10VDC DIMMABLE TO 1%, 120V DRIVER.	LED 1000 LUMENS 13W 80 CRI 4000K	RECESS MOUNTED WITHIN EXTERIOR SOFFIT. COORDINATE EXACT LOCATION WITH GENERAL CONTRACTOR ON SITE PRIOR TO ROUGH-IN.
	HALO #HC610D010-HM60525840-61WDH		
	LITHONIA #LLBR6 AL02 40K AR LSS MWD MVOLT UGZ		
	LIGHTOLIER #CR6RLMCCT		
	CREE #HHJ6-LED-1200L-DIM10-MVOLT-MWD-40K-90-HH6-6501-CL-WH		
D1	11"(w) x 5"(h) x 6.5"(d) EXTERIOR LED CYLINDER WALL PACK, DIE-CAST ALUMINUM HOUSING, TYPE 4 FORWARD THROW DISTRIUTION, BLACK POWDER COAT FINISH, 120V DRIVER.	LED 3000 LUMENS 25W L91 AT 100,000h 70 CRI 4000K	WALL MOUNTED TO EXTERIOR FAÇADE. COORDINATE EXACT LOCATION AND MOUNTING HEIGHT WITH GENERAL CONTRACTOR ON SITE PRIOR TO ROUGH-IN.
	LUMARK #AXCS3A-BK		
	LITHONIA #ARC1 LED P3 40K MVOLT DBLXD		
	KEENE #LPW16-30-NW-G3-4-UNV-BK		
	CREE #C-WP-B-RDC-3L-40K-DB		
E1	6" DIAMETER X 14" HIGH, UP/DOWN LED CYLINDER C/W EXTRUDED ALUMINUM HOUSING WITH AN INTEGRALLY SEALED LED LIGHT MODULE, 30 DEGREES FLOOD DISTRIBUTION, BLACK POWDER COAT FINISH, 120V DRIVER.	LED 3000 LUMENS 25W L91 AT 100,000h 70 CRI 4000K	WALL MOUNTED TO EXTERIOR FAÇADE. COORDINATE EXACT LOCATION AND MOUNTING HEIGHT WITH GENERAL CONTRACTOR ON SITE PRIOR TO ROUGH-IN.
	LUMINIS #L2L15 R30 120V BKT		

This page intentionally left blank

Kinkora Community Hall Expansion
Coles Associates Ltd. – 231053
09-21-2023 - Issued for Tender

PANEL 'A1'												
DESIGNATION	LOAD		P	BKR	CIRCUIT			BKR	P	LOAD		DESIGNATION
	A	B								A	B	
RECEPT: ROOM 100 & 111	240		1	20	1	A	2	15	1	480		RECEPT: ROOM 112
RECEPT: MANAGER 110		360	1	15	3	B	4	15	1		480	RECEPT: ROOM 113
RECEPT: ROOM 109 & 110	480		1	15	5	A	6	15	1	360		RECEPT: ROOM 113
RECEPT: STAFF ROOM 109 (FRIDGE)		750	1	15	7	B	8	15	1		240	RECEPT: IBI 115
RECEPT: STAFF ROOM 109	600		1	20	9	A	10	15	1			SPARE
RECEPT: STAFF ROOM 109		600	1	20	11	B	12	15	1			SPARE
DISHWASHER: STAFF ROOM 109	750		1	15	13	A	14	20	1			SPARE
RECEPT: ROOM 108		480	1	15	15	B	16	20	1			SPARE
RECEPT: ROOM 108	360		1	15	17	A	18	15	2			SPARE
RECEPT: STAFF ROOM 109		600	1	20	19	B	20					
BB-2, BB-3 & WF-2: ROOMS 100, 109 - 110	750		2	15	21	A	22	15	1	800		LIGHTING: ROOM 100, 108, 109 - 113
		750			23	B	24	20	2			SPARE
RECEPT: EXTERIOR	120		1	20	25	A	26					
SPACE					27	B	28					SPACE
SPACE					29	A	30					SPACE
SPACE					31	B	32					SPACE
SPACE					33	A	34					SPACE
SPACE					35	B	36					SPACE
SPACE					37	A	38					SPACE
SPACE					39	B	40	15	1		120	DOOR OPERATOR (*)
SPACE					41	A	42	15	1	120		EXIT SIGNS (*)
PHASE LOADS:	3300	3540								1760	840	
TOTAL PHASE LOADS	5060	4380								SUPPLY: 120/240V,1ø,3w		
TOTAL LOADS	9440		(*) - INDICATES LOCKING BREAKER							MAINS: 125A RATED, 60A MB (TOP FED)		
										NUMBER OF CIRCUITS: 42		
CURRENT AT 240V/1PH:	39									MOUNTING: RECESSED		

