PROJECT: AJAX SS GENDER NEUTRAL WASHROOM & GYMNASIUM RENOVATION

CLIENT: DURHAM DISTRICT SCHOOL BOARD

PROJECT No.: 24132

DATE: FEBRUARY 2025

BINDER: A ARCHITECTURAL, MECHANICAL & ELECTRICAL

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END OF SECTION

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SPECIFICATIONS BINDER "A"

INTRODUCTORY INFORMATION

CONTRACT REQUIREMENTS

THE BID DOCUMENTS

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DIVISION 2- Existing Conditions

DIVISION 3- Concrete

See Structural Drawings for Concrete Slab Requirements

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DRAWINGS
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PART 1 GENERAL

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

The Standard Construction Document for Stipulated Price Contract, 2008 English version, consisting of the Agreement Between *Owner* and *Contractor,* Definitions, and General Conditions of the Stipulated Price Contract, Parts 1 to 12 inclusive, governing same is hereby made part of these *Contact Documents,* with the following amendments, additions and modifications. Where these amendments, additions, and modifications specifically reference a change to the Agreement, Definitions, or General Conditions, these amendments, additions and modifications shall govern.

1.1 ARTICLE A-5 – PAYMENT

.1 Revise Paragraph 5.1 as follows:

.1 Revise format of the blank line and text following "subject to a Holdback of…" and insert: "Ten percent (10%), the *Owner* shall...'

1.2 ARTICLE A-6 — RECEIPT AND ADDRESSES FOR NOTICES IN WRITING

.1 Delete Article A-6.1 and substitute new article 6.1:

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

1.3 DEFINITIONS

.1 Add the following definition:

"19a. Submittals

Submittals are documents or items required by the *Contract Documents* to be provided by the *Contractor,* such as:

Shop Drawings, samples, models, mock-ups to indicate details or characteristics, before the portion of the *Work* that they represent can be incorporated into the *Work;* and As-built drawings and manuals to provide instructions to the operation and maintenance of the *Work.*

1.4 GC 1.1 CONTRACT DOCUMENTS

.1 Add to the end of subparagraph 1.1.2.2:

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

.2 Add new subparagraph 1.1.7.5:

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

.3 Add new subparagraph 1.1.7.6:

1.1.7.6 " And, in general, where discrepancies occur among various parts of the drawing or specifications, the Contractor shall provide the greatest amount of labour and/or materials to which it may refer.*"*

.4 Change 1.1.8 to read:

"The *Owner* shall provide the *Contractor,* without charge up to twenty (20) complete sets of the Contract Documents to perform the work. The *Contractor* may obtain additional sets of *Contract Documents* at the cost of printing, handling and shipping."

1.5 GC 2.2 ROLE OF THE CONSULTANT

.1 Add at the end of paragraph 2.2.9."The *Owner* and the *Contractor* shall waive any claims against the *Consultant* arising out of the making of such interpretations and findings made in accordance with paragraphs 2.2.7., 2.2.8. and 2.2.9".

.2 Change Paragraph 2.2.14 to read:

"The *Consultant* will review and take appropriate action upon *Shop Drawings,* samples and other *Contractor's* submittals which are provided in accordance with the Contract Documents."

.3 Add to paragraph 2.2.13:

"If in the opinion of the *Contractor a Supplemental Instruction* involves an adjustment in the Contract Price or Contract Time the Contractor shall within seven (7) working days of receipt of *Supplemental Instruction* advise the *Consultant* in writing accordingly. Failure to provide written notification within time stipulated shall imply acceptance of *Supplemental Instruction* by *Contractor.*

If it is the Contractor's opinion that a Supplemental Instruction, Change Order or Change Directive, as issued by the Consultant, will delay the project, the Contractor shall, within three (3) days after receipt of such Supplemental Instruction or Change Form, notify the Consultant in writing accordingly*"*

1.6 GC 2.3 REVIEW AND INSPECTION OF THE WORK

.1 Add to end of paragraph 2.3.2:

"Should a designated test or inspection fail, the *Contractor* shall promptly correct and retest the work using the designated testing/inspection agency and be responsible for all costs associated with retesting."

.2 Add to end of paragraph 2.3.3:

"In addition to the timely notice given to the Consultant of the Contractor's request for inspection, the Contractor shall notify the Owner of said inspections and the Owner shall have access for purposes of witnessing the testing and to the results thereof."

.3 Add new paragraph 2.3.8:

2.3.8 "The *Consultant* will conduct periodic reviews of the Work in progress, to determine general conformance with the requirements of the *Contract Documents.* Such reviews, or lack thereof, shall not give rise to any claims by the *Contractor* in connection with construction means, methods, techniques, sequences and procedures, nor in connection with construction safety at the Place of the Work, responsibility for which belongs exclusively to the *Contractor."*

1.7 GC 2.4 DEFECTIVE WORK

.1 Add new subparagraphs 2.4.1.1:

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

1.8 GC 3.1 CONTROL OF THE WORK

.1 Add new paragraph 3.1.3:

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

1.9 GC 3.4 DOCUMENT REVIEW

.1 Delete paragraph 3.4.1 in its entirety and <u>substitute</u> new paragraph 3.4.1:

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

1.10 GC 3.5 CONSTRUCTION SCHEDULE

.1 Add new sub-sentences .4 and .5 to paragraph 3.5.1:

.4 "commence Work immediately upon notification of award of the Contract, including mobilization on site within 2 weeks and provide sufficient labour for the steady progress of the Work including overtime work, if required to meet the scheduled date of completion.

.5 "carry out the Work to completion as rapidly as possible, or as otherwise agreed with *Owner* and *Consultant* consistent with good practice, safe working conditions and reasonable economy."

1.11 GC 3.6 SUPERVISION

.1 Add to paragraph 3.6.1:

"and not without prior consultation with *Consultant* and *Owner."*

.2 Add the following as Item 3.6. 3:

3.6.3 "Complete qualifications of the Superintendent shall be submitted to the Consultant for approval, including references to past projects and project participants. The Consultant reserves the right to review the record of experience and credentials of the supervisory staff. This same Superintendent must remain on the project from the start of Work, through the lien period, and ***must remain on site until all deficiencies are completed and accepted,*** unless otherwise approved by the Consultant and Owner's Representative."

1.12 GC 3.7 SUBCONTRACTORS AND SUPPLIERS

.1 Refer to sentence 3.7.4: Delete entire sentence.

.2 Add the following paragraph:

3.7.7 "Should the *Contractor* inadvertently or by design, claim to include in his bid, a *Product* from a manufacturer other than a manufacturer named in the specifications, he shall provide the *Product* from a manufacturer named in the specifications at no cost to the *Owner*."

1.13 GC 3.8 LABOUR AND PRODUCTS

.1 Change paragraph 3.8.3 to read:

3.8.3 "The *Contractor* shall maintain good order and discipline among workers engaged on the Work and shall not employ or permit to be employed anyone not skilled in the tasks assigned."

.2 Add new paragraph 3.8.4:

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

.4 Add new GC 3.8.5 to 3.8.10:

3.8.5 *"Products* which are specified by their proprietary names, or by parts or catalogue number, shall form the basis for the Specification and Contract. No substitutes for these may be used without the *Consultant's* approval in writing. Substitutes will be considered only when submitted in sufficient time to permit proper investigation by the *Consultant.* In applying for permission to use substitutes, the *Contractor* shall prove, to the *Consultant's* satisfaction, that the substitute is equal to or better than the specified product. Each application shall be accompanied by a list of properties of the specified product and the proposed substitute. No application to use substitutes will be considered unless made in this way."

3.8.6 "When requesting approval for the use of substitutes, the *Contractor* shall include in this submission any affect that the substitution may have on the *Contract Price* and/or *Contract Time."*

3.8.7 "The *Contractor* shall use all *products* in strict accordance with the manufacturer's directions except where specified otherwise. Whenever specific reference to manufacturer's directions or instructions is made in Specifications, submit copies of said instructions or directions, or both, for approval before commencing such work."

3.8.8 "Whenever more than one *product* is specified for one use, the *Contractor* may select for this use any of the *products* so specified unless the Specification or the Drawings indicate otherwise."

3.8.9 *"Products* are sometimes specified by reference to brand names, propriety names, trademarks or catalogue number or catalogue designation or symbols. In such cases, the name of a manufacturer, distributor, supplier or dealer is sometimes given to assist the *Contractor* to find a source of supply. The naming of a source of supply does not relieve the *Contractor* from his responsibly for finding his own source of supply even if the source named no longer supplies the products specified. If the *Contractor* is unable to obtain the specified product, he shall supply a substitute product equal to or better than the specified product, as approved by the *Consultant,* with no extra compensation. Should the *Contractor* be unable to obtain a substitute *product* equal or superior to the specified product and the *Owner* accepts an inferior product, the *Contract Price* shall be adjusted accordingly, as approved by the *Consultant."*

3.8.10 "The *Contractor* shall use Canadian made products where the price and quality thereof are comparable to corresponding foreign made products."

1.14 GC 3.10 SHOP DRAWINGS

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

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

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

3.10.3 "Prior to the first application for payment, the *Contractor* and the *Consultant* shall jointly prepare a schedule of the dates for submission and return of *Shop Drawings* and any *Submittals."*

.4 Delete the words "with reasonable promptness so as to cause no delay in the performance of the Work" and replace with "within 10 working days or such longer period as may be reasonably required" in paragraph 3.10.12.

.5 Add new paragraph 3.10.13:

3.10.13 "Reviewed *shop drawings* shall not authorize changes in *Contract Price* or *Contract Time."*

1.15 GC 3.11 USE OF THE WORK

.1 add the following paragraph

"3.11.3 "The *Owner* shall have the right to enter upon and take possession of the *Work* in whole or in part for purpose of placing fittings, furniture and equipment or other use before completion of the *Contract,* if such action does not prevent nor interfere with the *Contractor* in performing the completion of the *Contract* within the time specified. Such entry and taking possession shall not be considered as acceptance of the *Work* or parts of the *Work* or in any way relieve the *Contractor* of responsibility to complete the *Contract.* The *Contractor* shall cooperate and coordinate his work with that of the fittings, furniture and equipment installation."

1.16 GC 3.14 ADDITIONAL CONDITIONS

.1 Add new General Condition 3.14.1

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

.2 Add new General Condition 3.14.2

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

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

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

1.17 GC 4.1 CASH ALLOWANCES

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

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

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

4.1.5 "The net amount of any unexpended cash allowances, after providing for any reallocations as contemplated in paragraph 4.1.4, shall be deducted from the Contract Price by Change Order."

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

4.1.7 "At the commencement of the work, the *Contractor* shall prepare for the review and acceptance of the *Owner* and the *Consultant,* a schedule indicating the times, within the construction schedule referred to in GC 3.5, that items called for under cash allowances and items that are specified to be *Owner* purchased and

Contractor installed or hooked up are required at the site to avoid delaying the progress of the Work."

.4 Add new paragraph 4.1.8:

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

.5 Amend GC 4.1.2 to read:

"Cash Allowances cover the net cost to the *Contractor* of services, labour, products, construction machinery and equipment, freight, unloading, handling, storage, installation, provincial sales taxes and other authorized expenses incurred in performing the work stipulated under the cash allowances, but do not include any Value Added Taxes (HST) payable by the *Owner* to the *Contractor."*

.6 Paragraph 4.1.4: change first line to read:

"Where the total costs expended under cash allowances exceed the aggregate amount of all cash allowances, the Contractor shall be"

.7 Add new GC 4.1.8 and GC 4.1.9:

4.1.8 "Where a cash allowance covers a sub-contract, the *Owner* or the *Consultant* will call tenders for that part of the Work. Alternatively, the *Owner* of the *Consultant* may elect to have the *Contractor* call tenders and submit the results to the *Consultant*, with Contractor's recommendations, for the approval of the *Owner*. In either case, the invited bidders shall be mutually approved by the *Contractor* and the *Consultant*, and the *Contractor* shall then enter into a sub-contract with the bidder selected by the Owner."

4.1.9 "If requested by the *Consultant*, applications for payment from allowances shall be substantiated by, certified copies of all invoices and statement from suppliers or Sub-Contractors furnishing products, etc., purchased under a cash allowance."

1.18 GC 5.2 APPLICATION FOR PROGRESS PAYMENT

.1 Paragraph 5.2.2, first line: change "dated the last day" to "dated as of the last day".

.2 Change paragraph 5.2.7 to read:

"Application for payment for *Products* manufactured but not yet delivered to the Place of the Work will not be considered. Applications for payment for Products delivered to the Place of the Work but not yet incorporated into the work, provided such Products are Project specific and cannot readily be used elsewhere, may be considered for payment on an individual basis and shall be supported by such evidence as the *Consultant* may reasonable require to establish the value of delivered *Products."*

.3 Add new paragraph 5.2.8 and 5.2.9:

5.2.8 "A statutory declaration in the form CCDC Document 9A, and such additional supporting documents as the *Consultant* may reasonably require".

5.2.9 "Products delivered to the site significantly in advance of their being required for installation in the orderly process of construction will not be eligible for payment, unless approved in writing by the *Consultant* prior to delivery."

1.19 GC 5.5 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF THE WORK

.1 Delete paragraph 5.5.3.

.2 Delete paragraph 5.5.5.

1.20 GC 5.6 PROGRESSIVE RELEASE OF HOLDBACK

.1 Paragraph 5.6.1, third line: change *"Owner* shall pay the *Contractor"* to read *"Owner* may pay the *Contractor"*.

1.21 GC 5.8 WITHHOLDING OF PAYMENT

.1 Add new paragraph 5.8.2:

"5.8.2 In addition to any rights the *Owner* has pursuant to the Construction Lien Act, if a lien is registered or an action commenced against the *Owner*, the *Owner* shall have the right to withhold, from any money otherwise due to the *Contractor,* the full amount claimed in the lien action plus an additional sum sufficient to satisfy all of the *Owner's* expenses relating to such lien actions, including legal and consulting costs. These funds held back, less expenses incurred, shall be released to the *Contractor* upon the full discharge of all liens and dismissal of all actions against the *Owner."*

1.22 GC 5.10 NO CLAIMS FOR ANTICIPATED PROFIT

.1 Add new article GC 5.10 as follows:

"5.10.1 "If any change or deviation in, or omission from the Work is made by which the cost of Work to be done is decreased, or if the whole or any portion of the Work is dispensed with, or if the Contractor should stop Work or terminate the Contract in accordance with the provisions of GC 7.2, no compensation shall be claimable by the Contractor or Sub-Contractor for any loss of anticipated profits in respect thereof."

1.23 GC 6.2 CHANGE ORDER

.1 Add new paragraph 6.2.3:

6.2.3 "The costs for the following items shall be considered to be included in the allowance for overhead and profit:

.1 *Contractor's* head office expenses.
.2 Wages of project managers, superintendents, assistants, watchpersons and administrative personnel.
.3 Temporary site office expenses, including costs for telephone and facsimile machine.
.4 Small tools.
.5 Insurance and bonding premiums.
.6 Record drawings.
.7 Clean up and disposal of waste materials.

.2 Add new paragraph 6.2.4:

6.2.4 "If the method of valuation, measurement, change in *Contract Price* and change in *Contract Time* cannot be promptly agreed upon and the change is required to be proceeded with then the *Consultant* in the first instance will determine the method of valuation, measurement, the change in *Contract Price* and *Contract Time* subject to final determination in the manner set out in Part 8 Dispute

Resolution. In this case the *Consultant* will, with the consent of the *Owner*, issue a written authorization for the change setting out the method of valuation and if by lump sum his valuation of the change in *Contract Price* and *Contract Time."*

.3 Add Items 6.2.5 through 6.2.7 as follows:

6.2.5 "Combined overhead and profit mark-up on Work performed by the General Contractor's own forces shall not exceed 15%. Overhead and profit shall not be charged on credits to the Contract. Where a change involves both credits and extras, overhead and profit shall apply only to a net extra."

6.2.6 "General Contractor's combined overhead and profit mark-up on sub-contract Work shall not exceed 10%.

6.2.7 "Combined overhead and profit mark-up charged by Sub-Contractor's on their own Work shall not exceed 15%.

1.24 GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

.1 Add new subparagraph 6.4.5:

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

1.25 GC 6.5 DELAYS

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

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

.2 Paragraph 6.5.4, first line: after *"Consultant'* add:

"and simultaneously to the *Owner".*

.3 Add new paragraph 6.5.6:

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

.4 Add new paragraph 6.5.7:

6.5.7 "The *Contractor* shall be responsible for the care, maintenance and protection of the Work, in the event of a suspension of delay in the performance of the Work."

1.26 GC 6.6 CLAIMS FOR A CHANGE IN CONTRACT PRICE

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

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

.1 Paragraph 7.1.2, second line:
Delete the words "to a substantial degree..."

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

.1 Add the following new paragraph 7.2.6:

7.2.6 "The provisions of this GC 7.2 shall not apply to the withholding of certificates and/or payments because of the Contractor's failure to pay all just claims promptly, or because of the registration of a lien against the place of Work."

1.29 GC 8.2 NEGOTIATION, MEDIATION, AND ARBITRATION

.1 Add the following new paragraphs 8.2.9, 8.2.10, 8.2.11, 8.2.12., 8.2.13., 8.2.14. and 8.2.15.

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

a) a copy of the notice of arbitration
b) a copy of supplementary conditions 8.2.9 to 8.2.14 of this Contract, and;
c) any claims or issues which the Contractor or the Owner, as the case may be, wishes to raise in relation to the Consultant arising out of the issues in dispute in the arbitration

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

a) has a vested or contingent financial interest in the outcome of the arbitration;
b) gives the notice of election to the Owner and the Contractor before the arbitrator is appointed;
c) agrees to be a party to the arbitration within the meaning of the rules referred to in paragraph 8.2.6, and,
d) agrees to be bound by the arbitral award made in the arbitration.

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

8.2.12 The arbitrator in the arbitration in which the Consultant has elected under paragraph 8.2.10 to become a full party may:

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

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

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

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

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

1.30 GC 9.1 PROTECTION OF WORK AND PROPERTY

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

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

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

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

1.31 GC 9.4 CONSTRUCTION SAFETY

.1 Add new paragraph 9.4.2:

9.4.2 "The Contractor shall assume the role of the "Constructor" as defined by applicable legislation."

1.32 GC 10.1 TAXES AND DUTIES

.1 Add new paragraph 10.1.3:

10.1.3 "The *Contractor* shall, at the request of the *Owner*, assist, join in, or at *Owner's* expense, make application on behalf of the *Owner* for any exemption, recovery or refund. Provide the *Owner* with copies, or where required, originals of records,

invoices, purchase orders or other documentation as may be necessary to support such application."

1.33 GC 10.2 LAWS, NOTICES, PERMITS, AND FEES:

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

"Subject to paragraph 3.14.1, the".

1.34 GC 10.4 WORKERS' COMPENSATION

.1 Paragraph 10.4.1, change first line to read:

"Prior to commencing the Work, with each application for payment, again with the Contractor's application . . . "

1.35 GC 11.1 INSURANCE

.1 Add new paragraph 11.1.9:

11.1.9 "Insurance shall not be terminated until the *Owner* has been notified in writing of this intention by the insured and agrees to such termination."

.2 Delete paragraph 11.1.1.3, "Aircraft and watercraft liability insurance".

.3 Add to paragraph 11.1.1.4, "Town of Oakville" to joint names.

1.36 GC 11.2 CONTRACT SECURITY

.1 Add new paragraphs 11.2.3 through 11.2.7:

11.2.3 The *Contractor*, after receiving written notification from the *Owner* within forty-eight (48) hours of such notification, and prior to the signing of the Contract, shall provide a Performance Bond and a Labour and Materials Payment, Bond, each in the amount of 50% of the *Contract Price* issued by a duly incorporated and nationally recognized surety company approved by the *Owner*, guaranteeing the faithful performance of the *Contract* in accordance with the *Contract Documents* including the requirements for warranties provided for the GC 12.3 WARRANTY, and the payment of all obligations incurred in the event of the *Contractor's* default, including, but not limited to the following:

.1 The payment of all legal, accounting, architectural, engineering and other consultant's expenses incurred by the *Owner* in determining the extent of *Work* executed and any additional work required as a result of the interruption of the Work, and its completion.

.2 The payment of additional expenses to the *Owner* in the form of security services, light, heat, power, and other related costs, payable over the period between the default of the *Contract* and commencement of the Work under the terms of this Article.

11.2.4 Without limiting the foregoing in any way, the bonds shall indemnify and hold harmless the *Owner* for and against any and all costs and expenses (including legal and Consultant services and court costs) arising out of or as a consequence of any default of the *Contractor* under this *Contract.*

11.2.5 The form of such bonds shall be in accordance with the latest edition of the CCDC approved bond forms, modified as may be necessary to incorporate the requirements stated herein.

11.2.6 The *Contractor* shall be responsible for notifying the surety company of any changes made to the *Contract* during the course of construction.

11.2.7 Should the *Owner* require additional bonds by the *Contractor* or any of his subcontractors, after the receipt of bids for the Work, the *Contract Price* shall be increased by all costs attributable to providing such bonds. The Contractor shall promptly provide the *Owner*, through the *Consultant* with any such bonds that may be required.

1.37 GC 12.1 INDEMNIFICATION

.1 Add new paragraph to 12.1.7 as follows:

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

The indemnification, provided for in this paragraph shall specifically include, but shall not be limited to, all claims, demands, losses, costs, damages, actions, suits or proceedings directly or indirectly arising or alleged to arise as a result of or in connection with any scaffolding, structural Work or safe place law or any law with respect to the protection of adjacent landowners, but shall not include any claims arising solely from negligence of the party asking to be defended, indemnified or saved harmless.

.2 Add new paragraph 12.1.8:

12.1.8 "If a construction lien is registered or a construction action is commenced against the *Owner* for any reason whatsoever, the *Contractor* shall satisfy all judgments and pay all costs resulting from such liens and actions and shall fully indemnify the *Owner* against any and all expenses resulting from such liens and actions, including legal costs on a solicitor and his own client basis."

1.38 GC 12.3 WARRANTY

.1 Delete from the first line of paragraph 12.3.2 the word, "The" and substitute the words:"Subject to paragraph 3.14.1, the".

.2 Add to paragraph 12.3.2:

"The *Contractor* warrants that the work is in compliance with the requirements of the *Contract Documents."*

.3 Paragraph 12.3.5: change first sentence to read:

"The *Contractor* shall be responsible for obtaining Product Warranties from respective manufacturers where such warranties or extended warranties are required and/or offered by the manufacturer.

.4 Add paragraphs 12.3.7 through 12.3 9 as follows:

12.3.7 "The conditions of warranty cover all items of Work for at least 12 months and/or 1 year. Warrantees are extended on all components specified in individual specification sections with specific extended warrantees."

12.3.8 "The Contractor shall obtain from Sub-Contractors and provide with the final documentation, forms of warranty for all items for which warranties extend beyond the one-year period as required by the specifications."

12.3.9 "Upon acceptance of a deficiency correction, the warranty period shall be re-established for the period of time as originally specified."

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

Part 1 General

1.1 PRECEDENCE

.1 In all cases this Section is intended to be read in conjunction with and to coordinate with all other Sections. In the case of discrepancy between this Section and other Sections to more stringent Articles of any applicable Section shall apply.

1.2 RELATIONS OF TRADES

.1 The Contract Specifications have been generally divided into trade sections for the purpose of ready reference.

.2 The Contractor is responsible for coordinating all trades. He is solely responsible for determining the lines of demarcation between Contractor and/or trades. Neither the Consultant nor the Owner, assume any responsibility for any such determination or for any dispute arising concerning it. No extras will be considered due to any such dispute concerning either labour or materials.

.3 Specifications and drawings form an integral part of the Contract Documents. Any subject or item omitted from one, but which is mentioned or reasonably implied in the other, shall be considered as properly and sufficiently specified and will be part of the Work.

1.3 EXISTING SITE CONDITIONS

.1 Ascertaining the specific site and building conditions as they relate to the project is the responsibility of the contractor. Notwithstanding this overriding responsibility the consultant has made every effort to properly represent existing site conditions as they are evident at the time of tender.

.2 The Contractor shall assume the work site based on the existing conditions as shown on the drawings and visible on the job site at the time of the closing of the tender. All disposal, removal and importing of material is to be included in the work of this Contract.

.3 Inspection of the site during the tender period is mandatory for all Contractors.

1.4 WORK WITHIN AN EXISTING OCCUPIED BUILDING

.1 The contractor is reminded that work to this project will be performed while occupants are present at the facility. Access restrictions to portions of the work apply. Therefore, precise scheduling and sequencing of the various work areas is required.

.2 At all times it is the Owner who is the authority responsible for the well-being of the facility occupants. As such, the Contractor’s Site Superintendent must establish a working rapport with the Owner or his/her designee, suitable to provide daily notification of proposed construction timing and activities.

.3 Connection of any services must be made in such a way that it leaves no disturbance to materials or systems, nor any exposed construction conditions within the operating facility area.

.4 Catering trucks are not permitted on the site whatsoever.

.5 The Contractor shall minimize nuisances to the facility operation such as loud noise, percussion sounds from power tools, dust, odours. Due to noxious fumes, roofing and asphalt paving shall be done after hours (after 4:00 p.m., or during the weekends). Hot asphalt kettles may not be heated until after 4:00 p.m. on weekdays without prior permission from the School Board Owner and Owner Project Manager.

.6 *Refer also to Section 01 56 00- 'Temporary Barriers and Enclosures'*

1.5 CONSTRUCTION SEQUENCING:

.1 Basic Scope outline

.1 Project award.
.2 Shop drawings and ordering of material to commence immediately upon award.
.3 Work to be Substantially Performed by the required date for occupancy in the Contract.
.4 Following Substantial Performance complete deficiencies to renovations to the existing building such that project Total Completion is achieved by the required date.

.2 Coordinate sequencing with all trades and advise sub-trades of these sequencing requirements prior to the close of Tenders.

1.6 BYLAWS, PERMITS AND APPROVALS

.1 Nothing indicated on the Drawings or Specifications is intended to be in conflict with any law, by-law or regulation of Municipal, Provincial, or similar Authority Having Jurisdiction.

.2 Work of this Contract must conform with such laws, by-laws and/or regulations. Any required variation to, or deviation from, the drawings and specifications, shall be performed in accordance with the Contract contained in these specifications.

.3 Furnish inspection certificates and/or permits as may be applicable as evidence that the installed Work conforms with laws, by-laws and regulations of Authorities Having Jurisdiction.

.4 Each subtrade shall obtain and pay for all permits and licenses required by Municipal, Provincial, or other authorities having Jurisdiction, particular to their trade.

.5 It is the final responsibility of the General Contractor to obtain all the required approvals and permits and include in his Total Stipulated Price, the cost of such approvals, permits and fees. The only exception is the Building Permit, which will be applied for by the Consultant and paid for by the Owner.

.6 Any revisions or deviations to Contract Documents required by any Authorities Having Jurisdiction must be reviewed by the Consultants before implementation.

1.7 ORGANIZATION

.1 Organize the Work of each section as required for satisfactory and expeditious completion of the Work. Take field dimensions required for the Work. Fabricate and install work to suit field dimensions and conditions.

.2 If applicable, take into account existing work to ensure best arrangements of components in available space. Contact the Consultant prior to commencing Work in critical locations and interface with other Contractors' Work.

.3 Provide all forms, templates, anchors, sleeves, inserts and accessories required to be installed in the Work. Set in place or instruct the applicable subtrade as to their location. Pay costs of extra work, if required, as a result of a failure to comply with these requirements at the proper time.

.4 Before starting his work and from time to time as the work progresses, each Subcontractor shall examine the work and materials installed by the other Subcontractors insofar as it effects his own work, and the General Contractor shall promptly notify the Consultant IN WRITING, if any condition exists that will prevent any Subcontractor from giving a satisfactory result in his own work.

.5 Should any Subcontractor start his own work without such notification, it shall be construed as an acceptance by him of all preceding work and as a waiver of all claims or questions as to its suitability for receiving his work.

1.8 CANADIAN PRODUCTS AND LOCAL LABOUR

.1 To the extent that the same are available and consistent with the proper economy and expeditious completion of the Contract, Canadian equipment, materials, products and other such applicable items are preferred by the Owner to be used in the Work, wherever possible and practical.

1.9 MATERIALS AND WORKMANSHIP

.1 All materials shall be new and the best of their respective kinds, where a specific grade or brand is not indicated. Pre-packaged materials shall be delivered and stored in unopened containers.

.2 All work performed under this Contract shall be done by mechanics skilled in their respective trades. They shall make use of such templates, jigs or special tools as may be required for the operation involved.

.3 The acceptance of any materials or workmanship shall not be a bar to their subsequent rejection, if found defective.

.4 Adequate, dry storage facilities shall be provided and all stored materials shall be protected from damage and theft.

.5 All Contractors will do Work in accordance with the best industry practice of the type of work specified, unless the Contract Documents stipulate more precise requirements, in which case, the more precise requirements shall govern.

.6 Do Work in a neat, plumb & square manner. Ensure that various work components are properly installed, forming tight joints and appropriately aligned junctions, edges and surfaces, free of warps, twists, waves, or other such irregularities.

.7 Wherever indicated on the drawings or specifications, or in the manufacturers' / suppliers' written instructions, arrange to have manufacturers' / installer's representatives inspect the Work which incorporates their materials, products or items.

.8 Do not permit materials to come in contact with other materials such conditions may result in corrosion, staining, discolouration or deterioration of the completed Work. Provide compatible, durable separators where such contact is unavoidable.

.9 The design of the Work is based on the full interaction of its component parts. No provisions have been made for conditions occurring during construction. Ensure that no part of the Work is subjected to a load which will endanger its safety or which might cause permanent deformation.

.10 Conceal pipes, ducts, conduit, wiring and other such items requiring concealment preferably in, wall or ceiling construction of all finished areas. If in doubt as to method of concealment, or intent of the Contract Documents in this regard, request clarification from the Consultant before proceeding with the Work.

.11 Lay out mechanical and electrical work well in advance of concrete placement and furring installation to allow for proper concealment. Test and inspect Work before applying pipe covering and before it is concealed.

.12 Provide and maintain control lines and levels required for the Work. Lay out the Work in accordance with these lines and levels and dimensions indicated on the drawings.

.13 Verify lines, levels and dimensions and report any errors or inconsistencies on the drawings to the Consultants.

.14 Final responsibility of satisfactory completion of all the Work, however, lies with the General Contractor.

1.10 QUALITY CONTROL

.1 Refer also to Section 01 45 00.

.2 The Consultants and authorized Owner staff shall have access to all areas of the Work, including any off site construction facilities.

.3 The General Contractor shall give timely notice requesting inspection if Work is designated for special tests, inspections, or approvals by the Consultants, or any other authorized Owner staff or testing and Inspection Company.

.4 If the General Contract covers, or permits to be covered Work that has been designated as outlined above, he shall uncover such work, have the inspections and tests satisfactorily completed and make good such work at no additional cost to the Owner.

.5 The Consultants or the authorized Owner Staff may order any part of the Work to be examined, if such Work is suspected not to be according to the Contract Documents. If,

upon examination, such work is found not to be in accordance with the Contract Documents, then the General Contractor shall correct such Work and pay for cost of examinations and correction. If such Work is found to be in full accordance with the Contract Documents, the Owner shall pay for the cost of examination and making good.

.6 If defects are revealed during inspection and/or testing, the appointed agency may request additional inspection and/or testing to ascertain the full degree of defects. The General Contractor shall correct the defects and irregularities as reported by the inspection and/or testing agency, at no additional cost to the Owner and the General Contractor shall pay all associated costs for retesting and reinspection.

.7 The General Contractor shall provide any tools, materials or equipment that may be required by the inspection and/or testing agencies in retesting the Work (*e.g.* Video camera rental to reinspect incorrectly installed sewer lines.)

.8 The employment of inspection and/or testing agencies does not, in any way, affect the General Contractor's responsibility to perform the Work in strict accordance with the Contract Documents.

.9 The General Contractor shall remove all defective work, whether the result of poor workmanship by him or his subtrades, use of defective or damaged products, whether or not incorporated into the Work and any Work that has been rejected by the Consultants or authorized Owner Staff as failing to conform to the Contract Documents. Replacement and execution of the affected Work shall be done in full accordance with the Contract Documents, making good other trades' work damaged by such removals or replacements at no additional charge to the Owner.

.10 If, in the opinion of the Consultant and/or the authorized Owner Staff, it is not expeditious to correct the defective Work, or Work not performed in accordance with the Contract Documents, the Owner, may, at its sole discretion, deduct from the Contract Price, the difference in value between the work performed and that required by the Contract Documents, the amounts of which shall be determined by the Consultant.

.1 The notable exception to the above item is a faulty installation of base and asphalt paving. If, the inspection agency, after performing random test holes to determine compaction and thickness of sub base, base and asphalt, determines that either one or both, are not according to what was specified in the Contract Documents, the Owner will not accept credits for such inconsistencies but rather, demand that any such installation be removed and redone in its entirety, at the pleasure and convenience of the Owner, but within the first year of the warranty period.

1.11 OVERTIME AND OVERTIME SCHEDULING

.1 The General Contractor must include in his Total Stipulated Tender Price, all costs for overtime work which may be necessary to complete the various portions of the Work, in accordance with the Completion Dates specified in the contract documents. The Owner shall not entertain requests for any payments in connection with overtime work that may be required by the General Contractor, or any of his subtrades, in order to comply with the above referenced dates.

.2 Similarly, it is the Contractor's responsibility to ensure, prior to the close of tenders that all subtrades will meet the requirements for overtime, as required, with no additional

costs to the owner, in order to meet the Completion Dates specified in the Form of Tender.

.3 The contractor shall recognize the critical importance that the schedule for full occupancy must be met by the dates stated in the contract documents. Note that local by-laws may be enforced restricting morning and evening and Sunday work hours.

.4 Note that at no time will the Owner entertain additional charges or claims from the General Contractor or his subcontractors for premium, overtime or after–hours work.

.5 Only claims for scope changes or conditions beyond the control of the Contractor may be submitted for review by the Consultants and must be submitted and accepted in advance of the work taking place and at the outset of the condition or scope change arising. No claims additional charges or delays will be accepted if not reviewed and formally accepted in advance.

1.12 PROTECTION OF OTHER WORK

.1 Each trade shall avoid damage to other trades and shall take all measures necessary and provide all masking and materials necessary, to provide adequate protection.

.2 Each Subcontractor shall be held responsible for all damage to work installed by others that is caused by this work or by anyone employed by him.

.3 Patching and repairing of damaged work shall be done by the Contractor who installed the work, as directed by the Consultant, but the cost of same, shall be paid for by the Contractor who is responsible for the damage.

1.13 FASTENINGS

.1 All fastenings must be permanent, of same metal, or compatible with any metals with which they are in contact, of adequate size and spacing, to ensure permanent anchorage against load or shear.

.2 Exposed fastenings must be evenly spaced, neatly laid out and must not mar surfaces of prefinished materials.

.3 No ram-setting or similar techniques will be permitted, without prior written approval of the Consultant.

1.14 SUPPLY AND INSTALL

.1 Unless specifically noted, "*supply only*", any reference to supply intends the supply and installation of material or item so noted.

1.15 GENERAL REQUIREMENTS

.1 All Contractors shall examine carefully all drawings and specifications to inform themselves fully of all conditions and limitations pertaining to the work of the contract.

.2 All Contractors shall co-operate and co-ordinate their work for the proper completion of the work, including co-ordination of delivery dates and commencement of subtrades work.

.3 The responsibility and costs for all work, including temporary structures, shoring, shoring design (if applicable) and erection shall at all times rest with the General Contractor and his Subcontractors. The Consultant will review construction methods and shop drawings for general arrangements only. The method of obtaining the results contemplated by the Contract Documents shall be determined by the General Contractor.

.4 The undertaking of period site review by the Consultant or Owner Representative shall not be construed as supervision of actual construction, nor make them responsible for providing a safe place for work, visit, use, access, travel, or occupancy of the Consultant's or Owner's employees or agents.

.5 The General Contractor shall be fully responsible for coordinating and expediting the work of all Subcontractors and shall employ the necessary and qualified personnel to provide the required quality of labour and materials and to prevent delays in the progress of the project. Each trade shall be afforded all reasonable opportunities for the installation of its work and for the storage and handling of its materials.

1.16 COORDINATION

.1 The General Contractor shall coordinate all work and preparation on which subsequent work depends to facilitate mutual progress, and to prevent any conflict.

.2 The General Contractor shall ensure that each trade makes known, for the information of the General Contractor and other trades, the environmental and surface conditions required for the execution of its work; and that each trade makes known the sequence of others' work required for installation of its work.

.3 The General Contractor shall ensure that each trade, before commencing work, knows the requirements for subsequent work and that each trade is assisted in the execution of its preparatory work by trades whose work depends upon it.

.4 The General Contractor shall ensure that shop and layout drawings, templates, and all information necessary for the location and installation of materials, openings, inserts, anchors, accessories, fastenings, connections and access panels are provided by each trade whose work requires cooperative location and installation by other trades and that such information is communicated to the applicable installer.

.5 The General Contractor shall ensure that delivery of materials supplied by one trade to be installed by another is well before the installation begins.

.6 The General Contractor shall inform all trades that giving installation information in error, or too late to incorporate in the work, shall be responsible for any extra work caused thereby, unless impractical and where required, cutting shall be done by each respective trade, and patching shall be done by the general contractor.

1.17 ACCESS TO THE PROJECT

.1 The General Contractor for this Work shall, at all times allow the Consultants, the Owner, or any other Owner commissioned contractor or their employees, access into the building or around the premises, undisturbed, whether union or non-union, as may be required in the execution of other portions of the building work and installation of equipment, etc.

.2 The General Contractor shall cooperate fully with any and all Owner commissioned Contractors.

1.18 SUBTRADE AWARDS

.1 The Contractor shall, on notice of award of the contract, obtain the Consultants approval of a complete list of all persons or firms to which he proposes to sublet any part of the work, the trades or divisions of work which are to be sublet to each, and the amount of each trade. The General Contractor shall provide to the Consultant a financial breakdown showing all divisions of the work amounting to the full sum of the contract. Mechanical and Electrical trades shall be further broken down as specified in Divisions 26 and 33.

1.19 SAFETY DATA SHEETS

.1 The General Contractor shall ensure that the following material and safety data sheets are submitted prior to commencing installation and application of at least the following:

.1 Lead-free solder
.2 Resilient flooring
.3 Painting and finishing
.4 Fertilizers
.5 Glues and adhesives
.6 Pesticides
.7 Herbicides
.8 Any other product which may give off air borne particles after installation.
.9 Sealants and caulking

.2 The General Contractor and all of his Subcontractors must note that specifically, Asbestos and Asbestos containing materials solder for piping containing lead, and Painting & Coatings containing lead and/or mercury must be excluded from any part of the Work.

.3 The General Contractor must submit Certificates of Compliance, prior to the application for Substantial performance, for each of the following items:

.1 An affidavit relative to the use of Lead-free solder for all domestic water lines, regardless of location.
.2 Products for which Material Safety Data Sheets have been submitted and accepted.
.3 Other Work/Products identified in the Contract Documents as requiring a Certificate of Compliance.

.4 Each Certificate of Compliance must indicate names and addresses of the project, the Owner, the date of Issue, produce description including name, number, manufacturer,

with a statement verifying that the Work/Product installed meets specified requirements and, if applicable, complies with the submitted and accepted Material Safety Data Sheets.

.5 Each Certificate of Compliance must be issued on the trade's letterhead, properly executed, under whose work the respective Work/Product has been provided.

.6 Each Certificate of Compliance must be endorsed by the General Contractor with his authorized stamp/signature.

.7 The Completion Security Account will not be paid to the Contractor without submission of all required affidavits and requested material and safety data sheets.

1.20 REGULATING DOCUMENTS

.1 The General Contractor and all of his Subcontractors, Suppliers/Installers etc., must conform to the latest editions in force at the time of tender of each and all of the following: Ontario Building Code, Canadian Electrical Code (CEC), The Occupational Health and Safety Act, Ontario, the National Fire Code, the local Municipal Fire Code, and all other applicable Codes and Building By-Laws. All must also conform to the requirements of the Authorities Having Jurisdiction, such as Public Utilities. Where required under the Occupational Health and Safety Act, engage a Professional Engineer to design hoarding, scaffolding and shoring, formwork and falsework for concrete.

.2 Contract forms, codes, standards and manuals referred to in these specifications are the latest published editions at the date of close of tenders. The General Contractor and all of his Subcontractors, Suppliers/Installers must meet or exceed the requirements of specified standards.

.3 Provide, on site, copies of documents referred to in the Specification for joint use of Contractor and Consultant.

1.21 SITE SUPERINTENDENTS AND PROJECT MANAGERS

.1 It is the requirement under the work to this Contract that the Contractor provide an on-site, full-time, *Site Superintendent* while work is being performed, for the entire project duration through to the end of Deficiency completion. Superintendent shall have qualifications of previous experience with similar projects. Superintendent shall remain assigned full time to the project until completion of all deficiencies. This is a base bid requirement and the Contractor shall include this cost in the Tender Amount.

1.22 GENERAL CONTRACTOR'S RESPONSIBILITIES

.1 The list of General Contractor's responsibilities identified below is by no means comprehensive, nor is it in any priority or critical order. It is here, merely to identify the most often forgotten or ignored responsibilities of the General Contractor and is reproduced only as a reminder. The Consultants and the Owner advise the General Contractor that it is he who is responsible for all aspects and facets of the Project, from start to completion, from compliance with Occupational Health and Safety regulations to compliance with all codes and statutes.

.1 The General Contractor will be responsible to take all necessary steps to protect personnel (workers, visitors, general public, etc.) and property from any harm during the course of the contract.

.2 All equipment shall be in safe operating condition and appropriate to the task.

.3 Only competent personnel will be permitted on site. During the site introduction, *only the Consultant* will determine who is competent. The General Contractor will cause to remove from the site any persons not observing or complying with safety requirements.

.4 The General Contractor shall comply with, and shall ensure that all of his Subcontractors, Suppliers, Installers etc., comply with all Federal, Provincial and Municipal Safety Codes and Regulations and the Occupational Health and Safety Act.

.5 The General Contractor shall supply competent personnel to implement his safety program and ensure that all Subcontractors comply with the Owner's standards, and those of the Occupational Health and Safety Act.

.6 The Owner will provide periodic monitoring to ensure that safety requirements are met, and that safety records are properly kept and maintained. Continued disregard for safety standards can cause the Contract to be canceled and the General Contractor removed from the site.

.7 The Owner may hire Commissioners to perform inspections of building systems at the closing stages of the work of this contract. If so contracted and identified in the *Instructions to Bidders*, the General Contractor shall cooperate with and coordinate the work of the Owner's Commissioners on site.

.8 The General Contractor will report to the Owner and Jurisdictional Authorities any accident or incident involving personnel and/or property of the Contractor, Owner, or Public, arising from the General Contractor's or any of his Subcontractors' execution of the work.

.9 The General Contractor will include all provisions of this contract in any agreement with Subcontractors, and hold them equally responsible for safe work performance.

.10 If the General Contractor is responsible for a delay in the progress of the work due to an infraction of legislation or Owner Health and Safety requirements, the Contractor will, without additional cost to the Owner, work such overtime, and acquire and use for the execution of the work such additional labour and equipment as to be necessary in the sole opinion of the Owner's Representative and Consultant, to avoid delay in the final completion of the work or any operations thereof.

1.23 MANUFACTURERS' INSTRUCTIONS

.1 Unless otherwise specified, the General Contractor and all his Subcontractors shall comply with manufacturer's latest printed instructions for materials and installation methods.

.2 The General Contractor shall notify the Consultant in writing of any conflict between the Specifications and Manufacturer's Instructions and have same clarified.

1.24 FIRE SAFETY

.1 The General Contractor and all of his Subcontractors must comply with requirements of standard for Building Construction Operations FC No. 301-1982, issued by the Fire Commissioner of Canada.

.2 The appropriate clauses of the Ontario Building Code relating to fire protection shall be strictly followed.

.3 The General Contractor shall provide and maintain free access to temporary or permanent fire hydrants acceptable to local fire department.

1.25 CONSTRUCTION SAFETY

.1 The General Contractor and all his trades must observe and enforce construction safety measures required by Canadian Construction Safety Code, Workplace Safety & Insurance Owner, and Municipal statutes. In particular, the Ontario Construction Safety Act, the regulations of the Ontario Department of Labour and Ontario Hydro Safety Requirements shall be strictly enforced. In event of conflict between any provisions of above authorities the most stringent provisions will apply.

.2 The General Contractor is reminded that it is he who is responsible for Occupational Health and Safety on this Project. The items listed below are only guidelines of the Owner's expectations in this regard and not to be construed to be comprehensive or total in nature.

.3 The Owner will take every reasonable precaution to prevent injury or illness to students, employees and the public, participating in Owner activities, or performing their duties. This shall be accomplished by providing and maintaining a safe, health working environment by providing the education necessary to perform these activities or duties safely.