This page intentionally left blank

PANEL 'DPA'												
DESIGNATION	LOAD A	LOAD B	P	BKR	CIRCUIT			BKR	P	LOAD A	LOAD B	DESIGNATION
RECEPT: MECH/ELEC 118	480		1	15	1	A	2	15	1	360		RECEPT: ROOM 116
RECEPT: CORRIDOR 102 & 103		360	1	20	3	B	4	15	1		360	RECEPT: ROOM 116
RECEPT: CORRIDOR 102 & 103	360		1	20	5	A	6	15	1	240		RECEPT: MECH/ELEC 118 (COMMS DATA)
RECEPT: ROOM 101 & 104		240	1	20	7	B	8	40	2		2000	WALL OVEN: KITCHEN 117
RECEPT: ROOM 105	360		1	15	9	A	10			2000		
RECEPT: ROOM 105		480	1	15	11	B	12	40	2		3000	RANGE: KITCHEN 117
IU-1: MECH/ELEC 118	438		2	15	13	A	14			3000		
		438			15	B	16	15	2		625	BB-1 & WF-1: LAUNDRY 104 & VEST. 101
IU-2: MECH/ELEC 118	438		2	15	17	A	18			625		
		438			19	B	20	30	2		1500	DRYER: LAUNDRY 104
PANELBOARD 'A1'	4600		2	60	21	A	22			1500		
		4600			23	B	24	15	1		750	WASHING MACHINE: LAUNDRY 104
HC-1	4012		2	60	25	A	26	30	2	3350		DISHWASHER: KITCHEN 117
		4012			27	B	28				3350	
SPARE			2	15	29	A	30	15	1	810		LIGHTING: ROOM 102 - 103, 106 - 107, 116
					31	B	32	20	1			SPARE
SPARE			1	15	33	A	34	15	1	542		LIGHTING: ROOM 101, 104 - 105, 117 - 118
RECEPT: KITCHEN 117 ISLAND		600	1	20	35	B	36	15	1		260	EXTERIOR LIGHTING
HRV-1: MECH/ELEC 118	670		2	15	37	A	38	15	1	100		P-1: MECH/ELEC 118
		670			39	B	40	20	1		120	RECEPT: MECH/ELEC 118
HC-2: MECH/ELEC 118	5625		2	80	41	A	42	15	1	100		TRAP SEAL PRIMER (*)
		5625			43	B	44	15	1		100	RECEPT: DF-1 (LAUNDRY 104)
HC-3: MECH/ELEC 118	5625		2	80	45	A	46	20	1	240		RECEPT: EXTERIOR
		5625			47	B	48	35	2		3492	OU-1: OUTDOOR UNIT
RECEPT: KITCHEN 117 (FREEZER)	750		1	15	49	A	50			3492		
RECEPT: KITCHEN 117 (FREEZER)		750	1	15	51	B	52	35	2		3492	OU-2: OUTDOOR UNIT
RECEPT: KITCHEN 117 (FREEZER)	750		1	15	53	A	54			3492		
RECEPT: KITCHEN 117		600	1	20	55	B	56	15	1			SPARE
RECEPT: KITCHEN 117	600		1	20	57	A	58	15	1			SPARE
RECEPT: KITCHEN 117		600	1	15	59	B	60	15	1			SPARE
ECEPT: KITCHEN 117 (RANGE HOOI	320		1	20	61	A	62	20	2			SPARE
RECEPT: KITCHEN 117		600	1	20	63	B	64					
RECEPT: KITCHEN 117	600		1	20	65	A	66					SPACE
SPARE			1	20	67	B	68					SPACE
SPARE			1	20	69	A	70					SPACE
SPARE			1	15	71	B	72					SPACE
PHASE LOADS:	25628	25638								19851	19049	
TOTAL PHASE LOADS	45479	44687								SUPPLY: 120/240V,1ø,3w		
TOTAL LOADS	90166	(*) - INDICATES LOCKING BREAKER								MAINS: 400A RATED (TOP FED)		
										NUMBER OF CIRCUITS: 66		
CURRENT AT 240V/1PH:	376									MOUNTING: SURFACE		

This page intentionally left blank