.4 The Owner is vitally interested in the health and safety of all Contractors and their workers performing work for the Owner. Cooperation and support of the General Contractor in the protection of workers from injury or occupational disease is a major, continuing object of the Owner. To achieve these goals, the Owner, in concert with the Contractors, will endeavor to make every effort to ensure that the Contractors provide a work site which is a safe and healthy work environment. The Owner insists that all Contractors and their workers are dedicated to the continuing objective of reducing risk and injury.

.5 The General Contractor covenants and agrees to comply with all statutory and other obligations, including, without limitation, the provisions of the Occupational Health and Safety Act (Ontario) and all Regulations thereto, and all amending and successor legislation, including without limitation, Bill 208 (the "Act") in connection with all work performed by either the Contractor, Subcontractors, or any Other Contractor on, or in connection with, the Project.

.6 Without limiting the foregoing, for the purposes of this Contract, the General Contractor agrees that he shall be the "constructor" of the Project within the meaning of the Act, and as such, shall assume all the obligations and responsibilities, and observe all construction safety requirements and procedures, and duties of inspection imposed by the Act on the

"constructor", as therein defined, for all work and services performed by the General Contractor, Subcontractors and Other Contractors on or in connection with the Project.

.7 The General Contractor further covenants and agrees that the Owner and its existing and former officers, trustees, employees and agents, and their respective heirs, executors, administrators, successors and assigns (hereinafter collectively referred to as the "Owner") shall be released from any obligations or liabilities otherwise imposed on the Owner, or on any of them, pursuant to the Act in connection with the Project, and that the General Contractor shall assume all liability and responsibility in connection with same.

.8 The General Contractor agrees to save harmless and indemnify the Owner from any losses, damages, costs and expenses of any kind, or nature whatsoever, including all legal expenses, and all defense costs and related expert or consulting fees, incurred by the Owner, or any of them, arising in connection with the failure, default, or inability of the General Contractor of the Owner, or any of them, to comply with any of the aforementioned statutory, or other legal requirements, or arising in connection with any breach by the General Contractor of any of its covenants, agreements and obligations under this Contract.

.9 The General Contractor shall inform and instruct Other Contractors that they, while performing work on this project, are under the authority of the Contractor. Other Contractors are to discuss and co-ordinate with, and follow instructions from, the General Contractor on all matters of site access, vehicles, deliveries, storage, temporary facilities, coordination with the work of other subcontractors, work methods, scheduling, labour conditions, construction safety, environmental protection, security and all other matters which relate to the safe and proper execution of construction work.

.10 The General Contractor shall ensure that all supervisory personnel on job site are fully aware of the procedures and requirements outlined above and comply with all requirements specified.

.11 All Contractors are responsible to ensure that all machinery and/or equipment are/is safe and that the workers perform their tasks in compliance with established safe work practices or procedures. Workers must receive adequate training in their specific work tasks to protect their health and safety.

.12 The General Contractor shall be responsible for all persons and companies performing work, including Other Contractors, on this project, at all times, up to and including, the date of Substantial Performance of the Work. Authority for coordination and instructions relating to all matters which relate to the safe and proper execution of construction work shall rest with the General Contractor. The Contract Price must include the General Contractor's fees for the coordination and supervision of the work of all Other Contractors.

.13 In addition to the responsibility of all contractors as outlined above, Subcontractors will be held accountable for the health and safety of workers under their supervision.

.14 Every worker must protect his/her own health and safety by working in compliance with the law and with safe work practices and procedures established by the authorities having jurisdiction.

.15 All sections of the Occupational Health and Safety Act for Industrial Establishments, latest edition, and the Occupational Health and Safety Act for Construction projects, latest edition, shall be enforced, by the General Contractor, in their entirety, throughout the duration of the construction project.

.16 The General Contractor shall provide the Consultant with the telephone number where the General Contractor or his representative can be reached at any time, day or night, for the duration of the contract.

.17 Where an accident, explosion, or fire causes a person injury at the work place, and the worker is disabled from performing the usual task, the General Contractor shall prepare a written notice and shall forward same to the Ministry of Labour within four days of the occurrence with a copy to the Owner's Representative, who shall copy and inform the Owner's Supervisor of Health and Safety and/or the Owner's Joint Health and Safety Committee, containing such information and particulars as may be described.

.18 Where a person is killed or critically injured from any cause at the work place, the General Contractor shall immediately call the Ministry of Labour. A written notice from the General Contractor shall be given to the Ministry of Labour within forty-eight hours after the occurrence, containing such information and particulars as may be prescribed, with copies to the Architect and the Owner's Representative.

.19 The General Contractor is advised that the accident scene is under the jurisdiction of the Ministry of Labour and no wreckage, articles, etc., shall be interfered with, disturbed, destroyed, altered or carried away at the scene, or connected with the occurrence, until the Ministry of Labour has given permission.

1.26 INDEPENDENT TESTS AND INSPECTIONS

.1 The Contractor shall appoint inspection firms as directed by the Consultant and make payments from the cash allowances specified in Division noted, except for the following, which shall be included in the contract:

- .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 mechanical and electrical equipment and systems.
- .4 Mill tests and certificates of compliance.
- .5 Re-testing as already described in *Quality Control* of this Section.

.2 The Consultant will authorize payment of inspection services from specified cash allowances.

.3 The General Contractor shall furnish labour and facilities to:

- .1 Provide access to work to be inspected and tested.
- .2 Facilitate inspections and tests.
- .3 Make good work disturbed by inspection and test.
- .4 Pour concrete test cylinders and store as directed by Inspection Firm.

.4 The General Contractor shall notify Inspection Firms sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

.5 Where materials are specified to be tested, the General Contractor shall deliver representative samples in required quantity to testing laboratory.

1.27 TEMPORARY PROTECTION

.1 Refer also to Articles 1.8, in this Section.

.2 The General Contractor to provide temporary dustproof and fire resistant barricades, screens or barriers to separate all work areas from other parts of the building and/or as directed by the Consultant and/or authorized Owner Representative, for the safety of persons, or for dividing the Work from portion or portions of the building or site that may be required for use by the public.

.3 Properly protect the Work from any damage by the elements. In cold weather cover all exterior openings in the work areas likely to cause water damage.

.4 During off hours and/or stages of suspended operations for whatever reasons, the General Contractor must assume all responsibility for protection against the elements, theft and/or vandalism. This applies to all work in progress and to any materials, products, tools, equipment, or other such items left at the work site.

.5 Properly protect floors and roofs from any damage. Take special precautions when moving heavy loads or equipment over floors and roofs.

.6 The General Contractor must keep floors free of oils, grease or other such materials likely to discolour them and/or affect bonding of applied surfaces.

.7 The General Contractor must ensure that no part of the Work is loaded greater than it was designed for, when completed. Make any temporary support as strong as the permanent support. Place no load on concrete structure until it has sufficient strength to safely bear such load.

.8 Protect glass and other finishes against heat, slab and weld splatters, using appropriate protective shields and covers.

.9 The General Contractor must provide and maintain, in good working order, appropriately labeled ULC fire extinguishers, to the approval of Authorities Having Jurisdiction.

.10 The General Contractor must provide a minimum of two safety helmets on site at all times for the use of the Consultant and any other Owner authorized visitors to the site. It is the General Contractor's responsibility to make certain that any such visitors wear the protective headgear and any other safety gear which may be necessary at that particular time of construction.

1.28 COMPLETION

.1 Upon completion of the Work, all protection erected shall be removed, all damage to the Work and adjoining Work due to the lack or failure of such protection shall be made good and all debris, surplus materials tools equipment shall be removed from the work

areas and the site, and the Project shall be left clean and tidy to the full and complete satisfaction of the Consultant and Owner Staff. The General Contractor shall give written notice to the Consultant, requesting final inspection of the completed Project.

1.29 Changes to the Work shall be added to, or deducted from, from the Board approved Contract. The Contract shall be adjusted by Board approval. Crediting the Contract with any unused portion CASH ALLOWANCES will occur once at the end of the project.

.1 Include in the Contract Price, a stipulated sum Cash Allowance **in the amount of $35,000.00 (as noted in DDSB Front End Documents).**

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

.3 The Contract Price, *and not the Cash Allowance*, includes the General Contractor's profit and coordination costs in connection with all Cash Allowance expenditures.

.4 The Contract Price will be adjusted by written order by the Consultant to provide for an excess or deficit to each Cash Allowance. Any unused portions of these allowances shall be returned to the Board on the conclusion of the Contract.

.5 A schedule shall be prepared jointly by the Consultant and the General Contractor to show when items called for under Cash Allowance, so that the progress of the Work is not delayed.

.6 Exclusive of Deposits, which are the contractor's sole responsibility to provide as required of Authorities Having Jurisdiction, the following is a summary of the scope Cash Allowances to be included in the contract:

.7 Expend the Cash Allowance as directed by the Consultant in writing. Allowance will be adjusted to actual cost with no adjustment to Contractor's charges. Cash expenditure must identify the H.S.T. separately.

.8 **Cash Allowance - General**

.1 Controls and Pneumatic Demolition
.2 PA and Security
.3 Unforeseen Abatement not noted in DSR Report
.4 Additional unforeseen cutting, patching and terrazzo repair not noted in documents

1.30 ALLOWANCES CARRIED IN DIVISIONS 15 AND 16

.1 No Additional Cash Allowances are included in the work of Divisions 15 and 16.

1.31 SCHEDULE OF ALLOWANCES

.1 Material Allowances shall include the following:

.1 Net cost of Material

.2 Applicable taxes and duties

.3 Delivery to site

.2 For Material Allowance, the contract shall include:

.1 Handling at site, including unloading, uncrating, storage and hoisting

.2 Protection from elements, from damage

.3 Labour, installation and finishing

.4 Other expenses required to do cash allowance work (i.e. contract co-ordination)

.5 Overhead and profit

.3 Material and Installation Allowances shall include the following:

.1 Net cost of material

.2 Applicable taxes and duties

.3 Deliver to site

.4 Handling at site, including unloading, uncrating, storage and hoisting

.5 Labour, installation and finishing

1.32 POLYCHLORINATED BIPHENYL (PCB)

.1 Conform to the Environmental Protection Act and Regulations, Ontario Regulation 11/82 as amended.

1.33 USE OF CONSULTANTS'S DIGITAL DRAWINGS

.1 Where a contractor wishes to obtain a digital copy of consultant drawings for shop drawings or survey purposes, the consultant may elect to provide this drawing for a nominal fee. As this is the consultants' option, the contractor shall not anticipate provision of these digital drawings to meet the contract schedule.

1.34 DIMENSIONS

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

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

.3 Check and verify all dimensions referring to the work and the interfacing of all services. Verify all dimensions, with the trade concerned when pertaining to the work of other trades. Be responsible to see that Subcontractors for various trades co-operate for the proper performance of the Work.

.4 Avoid scaling directly from the drawings. If there is ambiguity or lack of information, immediately inform the Consultant. Be responsible for any change through the disregarding of this clause.

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

.6 Advise Consultant of discrepancies and if there are omissions on drawings, including layout of items which affect aesthetics, or which interfere with services, equipment or surfaces. DO NOT PROCEED without direction from the Consultant.

.7 Prepare interference drawings AND SUBMIT AS SHOP DRAWINGS IN ADVANCE OF PRODUCTION to properly co-ordinate the work in all ceiling spaces and where necessary. Coordinate these drawings with all Divisions. Refer also to Section 013300.

1.35 SETTING OF WORK AND REQUIRED SURVEYS

.1 If required by the work, as part of the base tender amount, provide and pay for the services of a Land Surveyor acceptable to the Consultant, registered in the Province of Ontario to establish the property boundaries and the location of the building addition.

.2 Lay out building lines for the work and provide substantial stakes, batter Owners or monuments to preserve lines and levels.

.3 Verify on the site all grades, lines, levels, dimensions and location of hydrants, existing structures, manholes, overhead and buried utilities, existing trees, roadways, sidewalks and the like, shown on the drawings, and report omissions, errors, or inconsistencies, before commencing work.

.4 Upon completion of layout work and before commencement of any excavation, give ample notification to allow for inspection of lines and levels. Such inspection does not in any way mitigate the Contractor's responsibility for accuracy of layout.

.5 Provide the consultant with a Surveyor’s Certificate describing the location of all perimeter foundation walls relative to property lines before construction proceeds on those walls.

1.36 LAYOUT OF WORK

.1 Layout work with respect to the work of all trades. Arrange mechanical and electrical work such as piping, ducts, conduits, panels, equipment and the like to suit the architectural and structural details.

.2 Alterations necessary due to conflict and interference between trades, to be executed at no cost to the Owner unless notification is given in writing before Tender Closing Date.

1.37 DOCUMENTS REQUIRED AT START, DURING & CLOSE-OUT OF CONSTRUCTION

.1 At Commencement of Contract

.1 Supply Performance Bond and Labour and Material Bond, in accordance with contract Terms and Conditions.

.2 Supply Public Liability and Property Damage Insurance Certificates, also Builder’s Risk and Boiler Insurance as required of the Contract.

.3 Supply Certificates of good standing from WSIB for the General Contractor and all Subcontractors.

.4 Supply a complete Contract Sum Breakdown of all subtrades or parts of work and general expense items for approval by all consultants. Include Mechanical and Electrical Breakdowns for review and acceptance by Consultants.

.5 Supply a competent detailed Construction Schedule that has been reviewed and approved by major subtrades. Identify critical milestone dates for Renovations.

.6 Supply Schedule of Shop Drawing Submissions and identify list of long-lead items.

.7 Apply for and post and supply a copy of Notice of Project, if applicable.

.8 Supply a copy of Health & Safety policy as well as post at the job site.

.9 Supply Shoring Designs of all load bearing areas if any required of the construction sequence or if required by the Structural Engineer.

.10 Supply interference drawings for all areas requested by the Architect, Mechanical Engineer or Electrical Engineer.

.2 During Construction

.1 Maintain as-built record drawings in clean condition.

.2 Organize regular Trade Coordination meetings.

.3 Organize separate, regular Owner and Consultant Job Meetings in accordance with Section 012200.

.4 Maintain a copy of up to date records on site including, but not limited to Permit Sets, Contract Documents updated with all addenda, all Changes and Supplementary Instructions issued by Consultants.

.3 Monthly with Each Progress Payment Application

.1 Supply Monthly Progress Reports and Construction Schedule in accordance with Section 012200.

.2 Adjust Allowances, as required.

.3 Current WSIB Form

.4 Confirm that payments are being made to subcontractors and suppliers by submission of original copies of the current versions of Statutory Declarations with the second and subsequent Progress Payment Application. Include both Statutory Declarations Form CCDC-9A for the General Contractor and CCDC-9B from subcontractors with each monthly Progress Payment Application. No payment will be made for unincorporated material on the site, unless Bill of Sale in proper format is provided.

.4 Prior to Substantial Completion

.1 Provide detailed Completion Schedule a minimum of 90 days prior to Substantial Completion. Schedule to illustrate all trades and sequences required for completion and legal occupancy. Issue to Consultants and upon acceptance, to all trades.

.2 Coordinate Completion Schedule with Building Commissioner at least 60 days prior to substantial completion or as directed by Consultant.

.3 Prior and as a requirement of owner acceptance of Substantial Completion of the work the following to be observed, executed and submitted:

.1 DEFICIENCIES ARE LISTED: prior to Substantial Completion, the contractor shall prepare a room by room deficiency list in electronic format on an MS Excel spreadsheet provided by the Consultant. Contractor shall print and review on site with consultants at a site meeting and post on each room or area. Contractor shall reissue back to Consultant, when updated, in Excel electronic format. This list will be acted upon by all trades and coordinated

and updated weekly as a minimum by the General Contractor to ensure all deficiencies are addressed by the date required for Total Performance. Confirm in writing to the Architect when and on what dates each deficiency has been completed in a satisfactory manner. The Consultant's site review will be final approval.

.2 Acceptable preliminary submissions of all Mechanical and Electrical Operations and Maintenance Manuals have been reviewed by Consultants.

.3 Acceptable preliminary submissions of all Warranty and Shop Drawing Records have been reviewed by Consultants.

.4 All final clean-up to have been executed, as specified in Section 01 74 11.

.5 Complete preliminary balancing and provide preliminary Balancing Reports.

.4 Failure to comply with these requirements shall have amounts withheld on Progress Payments and delay issuance of Certificate of Substantial Completion.

.5 Note that Prior to the Release of Holdback, a similar Progress Claim is required, and must include current Statutory Declaration Forms CCDC-9A for the General Contractor and CCDC-9B from subcontractors updated to refer to the Previous Certificate of Payment.

.5 Upon Completion (Refer also to 01 78 00 Close-Out Submittals)

.1 Upon completion of work before the Final Certificate of Payment is issued, the following to be observed, executed and submitted:

.2 DEFICIENCIES ARE COMPLETE. Confirm in writing to the Architect when and on what dates each deficiency has been completed in a satisfactory manner. The Consultant's site review will be final approval.

.3 Organize a Final Inspection tour at which to be present: the Owner's authorized representative; the Architectural, Structural, Mechanical and Electrical Consultants, and their supervisory personnel, if any; the Contractor and his superintendent.

.4 Where the above procedure is impossible or where any deficiencies remain outstanding, the Owner's representative and the Consultant concerned, to inspect and accept the affected work and/or material upon notification by the Contractor, that all deficiencies involving this Consultant have been made good.

.5 A complete release of all liens arising out of this Contract, other than his own. If a subcontractor or supplier refuses to furnish a release of such a lien, furnish a bond satisfactory to the Owner to indemnify him against any claim under such a lien.

.6 Certificates of good standing from the WSIB, for the General Contractor and all Subcontractors.

.7 All reference records, as specified, under Section 01 78 00.

.8 Certificate of Inspection from Mechanical and Electrical Engineers.

.9 Copies of all Lists of Deficiencies with each Deficiency verified when complete by only this project's job Superintendent. The Final List of Deficiencies to be signed, completed by all concerned, if accepted.

.10 Statement of Completion from General Contractor.

.11 Final adjustment of all Allowances.

.12 Certificates required by Provincial, Municipal and other authorities having jurisdiction. Including signed Building Permit (if applicable).

.13 2 sets of marked up prints of complete Architectural, Structural, Mechanical and Electrical drawings in addition to the digital copies required below.

.14 Digital copy of Site Services, Architectural, Structural, Mechanical and Electrical and 2 sets As-Built Drawings

.15 Final copies of all Maintenance Manuals.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 PROJECT MEETINGS FOR COORDINATION

.1 In consultation with the Consultant not later than the second week of construction, arrange for site meetings weekly or every 2 weeks as appropriate to the stage of construction, for project coordination. Such meetings shall fall at the same time each week the meeting is scheduled.

.2 Responsible representatives of the Contractor's and Subcontractor's office and field forces and suppliers shall be obliged to attend.

.3 Inform the Owner, Consultant, and those others whose attendance is obligatory, of the date of each meeting, in sufficient time to ensure their attendance.

.4 Provide physical space for meetings, prepare an agenda, chair and record the minutes of each meeting. Relevant information must be made available to all concerned, in order that problems to be discussed may be expeditiously resolved. Identify "action by: _____".

.5 Within three days after each meeting, distribute two copies of the minutes to each invited person and regular distribution list to be issued by the consultant.

1.2 PRECONSTRUCTION MEETING

.1 Within 5 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Include in the agenda the following:

- .1 Appointment of official representative of participants in the Work.
- .2 Site Safety and Security
- .3 Scheduling of Work. Schedule to include a detailed breakdown of mechanical and electrical works.
- .4 Interference with ongoing business.
- .5 Work by other Contractors.
- .6 Schedule of submission of shop drawings and samples.
- .7 Requirements for temporary facilities, site sign, offices, storage sheds utilities.
- .8 Delivery schedule of specified equipment and identification of long-lead or other critical items.
- .9 Site security.
- .10 Procedures for Contemplated change notices, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
- .11 Record drawings.
- .12 Maintenance manuals.
- .13 Take-over procedures, acceptance, warranties.

.14 Monthly progress claims, administrative procedures, photographs, holdbacks.

.15 Appointments of inspection and testing agencies or firms.

.16 Insurances, transcript of policies.

.17 Schedule for progress meetings.

1.3 PROJECT MEETINGS FOR PROGRESS OF WORK

.1 Conduct progress meetings in accordance with the schedule and/or decisions made at Preconstruction meeting.

.2 Inform the Owner, Consultant, project consultants, Subcontractors and suppliers and those whose attendance is obligatory, of the date of the meeting, in sufficient time to ensure their attendance.

.3 Include in the agenda the following:

.1 Site Safety and security record or incidents.

.2 Review, approval of minutes of previous meeting.

.3 Review of Work progress since previous meeting.

.4 Field observations, problems, conflicts.

.5 Problems which impede construction schedule.

.6 Review of off-site fabrication delivery schedules.

.7 Corrective measures and procedures to regain projected schedule.

.8 Revisions to construction schedule.

.9 Progress during succeeding work period as a “two-week look ahead”.

.10 Review submittal schedules: expedite as required.

.11 Maintenance of quality standards.

.12 Pending changes and substitutions.

.13 Review proposed changes for effect on construction schedule and on completion date.

.14 Other business.

1.4 PROGRESS RECORDS

.1 Maintain a permanent written record on the site of the progress of the work using standard OGCA form. This record shall be available to the Consultant at the site, and a copy shall be furnished to same on request. The record shall contain:

.1 Daily weather conditions, including maximum and minimum temperatures.

.2 Dates of the commencement and completion of stage or portion of the work of each trade in each area of the project.

.3 Conditions encountered during excavation.

.4 Dates of erection and removal of formwork, in each area of the project.

.5 Dates of pouring the concrete in each area of the project, with quantity and Particulars of the concrete.

.6 Work force on project daily per trade and active hours.

.7 Visits to site by personnel of Consultant, Jurisdictional Authorities and testing companies.

1.5 PROGRESS REPORTS

.1 Submit to the Consultant, Monthly Progress Reports consisting of a concise narrative and a marked-up summary schedule showing physical percentage complete by item and in total. These progress calculations must agree with the Progress Payment Claims. masonry; mechanical, finishing trades and the like. Include with this submission the digital schedule referenced below

1.6 DIGITAL PROJECT SCHEDULES

.1 At the outset of the project, General Contractor to provide and maintain a digital project schedule including Milestone Dates and listing all trades.

.2 Update and issue to Consultant in hard copy and electronic copy not less than monthly and at each Progress Draw. To be issued in format compatible with Microsoft Project program.

.3 At 70% completion, or 16 weeks prior to Substantial Completion, whichever comes first, Project develop a detailed Completion Schedule outlining final coordination and sequences to completion.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Shop drawings and product data.

.2 Samples and mock ups.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

1.3 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2- 2020 Stipulated Price Contract

1.4 SHOP DRAWINGS AND PRODUCT DATA

.1 Refer to CCDC 2 General Conditions.

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

.3 Drawings to be originals prepared by Contractor, Subcontractor, Supplier or Distributor, which illustrate appropriate portion of work; showing fabrication, layout, setting or erection details as specified in appropriate Sections.

.4 Identify details by reference to sheet and detail numbers shown on Contract Drawings.

.5 Maximum sheet size 606 x 909 mm.

.6 Reproductions for submissions: opaque diazo prints.

.7 Submit to Architect, for review, shop drawings, product data and samples specified.

.8 Until submission is reviewed, work involving relevant product must not proceed.

1.5 PROJECT DATA

.1 Certain specification Sections specify that manufacturer's standard schematic drawings, catalogue sheets, diagrams schedules, performance charts, illustrations and other standard descriptive data will be accepted in lieu of shop drawings.

.2 Above will only be accepted if they conform to following:

.1 Delete information which is not applicable to project.

.2 Supplement standard information to provide additional information applicable to project.

.3 Show dimensions and clearances required.

.4 Show performance characteristics and capacities.

.5 Show wiring diagrams (when requested) and controls.

1.6 COORDINATION OF SUBMISSIONS

.1 Review shop drawings, product data and samples prior to submission.

.2 Verify:

.1 Field measurements.

.2 Field construction criteria.

.3 Catalogue numbers and similar data.

.3 Co-ordinate each submission with requirement of work and Contract documents. Individual shop drawings will not be reviewed until all related drawings are available.

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

.5 Contractor's responsibility for deviations in submission from requirements of Contract documents is not relieved by Architect's review of submission, unless Architect gives written acceptance of specified deviations.

.6 Notify Architect, in writing at time of submission, of deviations from requirements of Contract documents.

.7 After Architect's review, distribute copies.

1.7 SUBMISSION REQUIREMENTS

.1 Schedule submissions at least fourteen (14) days before dates that reviewed submissions will be required to be returned.

.2 Submit one reproducible transparency, plus six (6) opaque diazo copies of shop drawings, product data to Architect for review.

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

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Number of each shop drawing, product data and sample submitted.

.5 Other pertinent data.

.4 Submissions must include:

.1 Date and revision dates.

.2 Project title and number.

.3 Name of:

.1 Contractor.

.2 Subcontractor.

.3 Supplier.

.4 Manufacturer.

.5 Separate detailer when pertinent.

.5 Identification of product or material:

.1 Relation to adjacent structure or materials.

.2 Field dimensions, clearly identified as such.

.3 Specification Section number.

.4 Applicable standards, such as CSA or CGSB numbers.

.5 Contractor's stamp, initialed or signed, certifying review of submission, verification of field measurements and compliance with Contract documents

1.8 INTERFERENCE DRAWINGS

.1 Prepare interference drawings for all work in confined space: all typical ceiling space conditions and atypical conditions. Coordinate with all trades.

.2 Submit as shop drawings in advance of fabrication or installation of components. Site conditions requiring corrections, due to failure to provide interference drawings as required will be corrected at no additional cost to the owner.

.3 Ceiling heights and bulkheads will not be revised during construction due to failure to prepare interference drawings.

1.9 SHORING DESIGN DRAWINGS

.1 If required as part of this project, or due to construction sequence, it is the contractor’s responsibility to provide in advance of any work requiring shoring, detailed Shoring design drawings bearing the seal of a Professional engineer registered in the Province of Ontario and also a Method Statement describing the work sequence.

.2 Submit to the Consultants as shop drawings in advance of the work.

1.10 SHOP DRAWINGS BEARING THE SEAL OF A PROFESSIONAL ENGINEERS

.1 In addition to any the similar requirements for shop drawings of any mechanical or electrical systems, Shop Drawings for all structural components or components required to perform in conjunction with other structural or building envelope components, cladding and the like shall bear the seal of a professional engineer licensed in the Province of Ontario.

.2 In addition, all components to be attached to or suspended from the walls and ceiling areas shall also bear the seal of a professional engineer licensed in the Province of Ontario. This shall include but not be limited to the following:

.1 Stage drapery and rigging

.2 Stage lighting system

.3 Gymnasium equipment such as basketball backstops

.4 Projection screen supports

1.11 LIST OF SAMPLE OR MOCK-UP SUBMITTALS

.1 At the outset of the project the contractor shall prepare a comprehensive list of all shop drawings, sample submissions and mock ups required.

.2 For assistance only, the following samples and mock up items to be provided are included but not limited to the list following (note this is not exclusive of data sheets and shop drawings):

.1	04 21 13	Concrete and Brick Masonry	samples, mock-up (2m x 2m)
.2	04 21 13	Masonry Accessories	samples
.3	04 22 00	Concrete Masonry	samples
.4	06 10 11	Rough Carpentry	samples (300mm long)
.5	06 40 00	Architectural Woodwork	samples (300mm x 300mm)
.6	06 47 00	Plastic Laminates	samples
.7	07 11 13	Bituminous Waterproofing	mock-up (3m x 2m)
.8	07 21 13	Board Insulation	samples
.9	07 27 10	Air Barriers	samples
.10	07 4143	Aluminum Composite Panels	samples
.11	07 81 00	Applied Fireproofing	samples (300mm x 300mm)
.12	07 84 00	Firestopping	samples (300mm x 300mm)
.13	07 92 10	Joint Sealing	samples and mock up
.14	08 44 13	Glazed Aluminum Curtain Walls	samples, mock-up
.15	08 71 10	Finish Hardware	samples
.16	08 80 50	Glazing	samples (300 x 300)
.17	09 30 13	Ceramic Tiling	samples
.18	09 51 13	Acoustical Panel Ceilings	samples (300 x 300)
.19	09 65 19	Resilient Tile Flooring	samples
.20	09 68 00	Carpeting	samples (225 x 225)
.21	09 84 10	Acoustic Wall Treatment	samples (300 x 300)
.22	09 91 22	Painting	draw downs, mock-up
.23	10 11 25	Manufacturer Specialties	samples
.24	10 14 10	Exterior Building Panel Signage	samples
.25	10 21 20	Laminated Plastic Toilet Partitions	samples
.26	10 22 27	Folding Panel Partitions	samples
.27	12 35 51	Music Education Storage Casework	samples
.28	12 35 53	Wood Laboratory Casework	samples, mock-up
.29	31 23 10	Excavating, Trenching and Backfilling	samples
.30	32 12 17	Asphalt Paving	samples
.31	32 13 10	Unit Paving on Sand Bed	samples
.32	32 31 13	Chain Link Fences and Gates	samples
.33	32 91 21	Imported Topsoil	test reports and samples

1.12 SUBMISSIONS TO INSPECTION AGENCIES

.1 Note that Millwork shop drawings are to be submitted to AWMAC as part of the Guarantee Inspection program.

.2 Note that Paint formulations specified are to be submitted to the OPCA with set up documentation upon award of Contract.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Health and safety considerations required to ensure due diligence towards health and safety on construction sites, and meets the requirements laid out Occupational Health and Safety - Construction.

1.2 RELATED SECTIONS

.1 These specifications apply to all divisions of this project specification. It is the responsibility of the Contractor to apply these provisions wherever practical within specification limits to all products and services used on this project.

.2 Recognized that currently specified materials and methods may conflict with the basic intention of this section. Where reasonable alternate materials and methods exist that are not specified here, and that do not compromise quality or create additional cost for the Owner, notify the Consultant of such alternate materials or methods. Do not proceed to use alternate materials or methods to those specified without the express approval of the Consultant.

.3 Elsewhere, apply the provisions of this section to all work. Exceptions can only be made when signed off by the Consultant. Suitability of all products used is the responsibility of the Contractor.

1.3 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 Ontario

.1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O.

1.4 COMPLIANCE SPECIFICATION

.1 The Contractor must comply with all applicable health, safety and environmental regulations.

1.5 BEYOND COMPLIANCE SPECIFICATION

.1 These specifications apply in addition to all applicable health, safety and environmental compliance regulations. They are incorporated here to reflect the Owner’s intention to develop a specification which maximizes environmentally “friendly” materials and methods wherever possible within current technical and budget limitations.

.2 Beyond compliance specifications recognize that performance well beyond the minimum regulatory standard is often desirable, possible and affordable, often with no cost or low

cost options. It also recognizes that application methods or protocols may be as important as the material specified. Therefore these specifications cover both material and methods.

.3 The primary goal of beyond compliance specification is to reduce the use of products or methods which have negative health and environmental impacts both during and after construction. These considerations may include full life cycle impacts, associated with raw materials, manufacturing, transport, deconstruction and their eventual fate.

.4 These specifications will specifically address primary categories of readily identifiable products, ingredients and methods.

.5 These provisions apply to both indoor and outdoor applications equally.

1.6 EXCEPTIONS

.1 These specifications recognize that not all substitutes are equal and therefore exceptions can be made based on substantive evidence of necessary and superior performance. Special considerations may be given to restricted substances when secondary provisions are made such as sealed in place (contained) applications. All such exceptions must be approved in writing by the Consultant.

1.7 PRODUCTS OR SUBSTANCES TO BE AVOIDED OR LIMITED IN USE

.1 No product containing the following substances may be used on this project when an equivalent product without or with a lower concentration of this substance is suitable and available. All products containing substances which are known to cause health effects including but not limited to cancer, mutagenic, neurological, or behavioral effects should be avoided if suitable substitutes not containing or containing lower concentrations are available. This provision shall be limited to information contained on Material Safety Data Sheets, therefore MSDS sheets must be reviewed for all products for which such sheets are required. Applications for exceptions must be accompanied by related MSDS and product application and performance sheets, clearly showing a need for the exception.

1.8 VOLATILE ORGANIC COMPOUNDS

.1 No product containing volatile organic compounds (in over simplified terms volatile petro chemical or similar plant derived solvents) may be used on this project when a suitable non VOC or failing that a low VOC substitute is available. Manufacturers may refer to the U.S. EPA definition of VOC's for guidance or alternatively use the low molecular weight organic compound descriptor.

.1 Example: Paints, Coatings, Primer, Adhesives, Chalks, Firestops, etc.

.2 Waterborne equivalents are available for most of the solvent borne products used in construction and in most cases would be the preferred alternative. Waterborne products may in some instances have high VOC contents; therefore the fact that a product is waterborne does not automatically make it acceptable.

1.9 CHLORINATED SUBSTANCES

.1 Poly Vinyl Chloride (vinyl) and other chlorinated products should be avoided if suitable substitutes are available.

1.10 PLASTICIZERS

.1 Plasticizers which off-gas (low molecular weight) should be avoided.

1.11 MAN MADE MINERAL FIBRES

.1 Products containing mineral fibres which can be emitted or abraded should be avoided.

.1 Examples: duct liner, mineral fibre ceiling tiles, etc.

1.12 RADIATION

.1 Products or methods which result in the lowest emission of Electro Magnetic Fields are preferred.

1.13 BIOCIDES

.1 Products containing biocides (pesticides, miticides, mildeweides. fungicides, rodenticides, etc.) are not to be used if suitable alternatives are available. Highly stable, low human toxicity biocides such as Portercept may be acceptable substitutes. Biocide formulas which break down, emit powders of offgass should be avoided.

1.14 HEAVY METALS

.1 Heavy metals such as lead, cadmium, mercury etc. should be avoided.

1.15 ALUMINUM

.1 Raw aluminum should be avoided, anodized or factory painted aluminum is acceptable. This is particularly applicable to surfaces which people can touch.

1.16 OZONE DEPLETING SUBSTANCES

.1 Products which contain or which use Ozone Depleting Substances such as Bromide, Chlorofluorocarbons (CFC) or Hydrofluorocarbons (HFC) etc. should be avoided if suitable substitutes are available.

1.17 GREENHOUSE GASES

.1 Products which contain, use or generate Greenhouse gasses such as CO2 should be avoided if suitable substitutes are available.

1.18 BITUMINOUS (Tar) PRODUCTS

.1 Products containing tar compounds should not be used if suitable substitutes are available.

1.19 CHEMICAL COMPOUNDS

.1 Products containing the following chemical compounds should not be used if suitable substitutes are available: Neoprene, Latex, Butyl, ABS, and Formaldehyde.

1.20 ADHESIVES

.1 Adhesives containing solvents or other non preferred ingredients should be avoided if suitable substitutes are available, including systems designs which do not need adhesives or can use mechanical etc. fastening alternatives

1.21 COMPOSITE PRODUCTS

.1 Some composite products contain adhesives such as formaldehyde which are not preferred, and some composites such as Fibre Reinforced Plastics are not practical for recycling. These products should be avoided if suitable substitutes are available.

1.22 CLEANERS AND SOLVENTS

.1 Products, equipment, and methods which require the use of cleaners and solvents are not preferred if suitable substitutes are available. Examples of preferred products would include No Wax floors, or primerless caulks and adhesives, or products not requiring caulks and adhesives.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 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 Refer also to Section 31 23 10.

.2 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.

.3 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

.4 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 where indicated.

.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 dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Restrict tree removal to areas indicated or designated by Engineer.

1.5 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under previous contract and to be provided new under this contract and as requested by local Municipal and Regional Authorities.

.2 Install, maintain, restore, replace sediment control fence as required by Municipal and Regional authorities. The fence shall be in accordance with Municipal standards.

3. Install, maintain, restore, replace roadside catchbasin sediment protection at all street catch basin in accordance with Municipal standards.

.3 Install, maintain, restore, replace catchbasin sediment barrier immediately after installation of catch basins on the property in accordance with Municipal Standards.

.4 A temporary mud mat has been installed under the previous grading contract and remains for removal under this contract. As part of this contract, include in the tender amount the supplementary stone required for maintenance and the removal of the mud mat consisting of 30m x 5m x 0.45m clear stone at any construction entrance. This is required whether or not such mud mat is shown on drawings or remains evident on site.

.5 Control emissions from equipment and plant to local authorities emission requirements.

.6 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.

.7 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.

.2 Tests and mix designs.

.3 Mock-ups.

.4 Mill tests.

.5 Equipment and system adjust and balance.

1.2 PRECEDENCE

.1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.3 RELATED SECTIONS

.1 Section 1 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals.

.3 Section 01 11 00 article 1.12 – Quality Control

1.4 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2- 2020 Stipulated Price

1.5 INSPECTION

.1 General: Materials and workmanship shall be subject to inspection at any time. Cooperate in permitting access for inspection to all places where work is being done or stock is being stored.

.2 Owner's quality control inspection and testing is specified in the technical sections and will be paid from Cash Allowance except as otherwise specified. Contractor to be responsible to pay for inspections and retesting to verify acceptability of work requiring correction.

.3 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.

.4 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Consultant instructions, or law of Place of Work.

.5 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.

.6 Consultant may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. [If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

1.6 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.7 PROCEDURES

.1 Notify appropriate agency 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.

1.8 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.

1.9 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.

.3 Allow sufficient time for testing, evaluation, alterations and retesting so as not to interrupt the Progress Schedule for the Project.

.4 The Consultant may require testing of connections and special prefabricated inserts, as part of the work of this Section.

1.10 MOCK-UPS

.1 Refer to partial list of mock ups in Section 01 33 00 - Submittal Procedures

.2 Prepare mock-ups for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.

.3 Construct in all locations acceptable to Consultant.

.4 Prepare mock-ups for Consultant's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

.5 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.

.6 If requested, Consultant will assist in preparing a schedule fixing dates for preparation.

.7 Remove mock-up at conclusion of Work or when acceptable to Consultant.

.8 Mock-ups may remain as part of Work only if previously agreed to by consultant and accepted as acceptable quality upon completion..

.9 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.11 MILL TESTS

.1 Submit mill test certificates as required of specification Sections.

1.12 EQUIPMENT AND SYSTEMS

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

1.13 SEALANTS

.1 Refer also to Section 07 92 10.

.2 Sealants used for the various building envelope assemblies shall be selected from those specified in the respective assembly Section, and shall be coordinated with the sealant being provided under other building envelope Sections. Preferably, one sealant by the same manufacturer shall be used throughout. If different sealants are selected, from those specified, it is the responsibility of the respective Section to ensure compatibility between selected sealant, substrates, and sealants of other Sections which come in contact with the selected sealant.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Construction aids.

.2 Office and sheds.

.3 Parking.

.4 Project identification – refer to AD Drawings for jobsite sign.

1.2 RELATED SECTIONS

.1 Section 01 51 00 - Temporary Utilities.

.2 Section 01 56 00 - Temporary Barriers and Enclosures.

1.3 INSTALLATION AND REMOVAL

.1 Provide construction facilities in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.4 SCAFFOLDING

.1 All necessary scaffolding shall be provided and constructed according to all by-laws and safety regulations. It shall be removed promptly and completely when no longer required.

.2 As required by Ministry or Labour, design of scaffolding or hoarding shall be by a Professional Engineer.

1.5 ACCESS

.1 Provide and maintain adequate access to project site.

.2 The General Contractor for this Work shall, at all times allow the Consultants, the Board, or any other Board commissioned contractor or their employees, access into the building or around the premises, undisturbed, whether union or non-union, as may be required in the execution of other portions of the building work and installation of equipment, etc.

.3 The General Contractor shall cooperate fully with any and all Board commissioned Contractors.

1.6 HOISTING

.1 Provide, operate and maintain hoists & cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.

.2 Hoists & cranes shall be operated by qualified operator.

1.7 ELEVATORS

.1 Permanent elevators may not be used by construction personnel for transporting of materials unless coordinated with the Architect or Structural Engineer.

.2 Provide protective coverings for finish surfaces of cars and entrances.

1.8 SITE STORAGE/LOADING

.1 Provide adequate weather tight sheds with raised floors, for storage of materials, tools and equipment which are subject to damage by weather.

1.9 CONSTRUCTION PARKING

.1 Contractor parking shall be restricted to designated parking areas only where pre-approved by Board Project Manager and Principal.

1.10 Contractor parking is restricted from all off-site street areas that interfere with site specific parent drop-off and parking areas.

1.11 OFFICES

.1 Provide office heated to 22oC, lighted 750 Lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing lay down table, telephone, and facsimile machine. Pay telephone not acceptable.

.2 Maintain in clean condition.

.3 Provide and maintain in clean condition: two separate plans layout tables, minimum 1200 x 1800 each. One table shall be used by the General Contractor and subcontractors at their discretion. The second shall be provided for use by subcontractors and by the consultant or Inspection and Testing Companies during site visits or project meetings.

1.12 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.

1.13 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. Keep area and premises in sanitary condition.

.3 When permanent water and drain connections are completed, provide temporary water closets and urinals complete with temporary enclosures, inside building. Permanent facilities may be used on approval or Architect.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Barriers.

.2 Traffic Controls.

.3 Fire Routes.

1.2 RELATED SECTIONS

.1 Section 01 51 00 - Temporary Utilities.

.2 Section 01 52 00 - Construction Facilities.

.3 Section 01 11 00 - Summary of Work.

1.3 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.4 SITE ENCLOSURES

.1 Refer to Section 01 11 00- Summary of Work, article 1.6 ‘Constructions Fencing’ for clarification of existing fence on site.’ Maintain fences in good repair.

2. Maintain siltation control fencing as part of site enclosure, as indicated in Section 01 35 43, and/or required Municipal or Regional authorities. Maintain/restore/replace siltation control fencing as directed throughout the construction period to ensure proper function.

1.5 WEATHER ENCLOSURES

.1 Provide temporary weathertight enclosures protection for exterior openings until permanently enclosed.

.2 Erect enclosures to allow access for installation of materials and working inside enclosure.

.3 Design enclosures to withstand wind pressure.

.4 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.

1.6 DUST TIGHT SCREENS

.1 Provide dust tight enclosure to be built out of metal stud and drywall or plywood to delineate work area, floor to ceiling with taped edges along seams to contain dust. Install door with lock and lockbox for restricted access.

.2 Maintain and relocate protection until such work is complete.

1.7 ACCESS TO SITE

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

1.8 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 the public.

1.9 FIRE ROUTES

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

1.10 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.

1.11 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 5 days prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

1.12 TEMPORARY FENCING TO SODDED AREAS

1. Following the installation of sod to the playfield areas, supply and install temporary, leased Modular (Mod U Lok) 1800 high chain link fencing. Stake with iron “T’s” at minimum 2400 o.c. and maintain for a minimum of **ten (10)** weeks while sod is maintained as part of this contract and is deemed established. Refer to Section 32 92 23 – Sodding and 01 11 00 – Summary of Work.

2. Remove fencing at end of 6 week period.

3. Cost of this temporary fencing for this period to be included Tender Price if sod is not installed a minimum of 6 weeks prior to tender.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Requirements and limitations for cutting and patching the Work.

.2 The responsibilities of this section includes but is not limited to the following item(s), including all related labour and materials necessary to successfully complete the installation of same as detailed on the Drawings.

.3 The cutting, removal and disposal and patching of masonry wall sections in locations of all new electrical panels and for all mechanical ducts passing through masonry walls or walls of any other construction not automatically accommodated in new work by the mason.

.4 The cutting, removal and patching of all penetrations required for mechanical and electrical services through floors, ceilings and walls.

.5 The supply and installation of a Portland cement based leveling skim coat as required to provide an acceptable surface for the installation of new VCT tile to any rooms as described on drawings to receive such flooring.

.6 All other work not listed in other Sections, but detailed on the Drawings.

1.2 RELATED SECTIONS

.1 Section 01 11 00 - Summary of Work.

.2 Section 04 21 13- Brick Masonry

.3 Section 01 33 00 - Submittal Procedures.

.4 Section 08 11 14- Metal Doors and Frames

.5 Section 08 71 15 – Finish Hardware

.6 Section 09 91 22- Painting

.7 Section 09 21 16- Gypsum Board Assemblies

.8 Section 09 51 13- Acoustic Panel Ceilings

.9 Section 10 11 25- Manufactured Specialties

.10 Mechanical and Electrical Sections.

.11 Individual product Sections: cutting and patching incidental to work of section. Advance notification to other sections required.

1.3 SUBMITTALS

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

- .1 Structural integrity of any element of Project.
- .2 Integrity of weather-exposed or moisture-resistant elements.
- .3 Efficiency, maintenance, or safety of any operational element.
- .4 Visual qualities of sight-exposed elements.
- .5 Work of 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.

1.4 MATERIALS

.1 Required for original installation.

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

.3 Concrete lintel block, reinforcing steel and concrete fill for openings if required at new penetrations in walls or steel lintels as may be permitted by consultant.

.4 Portland Cement based Concrete Patching Compound compatible with new slab, precast concrete slabs or other flooring to make good a smooth, suitable surface to accept the direct application of new VCT or resilient sheet flooring.

.5 Portland Cement based Concrete for new floor openings or floor leveling, or patching of floor openings.

.6 All other materials not listed in other Sections, but detailed on the Drawings.

1.5 EXECUTION

.1 The Trades requiring cuts, holes or sleeves for their work shall locate them.

.2 Do not cut, drill or sleeve load-bearing members without obtaining prior written approval from the Consultant for each condition.

.3 Cut holes carefully, leaving holes no longer than required, with clean, true and smooth edges.

.4 Fit items to the tolerances established by industry ‘Best Practice’ standard for applicable type of work.

.5 Make patches undetectable in the finished work. All other work not listed in other Sections, but detailed on the Drawings, is to be done in a professional manner and to the industry 'Best Practice' standard for the described work.

.6 Execute cutting, fitting, and patching including excavation and fill if required, to complete Work.

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

.8 Uncover Work to install ill-timed Work.

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

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

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

.12 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

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

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

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

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

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

General

.1 SECTION INCLUDES

.1 Progressive cleaning.

.2 Final cleaning.

.2 RELATED SECTION

.1 Section 01 77 00 - Closeout Procedures.

.2 Section 01 11 00 – Summary of Work.

.3 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2020, Stipulated Price Contract.

.4 GENERAL CLEANINESS DURING CONSTRUCTION

.1 Refer also to Section 01 11 10, item 1.30 ‘Periodic Cleaning’ and coordinate with this Section.

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

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

.4 Prevent accumulation of wastes which create hazardous conditions.

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

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

.7 Provide on-site dump containers for collection of waste materials, and rubbish.

.8 Remove waste materials, and rubbish from site.

.9 Vacuum clean interior building areas when ready to receive finish painting, and continue vacuum cleaning on an as-needed basis until building is ready for substantial completion or occupancy.

.10 Schedule cleaning operations so that resulting dust and other contaminants will not fall on wet, newly painted surfaces.

.5 FINAL CLEANING

.1 At completion of Work, remove waste materials, rubbish, tools, equipment, machinery, and surplus materials, and clean all surfaces exposed to view; leave project clean and ready for occupancy.

.2 Employ experienced, professional cleaners, for final cleaning.

.3 Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from all sight-exposed interior and exterior finished surfaces; polish resilient and ceramic surfaces so designated to shine finish. Vacuum carpet.

.4 Clean and polish glass and mirrors.

.5 Repair, patch and touch-up marred surfaces to specified finish, to match adjacent surfaces.

.6 Broom-clean paved surfaces; rake clean other surfaces of grounds.

.7 Clean exposed ductwork, and structure.

.8 Replace filters.

.9 Clean bulbs and lamps and replace those burned out.

.10 Clean diffusers and grilles.

.11 Clean sinks, faucets, and water closets and controls.

.12 Remove snow and ice from access to building, if applicable.

.13 Maintain cleaning until project, or portion thereof, is occupied by Owner.

Products

.1 NOT USED

.1 Not Used.

Execution

.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Section 01 11 00 - Summary of Work.

.2 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2 - 2020, Stipulated Price Contract.

1.2 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and Subcontractors: conduct 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 Consultant's Inspection: Consultant and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to 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 balanced and are fully operational.

.4 Certificates required by Fire Commissioner and Utility companies 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 Owner, Consultant and Contractor If Work is deemed incomplete by Owner and Consultant, complete outstanding items and request reinspection.

.5 Declaration of Substantial Performance: when Owner and 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.

.6 Commencement of Lien and Warranty Periods: 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: when Owner and Consultant consider final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed,

make application for final payment. If Work is deemed incomplete by Owner and Consultant, complete outstanding items and request reinspection.

.8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit an application for payment of holdback amount in accordance with CCDC 2.

1.3 CLEANING

.1 In accordance with Section 01 74 11 – Cleaning.

.2 Remove waste and surplus materials, rubbish and construction facilities from the site immediately following completion of work and prior to final inspection.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 As-built, samples, and specifications.

.2 Equipment and systems.

.3 Product data, materials and finishes, and related information.

.4 Operation and maintenance data.

.5 Spare parts, special tools and maintenance materials.

.6 Warranties and bonds.

.7 Final site survey.

1.2 RELATED SECTIONS

.1 Section 01 45 00 - Quality Control.

.2 Section 01 77 00 - Closeout Procedures.

.3 Section 01 78 10 - Guarantee/Warrantee Form

.4 Section 01 91 00 - Commissioning.

.5 Mechanical Division: Commissioning

.6 Section 01 11 00 Summary of Work.

1.3 SUBMISSION

.1 Submit one copy of completed project operation and maintenance volumes and as-biult drawings in final form 15 days prior to substantial performance. For equipment put into use with Owner’s permission during construction, submit Operating and Maintenance Manuals within 10 days after start-up. For items of Work delayed materially beyond date of Substantial Performance, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

.2 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.3 Copy will be returned after inspection with Consultant's comments.

.4 Revise content of documents as required prior to final submittal.

.5 Submit 2 copies of revised volumes of data in final form within 10 days after final inspection.

.6 For contract drawings (architectural, site services, landscaping, structural, mechanical, and electrical)**,** transfer neatly as-built notations onto second and third set and submit all three sets. Cost of only the transfer of these as-built sets into digital format is paid from Cash Allowance. Completion of digital as-built to the Consultant is a mandatory requirement of Total Completion of the Contract.

.7 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.

.8 If requested, furnish evidence as to type, source and quality of products provided.

.9 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.10 Pay costs of transportation.

1.4 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 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 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.5 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.

1.6 AS-BUILTS AND SAMPLES

.1 In addition to requirements in Sections 00 21 13 Instructions to Bidders, 01 11 00 Summary of Work and CCDC Contract terms, maintain at the site for Owner one record copy of:

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Change Orders and other modifications to the Contract.
.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Consultant.

1.7 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Consultant.

.2 Provide felt tip marking pens, maintaining separate colours 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 catalogue 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, inspection certifications, and field test records, required by individual specifications sections.

1.8 DIGITAL AS-BUILT DRAWINGS

.1 Retain the services of a CAD drafting company acceptable to the Consultant.

.2 Transfer to digital file all information recorded on As-Built drawings. Layering of information as per Consultant’s instructions.

.3 The Consultant will provide CAD file of contract document.

.4 The cost for preparing digital As-Built drawings will be deducted from the Cash Allowances.

1.9 EQUIPMENT AND SYSTEMS

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's coordination drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Include test and balancing reports as specified in Mechanical Sections.

.15 Additional requirements: As specified in individual specification sections.

1.10 MATERIALS AND FINISHES

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 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.

1.11 MAINTENANCE MATERIALS

.1 On completion of project, submit to Architect two (2) copies of Operations Data and Maintenance Manual in English, made up as follows:

.1 Bind data in vinyl hard covered, 3 ring loose leaf binder for 215 x 280 mm size paper.

.2 Enclose title sheet, labeled "Operation Data and Maintenance Manual", project name, date and list of contents.

.3 Organize contents into applicable sections of work to parallel project's specification break-down. Mark each section by labeled tabs protected with celluloid covers fastened to hard paper dividing sheets.

.2 Include following information, plus data specified.

.1 Maintenance instruction for finished surface and materials.

.2 Copy of hardware and paint schedules.

.3 Description, operation and maintenance instructions for equipment and systems, including complete list of equipment and parts list. Indicate nameplate information such as make, size, capacity, serial number.

.4 Names, addresses and phone numbers of sub-contractors and suppliers.

.5 Guarantees, Warranties and bonds showing:

.1 Name and address of project.

.2 Guarantee commencement date (date of Final Certificate of Completion).

.3 Duration of guarantee.

.4 Clear indication of what is being guaranteed and what remedial action will be taken under guarantee.

.5 Signature and seal of Contractor.

.6 Additional material used in project listed under various Sections showing name of manufacturer and source of supply.

.3 Neatly type lists and notes. Use clear drawings, diagrams or manufacturers' literature.

.4 Include one complete set of final shop drawings (bound separately) indicating corrections and changes made during fabrication and installation.

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 Refer to Section 002113 'Instructions to Bidders' for bonding requirements for this project, both at the time of tender submission and throughout the duration of the construction period.

.2 Refer to CCDC-2 Contract for Warranty requirements and conditions for the standard warranty which is required for the work of this contract.

.3 Extended warranties are required to be issued by manufacturers, fabricators, suppliers and/or installers, sometimes jointly, due to their unique position in the construction

process and their ability to guarantee a particular section of work. Refer to individual requirements of extended warranties requested as well as Section 01 11 00 article 1.33.

.4 Unless specifically noted otherwise, all extended warranties shall commence on the date of Substantial Performance of the Work as certified by the Consultant.

.5 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.6 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal. Use Guarantee/Warranty Form as provided in Section 017810 Sample Guarantee/Warranty Form, whenever standard preprinted trade or manufacturer's Guarantee/Warranty forms are not available. Provide written form for each warranty specified in Section 01 11 00 Summary of Work, Article 1.34.

.7 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work.

.8 Date at beginning of time of warranty start shall be Date of Substantial Performance.

.9 Verify that documents are in proper form, contain full information, and are notarized.

.10 Co-execute submittals when required.

.11 Retain warranties and bonds until time specified for submittal.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1. GENERAL

1. To be made out on the letterhead of Guarantor or Warrantor which usually is a Subcontractor.

2. This format is to be used only when standard preprinted trade or manufacturer's forms are not available. Preprinted forms are to include all elements of information shown on this sample or as a minimum.

3. Comply with Requirements for Guarantee/Warranty as specified in Section 017810, Closeout Submittals.

To: DURHAM DISTRICT SCHOOL BOARD
400 Taunton Road East
Whitby, ON L1R 2K6

Date: _____

SECTION _____

TITLE _____

GUARANTEE/WARRANTY TO:

OWNER Durham District School Board

PROJECT Ajax Secondary School
105 Bayly St. E.,
Ajax, ON L1S 1P2

ARCHITECT Hossack Architecture

REFERENCE (to specifications or drawings)

TIME Period of Guarantee/Warranty:_____ years

GUARANTEE/ WARRANTY Starting Date: Substantial Performance as certified by Consultant

Date: _____

(Description of Guarantee/Warranty)

_____

_____

_____

Upon written notification from the Owner or the Consultant that the above work is defective any repair or replacement work required shall be to the Consultant's satisfaction at no cost to the Owner.

This guarantee shall not apply to defects caused by the work of others, maltreatment of materials, negligence or Acts of God.

SUBCONTRACTOR

_____ _____
Signature Date

Authorized Signing Officer:

_____
(Name Printed)

_____
Title

Name of Firm: _____

Address: _____

Telephone Number _____

CONTRACTOR

_____ _____
Signature Date

Authorized Signing Officer:

_____ _____
(Name Printed)

_____
Title

Name of Firm: _____ SEAL

Address: _____

Telephone Number _____

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

These photographs are provided for convenience only. Bidders are strongly encouraged to attend the non-mandatory Site Meeting during tender.

Bidders remain responsible to inspect the site and assume existing site conditions.

The following photos were taken in November 2024.

WASHROOM RENOVATION AREA

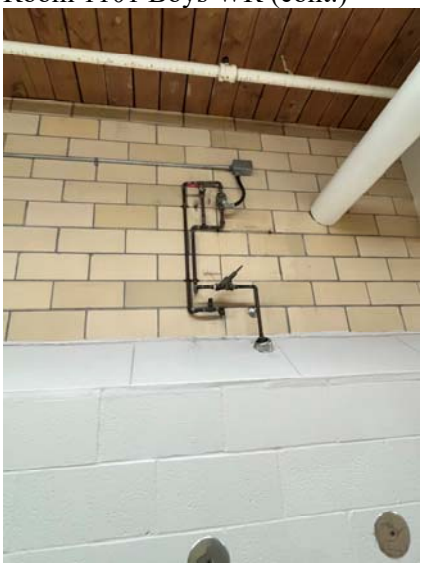
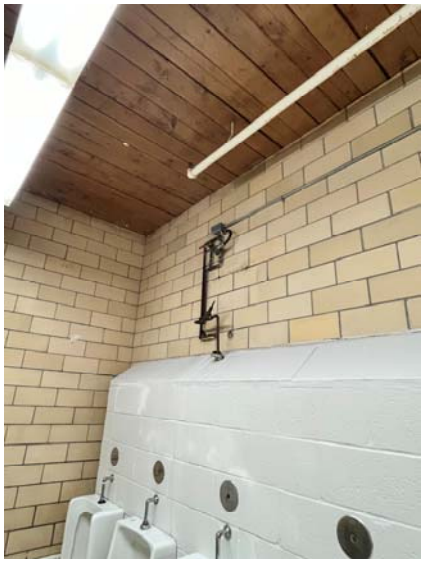
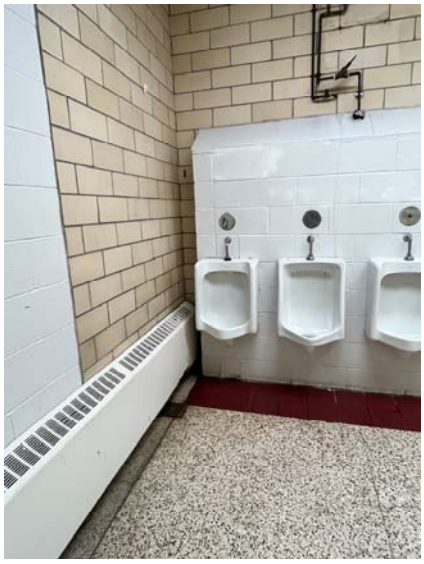
Room 1100 Girls WR

Room 1100 Girls WR (cont.)

Room 1100 Girls WR (cont.)

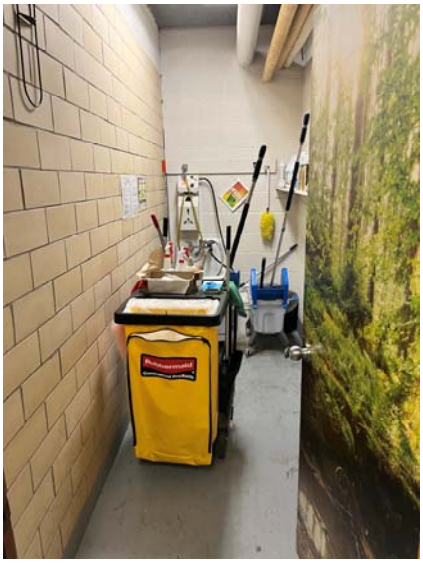
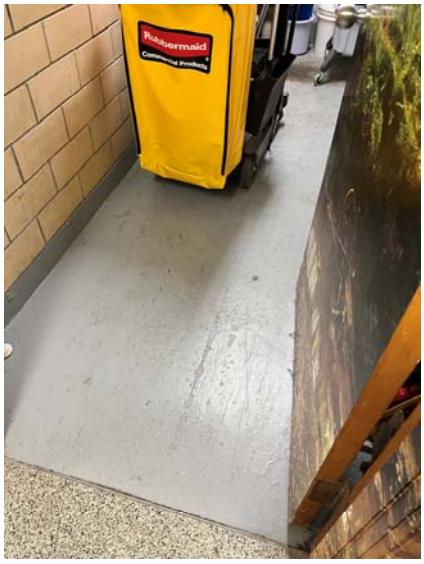
Room 1101 Boys WR

Room 1101 Boys WR (cont.)

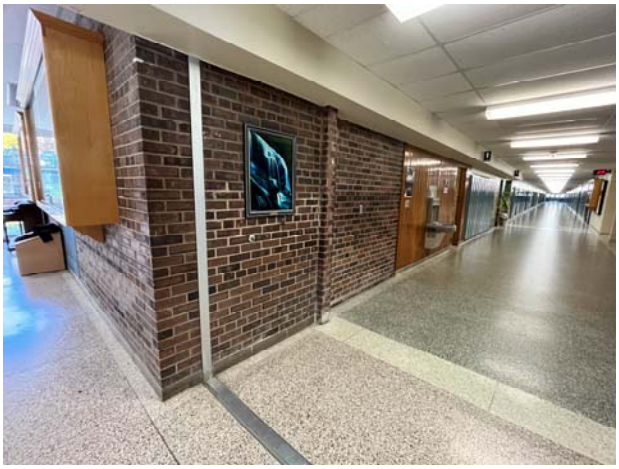




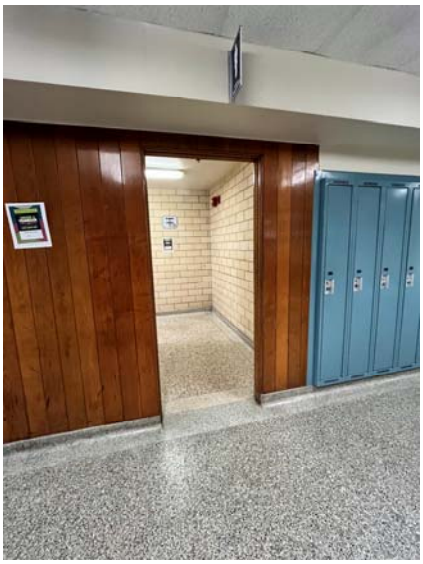


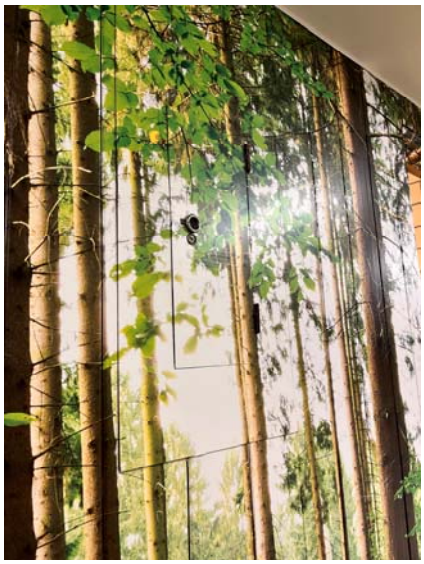
Room 1119 Custodial Room

Corridor outside Washrooms



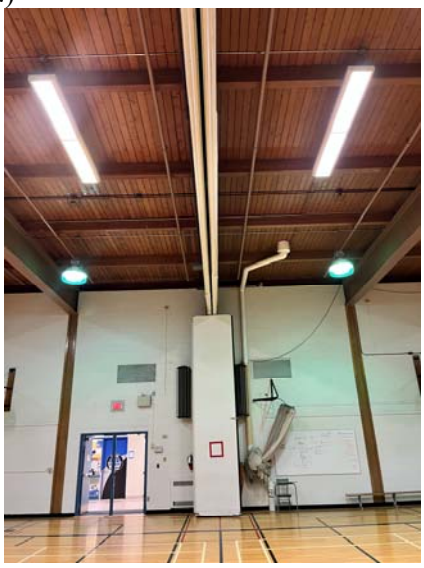
Roof over Washrooms

Roof over Washrooms (cont.)

GYMNASIUM RENOVATION AREA

Room 1036 Small Gymnasium

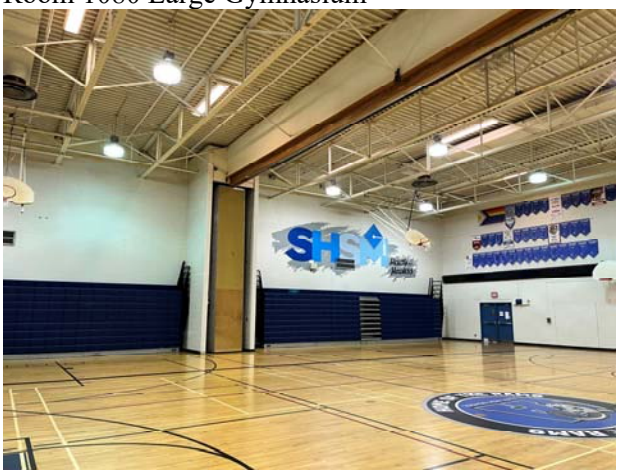
Room 1036 Small Gymnasium (cont.)

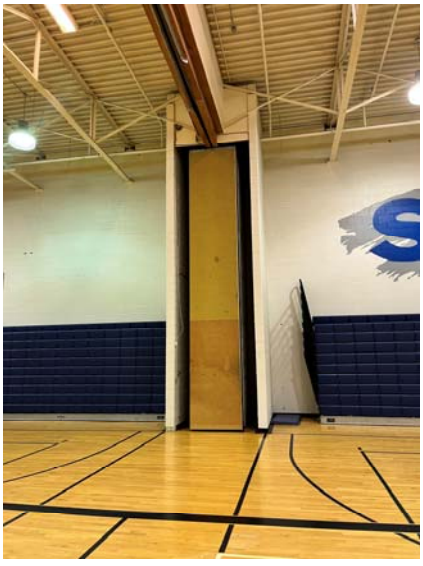



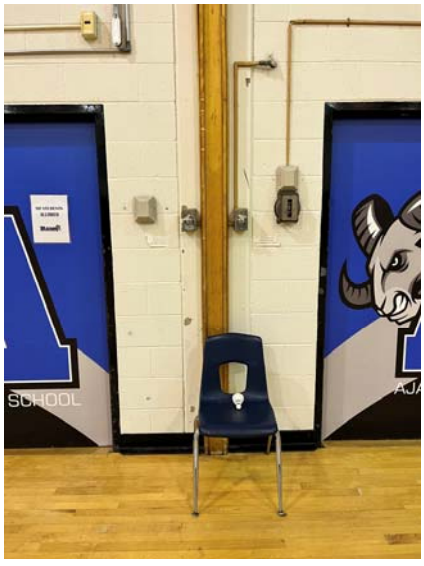


Room 1036 Small Gymnasium (cont.)


Room 1080 Large Gymnasium







Room 1080 Large Gymnasium (cont.)



PART 1 GENERAL

1.1 Related Sections

1. Section 01 11 00 - Summary of Work
2. Section 01 56 00 – Temporary Barriers and Enclosures
3. Section 01 73 03 – Execution Requirements (Cutting and Patching)
4. Section 04 21 13 - Block Masonry
5. Section 01 33 00 - Submittal Procedures
6. Section 08 11 14- Metal Doors and Frames
7. Section 08 71 15 – Finish Hardware
8. Section 09 91 22- Painting
9. Section 09 21 16- Gypsum Board Assemblies
10. Section 09 51 13- Acoustic Panel Ceilings
11. Mechanical and Electrical Sections

1.2 Scope

1. Scope includes but is not limited to:

.1 Demolition or alteration of all structural, architectural, mechanical, electrical or site components, equipment, fitments and finishes as required to execute the work.

.2 The removal, repair and reinstallation as required to make good of existing acoustic unit ceilings gypsum board bulkheads, windows, doors, hollow metal screens and partition walls where required to be removed for routing new services, general alterations or revising demising walls.

.3 Removal and reinstallation as indicated of any existing fixed in place millwork, chalkboards or tackboards or similar fitments or devices identified to remain and be reinstalled.

.4 Grinding and patching of walls where chalkboards or fitments have been removed and surface adhesives or similar surface deficiencies remain.

.5 Cutting and removal of slabs on grade to remove or replace existing drains, clean outs, oil interceptors, trenches and sub slab services contained within them, not previously removed by Abatement work.

.6 Making good of all walls and floors remaining where sections of walls or floors have been removed and surfaces require repair.

.7 Making good of all finishes to remain as result of selective demolition.

1.3 Existing Conditions

1. Take over structures to be demolished or altered based on their condition on date that tender is accepted, at time of examination prior to tendering.
2. Contractor may confirm the prior removal of all asbestos containing materials in documentation left on site following prior abatement work contract. Should areas of asbestos be found which are not documented as removed or included in the scope of this work for removal, it shall be reported to the Consultant and Owner’s representative for review and instructions for removal.

3. Prior to beginning alteration or demolition, confirm with Owner that no items to be salvaged or turned over to the owner remain in the work areas.

1.4 Protection

.1 Prevent movement, settlement or damage of adjacent structures, services, walks, paving, trees, landscaping, adjacent grades parts of existing building to remain. Provide bracing, shoring and underpinning required. Make good damage and be liable for injury caused by demolition.

.2 Take precautions to support structures and, if safety of building being demolished or adjacent structures or services appears to be endangered, cease operations and notify Consultant.

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

Part 2 Products

NOT USED

Part 3 Execution

3.1 Work

.1 Dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction. Confirm in Divisions 15 and 16 for removal and re-use of mechanical and electrical materials and equipment.

.2 Refer to drawings for furniture, materials or equipment to be removed and turned over to the owner. Carefully remove such items and store in location designated by Owner.

3. For a scope of work refer to all Drawings and also coordinate items to be altered, re-built, cleaned or otherwise “made good” as a result of the cutting and patching scope of work described in Section 01 73 03 Execution Requirements or other Sections.

3.2 Preparation

.1 Disconnect electrical, telephone/PA and data service lines in work areas without disrupting main service to building and in accordance with regulations of authorities having jurisdiction. Post warning signs on electrical lines and equipment which must remain energized to serve other properties during period of demolition.

.2 Disconnect and cap designated mechanical services in accordance with requirements of local authority having jurisdiction.

- .1 Natural gas supply lines, if applicable to be removed by gas company by qualified tradesman in accordance with gas company instructions.
- .2 Remove, cap or dispose of other underground services as indicated in drawings.
- .3 Do not disrupt active or energized utilities traversing premises designated to remain undisturbed.

.3 Floor scans to locate hidden or buried services in the work area have NOT previously been done. Prior to cutting, demolition or removal of any slabs on grade or areas where services may be concealed, engage a private locate firm to provide magnetic and X-ray scans of all areas involved. This is the responsibility of the General Contract and costs for such scans are to be included in the base contract price.

3.3 Disconnection and Removal of Materials and Equipment

.1 Contractor shall cooperate with the Owner to determine which materials are to be removed and retained by Owner. The Owner will decide which items or equipment they wish to retain as their property and all other materials shall be removed from the premises by this Contractor. The equipment which is to be retained by the Owner shall be stored on site where directed by the Owner.

.2 Refer to mechanical and electrical drawings and for disconnection and removal and/or relocated existing electrical, ductwork, piping and/or equipment.

3.4 Temporary Removals and Replacement

.1 All items to be removed and installed shall be completed so that replaced materials are left in a clean undamaged state. If required to be replaced due to damage, the contractor shall include in his price for the component to be replaced and installed at no additional cost to the Contract.

3.5 Selective Demolition

.1 Follow best trade practices for all demolition and alteration work. This includes but is not limited to the following items.

.1 The school will be vacant during **July and August 2025**. Ensure demolition work does not disrupt any ongoing aspect of the operation of the school including the period after Substantial Performance.

.2 Confirm all demolition work (including potential noise, vibration, tools or equipment noise, etc.) in advance with the principal of the school on a daily basis. Similarly, notify all building occupants in advance at each possible interruption in services or utilities.

.3 Protect all areas from damage and intrusion by means of locking rooms under construction when not in use, use of dust tight screens and temporary partitions and hoarding. Demolish to minimize dusting. Refer to drawings for locations and other Specification Sections for requirements.

.4 Signage to be posted at all times. Take precautions to demolish only areas as necessary to complete the work, and avoid damage to adjacent areas. Make good all areas affected by demolition or renovation activities, whether specifically included in the contract documents or not.

.5 The Contractor shall be responsible for damage to all areas affected by renovation or alteration activities.

.6 Prior to demolition, the Contractor shall carefully examine the drawings in relation to the site conditions, to ensure that all intended work can be carried out without ambiguity. Incorrect demolition of any work by the Contractor, will be back-charged to him. Any discrepancies between the drawings and the site conditions, must be reported to the Consultants immediately.

.7 Demolish or remove interior and exterior elements as indicated.

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

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

.10 Demolish masonry and concrete walls in small sections. Salvage existing imperial block units in coordination with Section 04 21 13 to re-use as patching in existing imperial unit masonry. Also coordinate with Section 04 21 13 for detail of edge condition required to match new Metric Units to existing Imperial block units.

.11 Carefully remove and lower structural framing and other heavy or large objects as required. Where partial walls of exposed concrete block masonry is to remain, grind all exposed edges to a bullnose and patch as required suitable for final painting.

.12 Do not sell or burn materials on site.

.13 Remove contaminated or dangerous materials from site and dispose of in safe manner to minimize danger at site or during disposal, in accordance with all governing legislation.

.14 Where applicable, saw cut existing terrazzo floor and base as required and remove to nearest metal 'panel' joint to enable replacement at a full panel**.** Replace with terrazzo flooring to match existing as closely as possible. Provide sample to consultant for approval.

.15 Following demolition and removals of floor trenches, walls and fitments, coordinate with Section 01 73 03. As part of the work of this section, scarify or otherwise grind existing or new slabs in preparation for slab in-fills and a self leveler skim slab by Section 01 73 03. That Section is responsible for the provision of a backfill, slab on grade patching and self leveling skim coat where required in advance of new VCT finishes by Section 09 65 19.

.16 Patch and make good existing wall, ceiling and floor finish with identical original materials if affected by temporary protection or by previous Abatement contract.

3.6 Repair to all Finishes and Colours

.1 Repaint all walls in rooms or areas modified as indicated in the Finish Schedule, or as directed by the Consultant.

.2 Repair and make good all fixtures, finishes, trims and surfaces to all floor, wall and ceiling areas in rooms or areas whether or not they have been modified or affected by the work or by previous Abatement Contract.

.3 Existing paint colours are to be matched exactly using computer colour matching.

END OF SECTION

Part 1 General

1.1 LIMITED DESIGNATED SUBSTANCE SURVEY REPORT REFEREENCE

.1 Abatement of designated substances is to be expended from the Cash Allowance.

.2 Refer to report pertaining to hazardous materials and abatement survey and findings prepared by others bound within this document for convenience only.

.2 This report outlines the designated substances discovered at this site. **Report is dated November 29, 2024.**

.3 Direct any questions regarding clarification regarding the Hazardous Building Material Assessment to:

Parasol Environmental Inc.

Brad Panzer
Senior Project Manager
125-1860 Appleby Line, Unit 14, Burlington, ON L7L 7H7
416-579-1284 | brad@parasolenv.ca www.parasolenv.ca

.4 The specification sections related to Asbestos Survey or Abatement forms part of the Contract Documents but contains information that is not prepared by the Architect or their sub consultants. The referenced asbestos reports and asbestos abatement specifications were not prepared by or under the supervision of the Architect. While every effort has been made to attempt to provide comprehensive abatement testing information for the purposes of design and tendering, the Architect claims no responsibility or liability for the accuracy of the information contained in the report.

Part 2 Products

2.1

1. Refer to documents noted above.

Part 3 Execution

.1 Abatement and Inspection and Testing will be paid for under Cash Allowances.

END OF SECTION

Parasol Environmental Inc.

125-1860 Appleby Line, Unit # 14,
Burlington, Ontario L7L 7H7

Limited Designated Substance Survey Report

Ajax High School

105 Bayly Street East, Ajax, Ontario

Prepared for

Durham District School Board
400 Taunton Road East, Whitby, Ontario

November 29, 2024
Parasol Project No: 13260

Executive Summary

Parasol Environmental Inc. (Parasol) was retained by the Durham District School Board to conduct a Limited Designated Substance Survey within Ajax High School located at 105 Bayly Street East, Ajax, Ontario. The purpose of the survey was to record the presence, location, condition and quantities of Designated Substances and Hazardous Materials within the surveyed area that may be disturbed during the planned washroom renovation. Additional information is provided to document corrective measures necessary to ensure that remedial action occurs applying the proper abatement procedures, if necessary.

The survey was completed by Brad Panzer of Parasol on November 20, 2024.

The following table summarizes the Designated Substances and Hazardous Materials observed within the surveyed area.

Designated Substance or Hazardous Material	Findings	Recommendation
Asbestos	Confirmed and suspected asbestos-containing materials were identified as follows: Friable Asbestos • Mechanical Insulations (Parging Cement and Pipe Straight Insulation)	The following remedial work is necessary to comply with Ontario Regulation 278/05: • Repair of parging cement fitting insulation using Type 2 abatement procedures
Benzene	No major sources were identified.	No recommendations are warranted as no benzene products were observed.
Lead	Low-level lead concentrations were found to be present in the following materials: • White Paint • Pale Yellow Paint • Glazed Masonry Block Mortar • Masonry Block Mortar Lead of varying concentrations is also suspected to be present in the following items: • Ceramic Floor and Wall Tile Glazing • Solder on pipe fittings	All paints and masonry mortar was observed in GOOD condition. If disturbed, remove using lead abatement procedures as per EACC *"Lead Guideline for Construction, Renovation, Maintenance or Repair".*
Mercury	Mercury vapour is presumed to be present within all fluorescent light tubes.	If removed, the fluorescent lights are to be kept sealed and intact, which will prevent direct skin contact and the inhalation of mercury vapour.
Silica	Crystalline silica is suspected to be present within: • Ceramic tiles and grout, • Masonry and mortar, • Concrete (poured or pre-cast)	The removal or disturbance of material suspected to contain crystalline silica are to follow procedures outlined in the MOL document *"Guideline - Silica on Construction Projects"*, dated September 2004.

Designated Substance or Hazardous Material	Findings	Recommendation
Polychlorinated Biphenyls (PCBs)	Suspect PCB-containing products observed include: • T12 light fixtures	If disturbed, compare fluorescent light fixture's ballast to the Environment Canada Document, *"PCB Identification of Lamp Ballasts Containing PCBs"* dated August 1991. If the ballast does not contain a label that states "PCB Free" or the serial code that does not identify it as "PCB Free" then the ballast should be presumed to contain PCBs and disposed of accordingly.
Mould	No major sources were identified.	No recommendations are warranted as no mould or water-damaged building materials were observed.
Other Designated Substances	The following Designated Substances are not likely to be found in the area assessed: • Acrylonitrile • Arsenic • Coke Oven Emission • Ethylene Oxide • Isocyanates • Vinyl Chloride	No recommendations are warranted as none were observed.

Before any renovation activities, perform an intrusive investigation for concealed Designated Substances and sample building materials that were not previously tested and may be disturbed as part of the renovation. In addition, consideration should be given to mechanical, electrical and structural components that pass beyond the rooftop into the building and may be impacted by the project. Further, consideration of the known or suspected asbestos-containing materials within the building should be assessed that may be disrupted during the renovation.

This executive summary is to be read in conjunction with the remainder of the report.

TABLE OF CONTENTS

1.0 Introduction

1.1 Background

Parasol Environmental Inc. (Parasol) was retained by the Durham District School Board to conduct a Limited Designated Substance Survey within Ajax High School located at 105 Bayly Street East, Ajax, Ontario. The purpose of the survey was to record the presence, location, condition and quantities of Designated Substances and Hazardous Materials within the surveyed area that may be disturbed during the planned washroom renovation. Additional information is provided to document corrective measures necessary to ensure that remedial action occurs using the proper abatement procedures, if necessary.

The survey was completed by Brad Panzer of Parasol on November 20, 2024.

2.0 Regulatory Framework

The following Acts, Regulations, Guidelines and documents were utilized for the survey and the preparation of this report:

1. *Occupational Health and Safety Act R.S.O. 1990, c. O.1.*
   I. *Ontario Regulation 278/05- Designated Substances – Asbestos on Construction Projects and in Buildings and Repair Operations.*
   II. *Ontario Regulation 490/09- Designated Substances*.
   III. Ontario Regulation 833 – Control of Exposure to Biological or Chemical Agents.
   IV. Ontario Regulation 213/91 – Construction Projects
2. Ministry of Labour (MOL) Document, "*Guideline - Lead on Construction Projects"*, September 2004.
3. Environmental Abatement Council of Canada (EACC) *"Lead Guideline for Construction, Renovation, Maintenance or Repair"*, October 2014.
4. Ministry of Labour (MOL) Document, "*Guideline - Silica on Construction Projects"*, September 2004.
5. Environment Canada Document, *"PCB Identification of Lamp Ballasts Containing PCBs"* August 1991.
6. Canadian Construction Association (CCA), "*Mould Guidelines for the Canadian Construction Industry*", 2018.
7. Environmental Abatement Council of Canada (EACC) "*Mould Abatement Guidelines - Edition 3"*, 2015.
8. Ontario Ministry of Labour (MOL), *Alert: Mould in Workplace Buildings*, ISSN: 1195-5228, December 2000.
9. Environmental Abatement Council of Canada (EACC) *"Pre-Construction Designated Substances and Hazardous Materials Assessments Guideline for Construction, Renovation and Demolition Projects"* 2021.

Ontario Regulation 490/09 – *Designated Substances* defines the eleven (11) Designated Substances, establishes the requirements for workplaces containing these materials, which include the health and safety responsibilities, control programs to minimize worker's exposures, and sets out the maximum exposure concentrations.

The control and management of asbestos in Ontario are further prescribed by Ontario Regulation *278/05- Designated Substances – Asbestos on Construction Projects and in Buildings and Repair Operations*.

The major components of O. Reg 278/05 require that an asbestos survey record be completed for buildings or private residences with more than four units, and an asbestos management program be established for the asbestos-containing materials present within these buildings. The regulation also states the frequency in which a building material must be sampled, and defines an asbestos-containing material. The current definition of asbestos-containing material in Ontario is having 0.5% or greater fibrous silicate asbestos content by dry weight. Further, the Regulation divides asbestos-containing material into friable material (a material, when dry, can be crumbled, pulverized, or powdered by hand pressure, or is crumbled, pulverized,

or powdered) and non-friable material. In addition, the Regulation also defines the minimum measures and procedures for the repair or removal of asbestos-containing materials. Due to the limited scope of this survey, this report does not meet all the requirements of O. Reg. 278/05 and additional asbestos-containing materials may be present within the building that are not noted within this report. Within this report, building materials are separated into the typical applications of asbestos-containing materials.

Section 30 of the Occupational Health and Safety Act requires an Owner to determine and list Designated Substances present at a project site before beginning work. Further, this information must be included in tender documents, and the Owner and Constructor must ensure that each prospective contractor and subcontractor receive a copy of the information before entering into a binding contract. Otherwise, the Owner is liable to the constructor and every contractor and subcontractor who suffers any loss or damage as a result of the failure. The same liability applies to the Constructor regarding their contractors and subcontractors. This report meets the requirements of Section 30 of the Act.

Section 6, subsection 3 of O. Reg 213/91 requires that a Notice of Project be filed with the Ministry of Labour before beginning a project and the document requires the constructor to remark if any Designated Substance will be used, handled, or disturbed on the project. The information provided in this report can be used for the Notice of Project.

Based on the Environmental Abatement Council of Canada (EACC) *"Lead Guideline for Construction, Renovation, Maintenance or Repair"*, dated October 2014, and for this report, paints, mortar, or surface coatings containing less than or equal to 0.1% lead by weight (1000 µg/g or 1000 mg/kg or 1000 ppm lead) are considered low-level lead paints, mortars, or surface coatings. Paints, mortars, or surface coatings containing greater than 0.1% lead by weight (1000 µg/g, or 1000 mg/kg, or 1000 ppm) but less than 0.5% lead by weight (5000 µg/g, or 5000 mg/kg, or 5000 ppm lead) are considered lead-containing paints, mortars, or surface coatings. Paints, mortars, or surface coatings containing equal to or greater than 0.5% lead by weight (5000 µg/g, or 5000 mg/kg, or 5000 ppm lead) are considered lead-based paints, mortars, or surface coatings.

3.0 Methodology and Scope

3.1 Scope of Assessment

The survey was limited to Location #1100-Girl's Washroom, #1101-Boy's Washroom, #1119-Custodian and the immediate Corridor as illustrated on the attached drawing (DSR-01). The scope of the assessment was carried out in all accessible areas on a non-intrusive basis. Areas that were inaccessible at the time of the survey are listed in Section 3.11.

For this assessment, the following Designated Substances, as defined under *Ontario Regulation 490/09-Designated Substances* made under the *Occupational Health and Safety Act R.S.O. 1990, c. O.1* were assessed for as they are typically found in buildings and building material:

1. Asbestos
2. Benzene
3. Lead
4. Mercury
5. Silica

In addition to the above-noted Designated Substances, Parasol personnel also documented the presence of the following hazardous materials, which have similar Regulations that outline the management, handling and disposal of the material.

1. Polychlorinated Biphenyls
2. Mould

For this assessment, the following Designated Substances, as defined under *Ontario Regulation 490/09-Designated Substances* made under the *Occupational Health and Safety Act R.S.O. 1990, c. O.1*, were not assessed as they would not be found in building materials that may be disturbed as part of this project and typically only found in industrial or manufacturing settings.

1. Acrylonitrile
2. Arsenic
3. Coke Oven Emission
4. Ethylene Oxide
5. Isocyanates
6. Vinyl Chloride

No additional comments will be made regarding these materials within this report unless the Owner or the Owner Representative notifies Parasol of the use of these materials within the building.

3.2 Methodology

The assessment was completed largely on a visual basis at ground level and representative checks were made above ceilings with the aid of a six-foot (6FT) step ladder. Locations and building materials present above this height were considered to be inaccessible. In addition, due to the non-intrusive nature of the assessment, materials concealed above solid ceiling finishes, within wall cavities, and below floor grade may be present that are not documented within this report. Designated Substances should be presumed to be present within these locations and all necessary precautions should be followed when accessing these spaces.

3.3 Asbestos

Representative bulk samples of building materials were collected in the frequency required under Table 1, Subsection 3(3) of *Ontario Regulation 278/05- Designated Substances – Asbestos on Construction Projects and in Buildings and Repair Operations*. Samples were submitted to EMC Scientific Inc., an independent, NVLAP accredited laboratory for analysis. The bulk samples were analyzed using Polarized Light Microscopy (PLM) and dispersion staining techniques in accordance with the EPA 600/R-93/116 *Method for the Determination of Asbestos in Bulk Building Materials*. If a material was determined to be asbestos-containing, the laboratory was instructed to cease analysis of the remaining samples in the Sample Set.

The locations and conditions of the asbestos-containing materials identified within the building are detailed in this report. The condition criteria were evaluated using The Public Works and Government Services Canada (PWGSC) document *Public Services and Procurement Canada Asbestos Management Standard* updated June 1, 2019, which were then used to form recommendations for the asbestos-containing material present within the surveyed area.

The condition of the asbestos-containing material was assessed as follows:

Condition	Non-Friable	Friable
GOOD	• Material intact and stable • Minor cracks may be present on the surface	• Material is intact, with no signs of damage or delamination. • Up to 1% of sprayed fireproofing has visible damage. • Mechanical insulation is completely covered in jacketing, with no penetrations or exposed insulation.
FAIR	• Criteria not used	• Jacket insulation is missing • Minor damage (cuts, tears, or nicks) to jacketed insulation. • Insulation is exposed but not showing surface disintegration. • Missing insulation ranges from minor to none.
POOR	• Material is broken, lifted, damaged, or deteriorated	• Damage cannot be easily repaired • More than 1% of sprayed fireproofing is damaged, delaminated, or deteriorated.

Condition	Non-Friable	Friable
		• The original insulation jacket is missing, damaged, deteriorated, or delaminated. • Insulation is exposed and significant areas have been dislodged.

3.4 Excluded Asbestos-Containing Building Materials

Due to the non-intrusive basis of the survey, the following building materials, if present, were excluded from the survey but should be considered asbestos-containing until proven otherwise: roofing materials, refractory brick in boilers and incinerators, fire door core insulation, elevator brakes, mastics, high voltage wiring, heat shields within light fixtures, mechanical packing and gaskets, insulation or vermiculite inside wall cavities or concealed spaces, insulations within mechanical units or ducts, wall finishes concealed behind visible wall finishes, window and door glazing/caulking compounds, flooring material concealed beneath visible flooring and/or concealed beneath existing sub-floors, ceramic tile grout and mortar/adhesive concealed behind ceramic tiles, and sub-grade materials.

3.5 Benzene

No samples of building materials suspected of containing benzene were collected. If above or below grade fuel tanks were present within the assessed area, they were noted within the appropriate findings section.

3.6 Lead

Representative bulk samples of the most prevalent painted finishes and/or masonry mortar suspected of containing lead that is to be disturbed as part of the project were collected at the time of the assessment. A small area of the mortar or paint and subsurface layers were collected by scraping the material down to the substrate to which they are applied. Paint finishes of limited applications were not collected. Samples were submitted to EMSL Canada Inc. (EMSL), an ELLAP accredited laboratory. The paint or mortar samples were analyzed using Flame Atomic Absorption Spectrometry in accordance with EPA Method SW 846 3050B/7000B *Flame Atomic Absorption Spectrophotometry*. Results of the analysis were reported by the laboratory as the percentage of lead by weight of the total sample (% by wt.) or the mass of lead by the mass of the total sample (mg/kg).

The condition of painted surfaces and/or masonry mortar is also detailed in this report. A visual assessment of the mortar or paint for signs of cracking, chipping, flaking, bubbling and deterioration due to friction were noted and were assessed as GOOD, FAIR or POOR based on the degree and extent of deterioration.

The remainder of the suspect lead-containing material (lead piping, copper pipes soldering joints, wiring connectors, electric cable sheathing, batteries, and lead sheeting) were noted if present.

3.7 Mercury

A visual inspection was completed based on the age, appearance, and historical uses of suspect mercury-containing equipment, building materials, or products to identify their locations and quantities. Suspect mercury-containing equipment was not dismantled nor were samples collected for the determination of mercury content.

3.8 Silica

A visual inspection of building materials suspected of containing crystalline silica (e.g., concrete, cement, tile, brick, masonry, mortar) was completed based on the historical use of suspect silica-containing materials in certain materials. Samples of building material were not collected for the determination of the presence or absence of crystalline silica.

3.9 Mould Contamination

A visual inspection to note the extent of surface mould growth and water-damaged building materials was completed within the assessed areas. No sampling for mould spore concentration, or destructive testing

to identify concealed mould growth or water damage, was completed. Surface discolouration, material degradation, or suspect mould growth were noted.

3.10 Polychlorinated Biphenyls

A visual inspection for polychlorinated biphenyls (PCBs) was completed on a select number of accessible fluorescent light ballasts present within the assessed areas. If available, information was collected from the ballasts' label and compared to the information in the Environment Canada Document, *"PCB Identification of Lamp Ballasts Containing PCBs"*, dated August 1991. It is important to note that due to safety precautions, the light fixtures were not opened to obtain the manufacturer's details as the fixtures were not de-energized. If visual confirmation of PCB content within the ballast could not be made, it was assumed that light fixtures in areas constructed before 1980 and did not have T8 style fluorescent light fixtures are PCB-containing until proven otherwise.

Information from electrical equipment, transformers specifically, was limited to the exterior labels, or nameplates, a review of maintenance records, and the age of the building to determine PCB content. No dielectric fluids were collected at the time of the assessment.

Caulking and sealants were not sampled or analyzed for PCB content. It should be assumed that if the material was installed before 1980, it contains PCBs until proven otherwise.

Dry-type transformers and fluorescent light ballasts with T8 style lights are presumed to be free of PCBs.

3.11 Inaccessible Locations

At the time of the survey the following locations were inaccessible:

1. N/A

4.0 Existing Reports and Drawings

The following reports were provided to Parasol and the information presented within these reports was utilized in the preparation of this report.

1. Detailed Asbestos-Containing Building Materials Survey Report – Maple Environmental Inc. December 2016 (Maple Project No.15465-110)

Detailed drawings were provided by the client and can be found in Appendix B.

5.0 Findings

The results of the visual identification and the bulk sampling completed during the duration of the survey are summarized below. The materials are divided into typical building material applications. The Laboratory Certificate of Analysis for the bulk samples collected while on site are presented in Appendix A.

5.1 Building Information

A summary of pertinent building details specific to the surveyed area is provided in the table below. Information is based on onsite observations, and interviews conducted as well as the provided prior reports.

Building Element	Details
Date of Construction & Additions	Original Building-1954, Additions-1959, 1962, 1963, 1966, 2000
Number of Floors	2 plus Basement
Total Area	218,274 SF
Roof Type	Built-up
Floors	Terrazzo, Concrete
Walls	Glazed Masonry Block, Masonry Block, Smooth Plaster, Ceramic Tile, Brick, Drywall
Ceilings	Lay-in Ceiling Tiles, Smooth Plaster, Wood

Building Element	Details
HVAC	Forced Air, Radiators
Structure	Wood, Concrete, Steel

The following section summarizes the findings of the assessment and provides a general description of the hazardous materials identified and their locations.

5.2 Asbestos

5.2.1 Building Materials Not Observed

At the time of the survey, the following building materials, which are known to historically contain asbestos were not observed and therefore are not discussed further within the report.

1. Sprayed Fireproofing
2. Texture Coat Finishes
3. Vermiculite
4. Vinyl Floor Tiles
5. Vinyl Sheet Flooring
6. Transite Cement Products
7. Caulking

5.2.2 Acoustic Ceiling Tiles

The following acoustic ceiling tiles were observed to be present at the time of the survey:

Tile Number	Sample Number	Description	Locations	Asbestos Content	Notes
AT-01	S07A-C	2'x4' Pinholes and Random Flecks	Corridor	ND	-

ND= None Detected, NA= Not Applicable, CH= Chrysotile Asbestos, AM= Amosite Asbestos

5.2.3 Plaster Finishes

Smooth plaster finish was observed within the surveyed area as ceiling and bulkhead finishes. Analysis of Sample Set S01A-C determined that the samples do not contain asbestos.

5.2.4 Drywall Finishes

Drywall with joint compound applied to gypsum board was observed within the surveyed area as a bulkhead and limited to the Corridor. Analysis of Sample Set S06A-C determined that the samples do not contain asbestos.

5.2.5 Insulations

Friable asbestos-containing insulations and non-asbestos-containing insulations were observed to be present on mechanical systems throughout the surveyed area.

5.2.5.1 Fitting Insulation

Asbestos-containing parging cement insulation was observed to be applied to pipe fittings throughout the surveyed area. Analysis of Sample Set S05A-C determined that sample S05A was found to contain **60% Chrysotile asbestos.** The remaining samples were not analyzed due to the stop positive confirmation. Ontario Regulation 278/05, requires a material to be considered as asbestos-containing if one or more samples within the set is determined to contain asbestos. Therefore, all parging cement is considered to be asbestos-containing. Parging cement fittings were observed in FAIR to GOOD condition at the time of the assessment.

The remaining fitting insulation present within the surveyed area was observed to be fibreglass and PVC; materials not suspected to contain asbestos.

5.2.5.2 Straight Insulation

Cellulose pipe insulation was observed to be applied to pipe straights within the Corridor. Analysis of Sample Set S08A-C determined that the samples do not contain asbestos.

Layered paper pipe insulation was observed to be applied to pipe straights within Location #1119-Custodian. Analysis of Sample Set S10A-C determined that sample S10A was found to contain **60% Chrysotile asbestos.** The remaining samples were not analyzed due to the stop positive confirmation. Ontario Regulation 278/05, requires a material to be considered as asbestos-containing if one or more samples within the set is determined to contain asbestos. Layered paper pipe insulation was observed in GOOD condition at the time of the assessment.

The remaining pipe straight insulation present within the surveyed area was observed to be fibreglass and PVC; materials not suspected to contain asbestos.

5.2.5.3 Duct Insulation

Ducts present within the surveyed area were observed to be externally uninsulated.

5.2.5.4 Mechanical Equipment Insulation

Mechanical equipment (radiators) within the surveyed area was observed to not be externally insulated.

5.2.6 Vermiculite

No loose-fill vermiculite was observed to be present within the surveyed area at the time of the assessment. However, as the survey was non-destructive, loose-fill vermiculite may be present within the voids of the masonry blocks, which is a historical application of vermiculite. Precaution should be taken if the masonry block is to be disturbed.

5.2.7 Other

- Mortar associated with masonry block finishes was observed throughout the surveyed area. Analysis of Sample Set S02A-C determined that the samples do not contain asbestos. In addition, a layer of off-white primer was identified within the sample set and analyzed as a separate sample layer. Analysis of the off-white primer determined that the material does not contain asbestos.
- Mortar associated with glazed masonry block finishes was observed within the surveyed area. Analysis of Sample Set S04A-E determined that samples do not contain asbestos.
- Mortar associated with brick finishes was observed within the surveyed area. Analysis of Sample Set S09A-C determined that samples do not contain asbestos.
- Ceramic tile grout and mortar was observed within the surveyed area. Analysis of Sample Set S03A-C determined that samples do not contain asbestos.

5.3 Benzene

No products suspected of containing benzene were identified within the surveyed area.

5.4 Lead

Results of the lead in paint chips and masonry mortar are presented in the table below. The Certificate of Analysis is attached in Appendix A.

Sample No	Sample Location	Description	Substrate	Result	Lead Class	Condition
Pb-01	1101-Boy's Washroom Room	Mortar	Glazed Masonry Block	<40mg/Kg	Low-Level Lead	GOOD
Pb-02	1101-Boy's Washroom	Mortar	Masonry Block	<40mg/Kg	Low-Level Lead	GOOD

Sample No	Sample Location	Description	Substrate	Result	Lead Class	Condition
Pb-03	1100-Girl's Washroom	White Paint	Walls and Ceilings	<0.0082%	Low-Level Lead	GOOD
Pb-04	1100-Girl's Washroom	Pale Yellow Paint	Washroom Stall Partitions	<0.0080%	Low-Level Lead	GOOD

As noted in the EACC guidelines, results above 0.1% are considered elevated and specific procedures apply to the removal or disturbance of these materials.

The following building materials were observed to be present within the assessed area and are suspected to contain lead:

1. Ceramic Floor and Wall Tile Glazing
2. Solder on pipe fittings

5.5 Mercury

5.5.1 Lamps

Mercury vapour is presumed to be present within all fluorescent light tubes.

5.5.2 Devices and Equipment

Thermostatic switches within the assessed areas were not observed to have liquid mercury present.

It is important to note that equipment present within the assessed area was not dismantled to verify the presence or absence of mercury within. As such, concealed mercury-containing devices may be present that are not noted within this report. Caution should be taken when dismantling this equipment as mercury-containing components should be assumed to be present.

5.6 Silica

The following building materials were observed to be present within the assessed area and are presumed to contain crystalline silica:

1. Ceramic tiles and grout
2. Masonry and mortar
3. Concrete (poured or pre-cast)

5.7 PCBs

5.7.1 Light Fixtures

Light fixtures observed within the surveyed area were observed to contain a combination of T8 and T12 lights. T8 lights contain electronic ballast and do not contain PCBs. T12 lights have the potential to contain PCBs.

5.7.2 Transformers

Transformers were not observed to be present within the surveyed area.

5.8 Mould

No obvious visible mould growth and water damage were observed to be present within the surveyed area.

6.0 Conclusions and Recommendations

Based on the results of the bulk sampling and visual identification, the following Designated Substances and Hazardous Materials are known and/or assumed to be present within the surveyed area:

1. Asbestos
2. Lead
3. Mercury
4. Silica
5. PCBs

Parasol proposes the following recommendations:

6.1 General Recommendations

6.1.1 Asbestos

Based on the results of the bulk sampling and visual identification, the following asbestos-containing building materials were identified:

1. Mechanical Insulations (Parging Cement and Pipe Straight Insulation)

Due to the presence of asbestos-containing materials within the building, the Asbestos Management Program must be updated and maintained for the building.

Perform a reassessment survey of asbestos-containing materials on an annual basis (minimum requirement).

Before any renovation activities, perform an intrusive investigation for concealed asbestos-containing materials and sample building materials that were not previously tested and may be disturbed as part of the renovation.

Before completing any renovation or alteration, all asbestos-containing material that may be disturbed as part of the project should be removed following Ontario Regulation 278/05.

6.1.2 Asbestos Abatement Procedures

Depending on the condition, geometry and size, the removal of mechanical insulations are to be completed using Type 2, Glove Bag or Type 3 asbestos abatement procedures.

6.1.3 Lead

Based on the results of the bulk sampling and the visual identification, low-level lead concentrations (less than or equal to 0.1% lead by weight (1000 µg/g or 1000 mg/kg or 1000 ppm lead)) were found to be present in the following building materials: white paint, pale yellow paint, glazed masonry block mortar and masonry block mortar.

Low-level lead guidelines only apply if they meet the following criteria:

1. The paint and substrate are not disturbed in an aggressive manner (grinding, cutting or blasting) or not heated where fumes are produced (welding or torching),
2. Dust control and suppression procedures are utilized so that the TWA (10 mg/m^3) for particulates not otherwise specified (PNOS) is not exceeded and airborne lead concentrations are kept below 0.05 mg/m^3,and,
3. Washing facilities are available for workers to wash hands and faces.

Removal or disturbance of paints and brick mortar is to follow the procedures outlined in the EACC document *"Lead Guideline for Construction, Renovation, Maintenance or Repair"*, October 2014.

6.1.4 Mercury

Mercury vapour is present within fluorescent lights.

When removing the fluorescent lights, the materials are to be handled carefully to ensure they are kept sealed and intact, which will prevent direct skin contact and the inhalation of mercury vapour. Mercury is to be disposed of per Ontario Regulation 347 if greater than five kilograms (5 kg) is produced within a month.

6.1.5 Silica

Crystalline silica is suspected to be present within the ceramic tiles and grout, masonry and mortar, and concrete (poured or pre-cast) within the assessed area.

The removal or disturbance of material suspected to contain crystalline silica should follow procedures outlined in the MOL document "*Guideline - Silica on Construction Projects*", dated September 2004.

6.1.6 PCBs

Light fixtures observed within the surveyed area were observed to contain a combination of T8 and T12 lights. T8 lights contain electronic ballast and do not contain PCBs. T12 lights have the potential to contain PCBs.

If the fluorescent light fixtures are to be disturbed as part of the project, they should be disassembled and the information on the ballast compared to the Environment Canada Document, *"PCB Identification of Lamp Ballasts Containing PCBs"* dated August 1991. If the ballast does not contain a label that states "PCB Free" or the serial code that does not identify it as "PCB Free" then the ballast should be presumed to contain PCBs and disposed of accordingly.

6.1.7 Mould

No visible mould growth or water-damaged building materials were observed within the assessed area. If mould growth is discovered as part of the renovation project, then the material should be removed following the Environmental Abatement Council of Canada (EACC) "*Mould Abatement Guidelines - Edition 3"*, dated 2015. Further, a qualified Health and Safety professional should be consulted to inspect and verify the proper removal of the building materials.

6.2 Remedial Recommendations

The following remedial work should be completed regardless of the planned renovation.

6.2.1 Asbestos

The following remedial work is necessary if the asbestos-containing building materials are to remain:

Location	Description and Quantity	Remedial Recommendations
1100-Girl's Washroom	10 Parging Cement Fittings in FAIR Condition located in plaster bulkhead	Repair insulation using Type 2 Asbestos Abatement Procedures (Limited access)
1100-Girl's Washroom	1 Parging Cement Fitting in FAIR Condition located at floor level in washroom stall	Repair insulation using Type 2 Asbestos Abatement Procedures
1101-Boy's Washroom	2 Parging Cement Fittings in FAIR Condition located in plaster bulkhead	Repair insulation using Type 2 Asbestos Abatement Procedures (Limited access)
1101-Boy's Washroom	2 Parging Cement Fittings in FAIR Condition located behind glazed masonry block wall	Repair insulation using Type 2 Asbestos Abatement Procedures (Limited access)

7.0 Statement of Limitations

The information and recommendations detailed in this report were carried out by trained professional and technical staff following generally accepted engineering and scientific work practices and procedures. Recommendations provided in this report have been generated in accordance with accepted industry guidelines and practices. These guidelines and practices are considered acceptable as of the date of this report.

During the preparation of this report, Parasol relied on information provided by the client, which includes reports and test results prepared by other consultants, the history and use of the site supplied by on-site personnel, and testing services provided by independent laboratories. Parasol has not made any independent verification of the provided information.

The collection of samples at the location noted was consistent with the scope of work agreed upon with the person or entity to whom this report is addressed and the information obtained concerning prior site investigations. As conditions between samples may vary, the potential remains for the presence of unknown additional contaminants for which there were no known indicators.

Information provided in this report by Parasol is intended for the client's use only. Parasol will not provide results or information to any party unless disclosure by Parasol is required by law. Any use by a third party of reports or documents authored by Parasol or any reliance by a third party on or decisions made by a third party based on the findings described in said documents is the sole responsibility of such third parties. Parasol accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted. No other warranties are implied or expressed.

Please contact the undersigned regarding the information presented within this report.

Sincerely,

Brad Panzer, Senior Project Manager
Parasol Environmental Inc.

Appendix A
Laboratory Certificate of Analysis

emcscientific
INCORPORATED

Laboratory Analysis Report

To:

Brad Panzer
Parasol Environmental
125–1860 Appleby Line, Unit #14
Burlington, Ontario
L7L 7H7

EMC LAB REPORT NUMBER: A112117
Job/Project Name: Ajax H.S.
Job No: 13260
Analysis Method: Polarized Light Microscopy – EPA 600
Number of Samples: 32
Date Received: Nov 21/24
Date Analyzed: Nov 28/24
Date Reported: Nov 28/24
Analyst: Elizabeth Mierzynski
Reviewed By: Chengming Li

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
S-01A	A112117-1[5]	Smooth plaster / 1101 – boys w/r	2 Phases: a) White, plaster b) Grey, plaster	 **ND** **ND**			 100 100
S-01B	A112117-2	Smooth plaster / 1101 – boys w/r	2 Phases: a) White, plaster b) Grey, plaster	 **ND** **ND**			 100 100
S-01C	A112117-3[5]	Smooth plaster / 1100 – girls w/r	2 Phases: a) White, plaster b) Grey, plaster	 **ND** **ND**			 100 100
S-02A	A112117-4[5]	Masonry block mortar / 1101 – boys w/r	2 Phases: a) Off white primer b) Grey / white cementitious material	 **ND** **ND**			 100 100
S-02B	A112117-5[5]	Masonry block mortar / 1101 – boys w/r	2 Phases: a) Off white primer b) Grey / white cementitious material	 **ND** **ND**			 100 100
S-02C	A112117-6[5]	Masonry block mortar / 1100 – girls w/r	2 Phases: a) Off white primer b) Grey cementitious material	 **ND** **ND**			 100 100
S-03A	A112117-7	Ceramic tile grout + mortar / 1100 – girls w/r	Beige cementitious material	**ND**			100
S-03B	A112117-8	Ceramic tile grout + mortar / 1100 – girls w/r	Beige cementitious material	**ND**			100

emcscientific INCORPORATED

Laboratory Analysis Report

EMC LAB REPORT NUMBER: A112117
Client's Job/Project Name/No.: 13260
Analyst: Elizabeth Mierzynski

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
S-03C	A112117-9	Ceramic tile grout + mortar / 1101 – boys w/r	Beige cementitious material	**ND**			100
S-04A	A112117-10[6]	Glazed block mortar / 1100 – girls w/r	Grey cementitious material	**ND**			100
S-04B	A112117-11[6]	Glazed block mortar / 1100 – girls w/r	Grey cementitious material	**ND**			100
S-04C	A112117-12[6]	Glazed block mortar / 1100 – girls w/r	Grey cementitious material	**ND**			100
S-04D	A112117-13[6]	Glazed block mortar / 1101 – boys w/r	Grey cementitious material	**ND**			100
S-04E	A112117-14[6]	Glazed block mortar / 1101 – boys w/r	Grey cementitious material	**ND**			100
S-05A	A112117-15	Parging cement / 1101 – boys w/r	Grey parging cement	**CH**	**60**		40
S-05B	A112117-16	Parging cement / 1100 – girls w/r	N/A	**NA**			NA
S-05C	A112117-17	Parging cement / 1100 – girls w/r	N/A	**NA**			NA
S-06A	A112117-18	DJC / corridor	White DJC	**ND**			100
S-06B	A112117-19	DJC / corridor	White DJC	**ND**			100
S-06C	A112117-20	DJC / corridor	White DJC	**ND**			100
S-07A	A112117-21	AT-01 / corridor	Grey ceiling tile	**ND**		75	25
S-07B	A112117-22	AT-01 / corridor	Grey ceiling tile	**ND**		75	25
S-07C	A112117-23	AT-01 / corridor	Grey ceiling tile	**ND**		75	25

emcscientific INCORPORATED

Laboratory Analysis Report

EMC LAB REPORT NUMBER: A112117
Client's Job/Project Name/No.: 13260
Analyst: Elizabeth Mierzynski

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
S-08A	A112117-24	Pipe insulation / corridor	2 Phases: a) Brown paper b) Black paper with tar	 **ND** **ND**		 90 80	 10 20
S-08B	A112117-25	Pipe insulation / corridor	2 Phases: a) Brown paper b) Black paper with tar	 **ND** **ND**		 90 80	 10 20
S-08C	A112117-26	Pipe insulation / corridor	2 Phases: a) Brown paper b) Black paper with tar	 **ND** **ND**		 90 80	 10 20
S-09A	A112117-27[6]	Brick mortar / corridor	Grey cementitious material	**ND**			100
S-09B	A112117-28[6]	Brick mortar / corridor	Grey cementitious material	**ND**			100
S-09C	A112117-29[6]	Brick mortar / corridor	Grey cementitious material	**ND**			100
S-10A	A112117-30	Pipe insulation / 1119 - custodian	Grey layered paper	**CH**	**60**	20	20
S-10B	A112117-31	Pipe insulation / 1119 – custodian	NA	**NA**			NA
S-10C	A112117-32	Pipe insulation / 1119 - custodian	NA	**NA**			NA

Note:
1. Bulk samples are analyzed using Polarized Light Microscopy (PLM) and dispersion staining techniques. The analytical procedures are in accordance with EPA 600/R-93/116 method.
2. The results are only related to the samples analyzed. **ND** = None Detected (no asbestos fibres were observed), **NA** = Not Analyzed (analysis stopped due to a previous positive result).
3. This report may not be reproduced, except in full without the written approval of EMC Scientific Inc. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
4. The Ontario Regulatory Threshold for asbestos is 0.5%. The limit of quantification (LOQ) is 0.5%.
5. Phase b) is small in size.
6. This sample is small in size.

EMSL Canada Inc.
2756 Slough Street, Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com torontolab@emsl.com

EMSL Canada Or	552419037
CustomerID:	55PAEN75
CustomerPO:	13260
ProjectID:	

Attn: **Brad Panzer**
Parasol Environmental Inc.
125-1860 Appleby Line
Unit 14
Burlington, ON L7L 7H7

Phone: (416) 579-1284
Fax:
Received: 11/21/2024 09:00 AM
Collected: 11/20/2024

Project: **Ajax H. S./ 13260**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client SampleDescription	Collected	Analyzed	Weight	RDL	Lead Concentration
Pb-03	11/20/2024	11/22/2024	0.2445 g	0.0082 % wt	<0.0082 % wt
552419037-0003	Site: 1100-Girls Washroom/ White Paint				
Pb-04	11/20/2024	11/22/2024	0.2497 g	0.0080 % wt	<0.0080 % wt
552419037-0004	Site: 1100 - Girls Washroom. Pale Yellow Paint				

Rowena Fanto, Lead Supervisor
or other approved signatory

* Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.
Samples analyzed by EMSL Canada Inc. Mississauga, ON AIHA LAP, LLC-ELLAP Accredited #196142

Initial report from 11/28/2024 08:42:58

EMSL Canada Inc.
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EMSL Canada Or	552419037
CustomerID:	55PAEN75
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Attn: **Brad Panzer**
Parasol Environmental Inc.
125-1860 Appleby Line
Unit 14
Burlington, ON L7L 7H7

Phone: (416) 579-1284
Fax:
Received: 11/21/2024 09:00 AM
Collected: 11/20/2024

Project: **Ajax H. S./ 13260**

Test Report: Lead by Flame AAS (SW 846 3050B/7000B)*

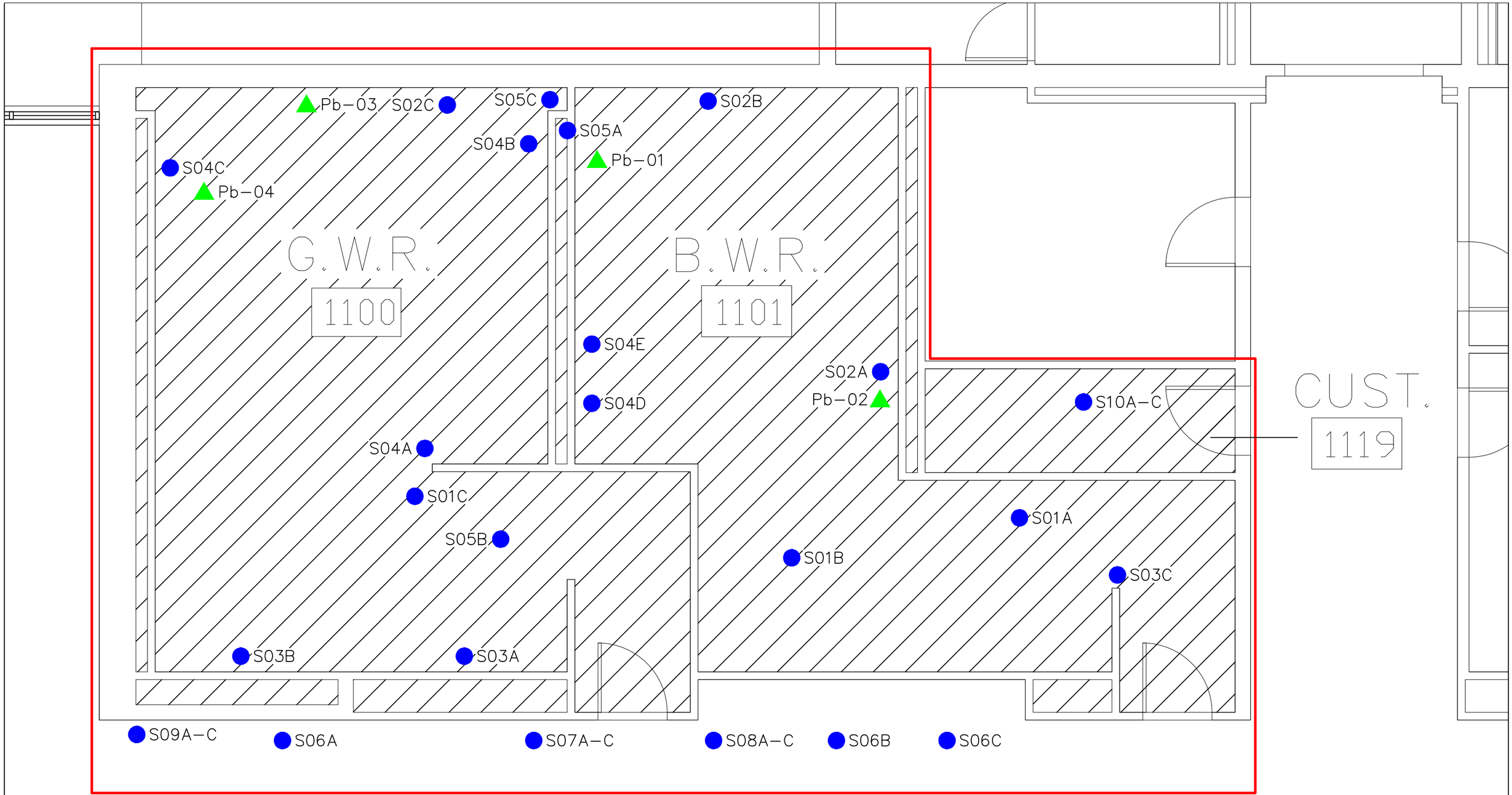
Client SampleDescription	*Collected*	*Analyzed*	*Weight (g)*	*RDL*	*Lead Concentration*
Pb-01	11/20/2024	11/25/2024	0.5040 g	40 mg/Kg	<40 mg/Kg
552419037-0001	Site: 1101- Boys Washroom/ Glazed Block Mortar				
Pb-02	11/20/2024	11/25/2024	0.5029 g	40 mg/Kg	<40 mg/Kg
552419037-0002	Site: 1101- Boys Washroom/ Masonry Block Mortar				

Rowena Fanto, Lead Supervisor
or other approved signatory

* Analysis following Lead in Soil/Solids by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 40 mg/kg based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.
Samples analyzed by EMSL Canada Inc. Mississauga, ON

Initial report from 11/28/2024 08:42:58

Appendix B
Site Drawing



TITLE	LEGEND		CONFIRMED & SUSPECTED ACM		DRAWING NO	DRAWN BY:
Limited Designated Substance Survey First Floor Plan	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	DSR-01	B. PANZER
CLIENT		NO ACCESS		MECHANICAL INSULATIONS (PARGING CEMENT AND PIPE STRAIGHT INSULATION)	SCALE	PARASOL PROJECT NO
Durham District School Board		ASBESTOS SAMPLE LOCATION			NTS	13260
LOCATION		LEAD SAMPLE LOCATION			DATE	
Ajax High School 105 Bayly Street East Ajax, Ontario		SURVEY AREA			November 29, 2024	

Parasol Environmental Inc.

Part 1 General

1.1 RELATED SECTIONS

.1 This Section specifies work which shall be performed by:
Section 04 22 01: STRUCTURAL LOAD BEARING CONCRETE MASONRY UNIT (CMU) CONSTRUCTION.

1.2 QUALITY ASSURANCE

.1 Requirements of Regulatory Agencies:
Modify requirements of the Specifications only as jurisdictional authorities may direct.

1.3 REFERENCES

.1 ASTM C270-89: Standard Specification for Mortar for Unit Masonry.
.2 CSA A179-04 (R2009): Mortar and Grout for Unit Masonry.
.3 CSA A371-04 (R2009): Masonry Construction for Buildings.
.4 CSA S304.1-04: Masonry Design for Buildings (Limit States Design).

1.4 SUBMITTALS

.1 Affidavits:
Submit to Consultants affidavits of an inspection company that mortar and grout materials conform to requirements of the Specifications, if requested.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Handle and store cementitious materials protected against moisture.

.2 Handle and store all mortar materials to prevent contamination by foreign materials, and damage by freezing or excessively high temperatures.

1.6 SITE CONDITIONS

.1 Environmental Requirements:
When air temperature is less than 5^{o} C, mix mortar as specified in CSA A371.

Part 2 Products

2.1 MATERIALS

.1 Use materials only as specified in CSA Standard A179 referenced from CSA A371 and CSA S304.1 as applicable. Ensure that water and aggregate used in mortar, other than in walls buried in earth, will cause no efflorescence.

.2 Incorporate only materials from same source in mortar exposed to view.

.3 Water: Verify that water used contains no salts to cause efflorescence.

.4 Portland Cement: to CAN/CSA-A3001, Type GU; grey colour, unless indicated

elsewhere.

.5 Masonry Cement: to CAN/CSA-A3002, Type S.

.6 Hydrated Lime: to ASTM C207, Type S-Special.

.7 Mortar Aggregate: natural sand, to CSA A179, standard masonry type; clean, dry, protected against dampness, freezing and foreign matter.

.8 Grout Coarse Aggregate: to CSA A179, maximum 10 mm size, 27 percent by volume.

.9 Grout Fine Aggregate: to CSA A179, clean well graded sharp sand; 54 percent by volume.

.10 Water: potable, clean and free of deleterious amounts of acids, alkalies or organic materials.

2.2 ADMIXTURES

.1 Plasticizer: water reducing type, reducing porosity and absorption to increase bond strength.

.2 Water Repellent: mixture of calcium carbonate and hydrous magnesium aluminum silicate powders.

2.3 MIXES

.1 Mortar for Concrete Masonry Units: to CSA A179, Type S using the Proportion Specification Method c/w water repellent addition.

.2 Mortar for Calcium Silicate Masonry Units: to CSA 179, Proportion Specification Method, consisting of 1-1-6 mix of Portland cement, hydrated lime and aggregate, c/w integral colour.

.3 General: Ensure that water and aggregates used are all from same source and will meet required strengths. Batch mortar and grouts are acceptable provided source is approved prior to commencement of work.

.4 Mix mortars as specified in CSA A179. Use only dry aggregate. Test for bulking to determine accurate proportioning.

.5 Do not incorporate calcium chloride in mortar mix. In cold weather non-chloride accelerating admixtures may be utilised such as Accelguard 80 by Euclid Chemical Canada Inc., or equivalent meeting specified requirements of ASTM Specification C270.

.6 Dirt resistant additives: aluminum tristearate, calcium stearate or ammonium stearate.

.7 Use aggregate passing 1.18 mm sieve where 6 mm thick joints are indicated.

.8 Colouring Additive: A mineral-oxide pigment, harmless to mortar set and strength, shall be provided. Colour shall be one (1) colour per masonry unit type, as selected by the

Consultant.

2.4 GROUT

.1 Grout in Reinforced Masonry Cores, Bond Beams and Lintels:
: 20 MPa strength at 28 days
: 175 – 200 mm slump, mixed to CSA – A179, fine grout.

Part 3 Execution

3.1 MIXING

.1 Mix mortar to consistency required for working.

.2 Mix grout to semi-fluid consistency.

.3 Incorporate colour and admixtures into mixes in accordance with manufacturer's instructions. Use clean mixer for coloured mortar.

.4 Prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball. Allow to stand for not less than 1 hour nor more than 2 hour then remix with sufficient water to produce mortar of proper consistency for pointing.

3.2 INSTALLATION

.1 Grout fully all pockets in concrete foundation walls where structural components installed, under bearing plates at piers and elsewhere as noted on drawings.

.2 Grout solid all reinforcing installed in concrete block walls.

.3 Protect all mortar and grout installed from freezing or from excessive heat which will prevent bonding or decrease the required compressive strength.

3.3 PREPARATION

.1 Protection:
Provide waterproof protection over construction surfaces at mixing areas to prevent deposit on them of mortar and mortar materials.

3.4 MORTAR TYPES

.1 For laying concrete and brick unit masonry, use mortar type:
"S" in masonry walls in contact with earth.
"S" in masonry walls for all structural walls.
"N" in non-structural applications.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 This section to be read in conjunction with Section 04 21 13 for Execution Requirements.

.2 Work performed by other Sections and which is related to this Section is specified in:
Section 03 10 00: Concrete Formwork: for dovetail anchor slots in concrete, concrete lintels.

.3 Supply of work which shall be installed by this Section is specified in:

Section 05 12 23: Structural Steel for Buildings: to furnish bearing plates, steel lintels

Section 05 31 00: Steel Decking: to furnish weld plates. Miscellaneous inserts and attachment devices to support the installations of other Sections, frames and miscellaneous metal work

.4 This Section shall include performance of work which is specified in:
Section 04 05 12: Mortar and Grout

1.2 SYSTEM DESCRIPTION

.1 Tolerances:
Lay masonry to tolerances specified in CSA A371 and:
.1 Level within 6 mm in any bay or 6 m maximum distance, and 13 mm in 12 m or more.
.2 Opening sizes within 6 mm of designated dimension.
.3 With joints to dimensions indicated, but in no case greater than 13 mm.

1.3 QUALITY ASSURANCE

.1 Requirements of Regulatory Agencies:
.1 Construct masonry as required by jurisdictional authorities.
.2 Before commencing masonry work, verify that site conditions will allow construction of masonry within required limitations for wall heights, wall thickness, openings, bond, anchorage, lateral support, and compressive strengths of masonry units and mortars.
.3 Construct masonry fire rated assemblies, which are validated by UDI, ULC, or NRC fire tests, in complete accordance with the test design specification. Fire rated assemblies constructed otherwise will be acceptable only on presentation of authorization by jurisdictional authorities.

1.4 REFERENCES

.1 CAN/CSA-A165 SERIES-04 (R2009): Concrete Block Masonry Units
CAN/CSA-A370-04 (R2009): Connectors for Masonry

CAN/CSA-A371-04 (R2009): Masonry Construction for Buildings

CSA S304.1-04: Design of Masonry Structures (Limit States Design)

.2 Reference standards quoted in Contract Documents refer to: ASTM A924/A924M-95, Specification for General Requirements for Steel Sheet Metallic Coated by the Hot-Dip Process.
CAN/CGSB-37.2-M88, Emulsified, Asphalt, Mineral Colloid Type, Unfilled, for Dampproofing and Waterproofing, and for Roof Coatings.

1.5 SUBMITTALS

.1 Samples:
Submit samples of unit masonry for review.

.2 Affidavits:
Submit affidavits by an approved independent testing laboratory stating that materials supplied are in accordance with the Specifications, if requested.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Isolate masonry units from contact with ground and other materials until laid, to prevent staining.

.2 Ensure that moisture content of concrete masonry units is maintained within specified limits from time of shipment from plant, to time of installation.

.3 Cover masonry unit stockpiles while stored to prevent exposure to weather. Keep water out of all holes and reglets in units during freezing weather.

.4 Handle and store masonry units to prevent soiling and chipping.

.5 Deliver products to the place on site as directed, and to meet installation schedule.

Part 2 Products

2.1 MATERIALS

.1 Meet specified requirements of CSA A370 and CSA A371 for materials unless specified otherwise.

.2 Asphalt Emulsion:
To meet specified requirements of CAN/CGSB-37.2.

.3 Joint Packing at Walls:
.1 Fire Separation Packing: at tops of fire rated walls and partitions: Thermafiber 200 degree glass fibre insulation by Canadian Gypsum Company, Limited, or Firebarrier fibre firestopping by AD Distributors Ltd.
.2 Expansion Joint Packing: Glass fibre insulation, rigid board, density of 48 kg/cu.m.; or Rodofoam by Sternson Limited, or closed cell neoprene DA2015 by Dur-O-Wal Ltd.

.4 Joint Reinforcement:

.1 Provide joint reinforcement in width to ensure that longitudinal rods at faces of wall have minimum mortar cover of 16 mm and that they are centred on shells of hollow core units.

.2 Horizontal joint reinforcing shall include longitudinal and cross rods, welded steel rod, Truss type extra heavy duty Blok-Lok BL-30 or 120 Truss-Mesh by Hohmann & Barnard Inc. Galvanizing as per Section 2.1.9.

.3 For Exterior single-wythe block wall horizontal joint reinforcement shall include cross ties hot dipped galvanized Truss type (Extra Heavy Duty). Spacing to be minimum everty 3rd course, U.N.O.

.4 For Interior Single Wythe Load-bearing Walls shall include 4.8mm cross ties mill galvanized Truss type (Extra Heavy Duty). Spacing to be as per drawings.

.5 For Interior Single Wythe Non-Load-bearing Walls provide 3.76 mm dia. longitudinal and cross rods, welded steel rod, galvanized, ladder design (Standard). Spacing shall be every second block course.

.6 All joint reinforcing to be galvanized as per 2.19 of this Section.

.5 Wall Tie (Structural Steel Back-up):

Adjustable, dual component design; suitable for welded attachment; e.g. Blok Lok Flex o-lok ties BLT-9, hot dipped galvanized c/w V-Tie, 4.8 mm size; hot dipped galvanized, suitable length to provide placement of tie legs at central line of veneer.

.6 Strap Anchors: 6.35 mm thick steel plate, hot dipped galvanized; U-shaped and Z-shaped to suit application; e.g. BLT 11Z BY Blok-Lok.

.7 Galvanizing:

.1 For Joint Reinforcement, Bond Ties, Anchors, and Accessories in Exterior Walls: To meet specified requirements of ASTM Specification A153 , Class B, hot dip.

.2 For Joint Reinforcement, Anchors, and Accessories in Interior Walls: above grade Manufacturer's standard mill galvanising.

.3 For Joint Reinforcement, Bond Ties, Anchors, and Accessories in interior walls below grade: To meet specified requirements of ASTM Specification A153, Class B, Hot Dip Gavanized.

.8 Reinforcing Steel:

For reinforced block lintels: to meet specified requirement of CSA Standard G30.18.

.9 Dovetail Anchor:

25 mm x 2mm formed sheet steel dovetail brick anchor galvanised, with end bent to form hook, to suit dovetail anchor slot specified for installation by formwork constructor.

.10 Weep Holes:

Plastic tube, 10mm OD x 100 mm long, or 10 mm x 38 mm x 90 mm long rectangular; or DA1069 Cell Vent by Dur-O-Wall Limited.

.11 Concrete Masonry Units:

.1 To meet specified requirements of CAN3-A165 Series – 04.

.2 Include all special shapes, such as end, bond, sash groove and lintel units, required for complete masonry installation indicated on Drawings. Use bullnose corner block at all door jambs, vertical external corners and where otherwise

indicated on Drawings.

.3 Modular size units.

.4 Provide 100% solid units where required by jurisdictional authorities.

.5 Moisture controlled ("M") units acceptable to Consultant.

.6

.1 Normal Weight Units: For use in walls below ground floor elevation:
Hollow Units: H/15/A/O.
75% Solid Units: S/15/A/M.
Solid Units: Sc/15/A/O:

.2 Light Weight Units: For use in walls above ground floor elevation:
Hollow Units: H/15/C/M
75% Sold Units S/15/C/M
Solid Units: Sc/15/C/M

.7 Supply lintel blocks for fabrication of lintels by Section 03 30 00.

Part 3 Execution

3.1 PROTECTION

.1 Cover exposed tops of masonry walls when laying is not in progress and until protected by completed construction. Cover with non-staining waterproof material to overhang top edges of wall by 600 mm minimum and secured to prevent dislodgement.

.2 Protect exposed external corners of masonry with materials which will not damage or soil finished surfaces.

.3 Protect all finished surfaces from mortar droppings.

.4 Take particular care to protect faces of concrete unit masonry from mortar droppings and smears as laying proceeds.

.5 Turn over or cover scaffolds and mortar boards at completion of each day's work to avoid staining of finished surfaces by splashed rain.

3.2 LAYING MASONRY

.1 Lay masonry to meet specified requirements of CSA A370 and CSA A371, unless otherwise specified.

.2 Lay masonry to course as shown on Drawings and to minimise cutting of units.

.3 Coordinate coursing of dissimilar sized units only as approved by Consultant.

.4 Use only dry and unfrozen materials.

.5 Remove sections of masonry which have been frozen before laying of masonry continues.

.6 Lay masonry in running bond with vertical joints of alternate courses in line.

.7 Lay concrete unit masonry with thick ends of webs on top.

.8 Joints:

.1 Make joints of uniform thickness with vertical joints from course to course maintained plumb.

.2 Provide full bed and head joints for shear walls.

.3 When laying is resumed on walls previously laid with mortar either partially or totally set, remove loose units and mortar from top and adjoining surfaces. Remove mortar completely when masonry is removed and replaced with new.

.4 Form tooled concave joints wherever exposed to view, whether behind cabinets, fitments, and wall accessories, or not. When mortar has become "thumb-print" hard, tool joints and clean off burrs with trowel or burlap. Use a tool with a bearing surface of 550 mm minimum length on horizontal joints to avoid uneven depressions.

.5 Rake out joints to masonry exposed to view to provide for caulking
: at junction of interior and exterior walls with columns.
: at junction of interior with exterior walls.
: intersections of walls and partitions where joint reinforcement is installed.
: at caulked joints where indicated typically.

.9 Stop off horizontal runs of walls by racking back a half unit in each horizontal course: do not touch.

.10 Do not wet concrete units.

.11 Distribute masonry units of varying colours and textures to avoid spotty appearance over wall surfaces exposed to view. Do not use units which contrast too greatly with overall range.

.12 Use chipped and blemished units only where concealed. Do not use defective or broken units. Do not lay concrete units with markedly smooth face that will appear slick where exposed to view, whether painted or not.

.13 Maintain bracing of walls and piers continuously during construction until structure provides support.

.14 Lintels:

.1 Build in Lintels supplied by Section 03 30 00 and 05 50 00. Set and level lintels on a bed of mortar.

.2 Build in precast concrete block lintels fabricated under work of Section 03 30 00.

.3 Provide means to prevent damage due to differential movement resulting form expansion or contraction and from deflection of lintel.

.4 Bridge openings not exceeding 450 mm in width with 6 mm mild steel plate lintels bearing 100 mm on each side of opening. Width of plate shall be wall thickness less 25 mm. Joint at lintel to be dry packed. Provide weep joints in mortar at 800 mm above lintels.

.15 Built-In Items:

.1 Verify that built-in items specified in other Sections are available for building in before laying of masonry commences. Co-operate in the setting and aligning of built-in items and provide for later installation of items which are installed by

other Sections, to avoid cutting, fitting, and patching.

.2 Build masonry around pressed steel door frames supplied and set as specified in other sections. Ensure that anchors are well secured and that frames are true and plumb. Completely fill frames with mortar as each course is laid. Maintain protective frame covering and ensure that no mortar is left on frame faces.

.16 Cope, cut and split concrete masonry units with power-driven abrasive discs. Cut units wherever electrical outlets, grilles, and pipes occur. Allow 3.2 mm clearance around items which are incorporated in walls.

.17 Do not expose open cells, cores or frogs of masonry units to view.

.18 Coat faces of concrete covered with less than 200 mm of masonry veneer at exterior walls and parapets with prime coat and one dampproof coat of asphalt emulsion.

.19 Locate bearings and piers as indicated on Drawings; provide solid masonry units at bearings.

.20 Extend walls and partitions at top to deck, slab or structural members, as applicable, except where otherwise noted on Drawings. Incorporate both lateral support and deflection space at termination of walls as required by this Section. Where walls terminate at bottoms of steel joists, close space at joists to deck or slab with metal lath and plaster on one side of joist or with 16 mm thick fire rated, Type X. gypsum board secured to each side of joists, if infilling with masonry is impractical; and to meet specified requirements of Section 09 21 16. Ensure that construction at joists completely closes and seals space.

.21 Masonry Solid Wall Anchorage:

.1 Use dovetail anchors for slots at concrete construction.

.2 Keep masonry a minimum of 12.7 mm clear of faces of structural members or as indicated on Drawings, and fill space with glass fibre board, leaving space for caulking at joints exposed to view or the weather.

.3 Bed anchors solidly in mortar joints.

.4 Fill cores of hollow units solidly with mortar where anchors are embedded.

.5 Co-ordinate with Section 031 0 00 to ensure that dovetail anchor slots in concrete are located correctly. Assist in their installation if requested.

.6 Coodinate with Section 11 52 00 locations of all wall mounted Gymnasium equipment and fill blocks solid above, below, and within mounting locations.

.22 Joint Reinforcement:

1. Install joint reinforcement in single wythe masonry walls and partitions. Place reinforcement continuously in horizontal joints spaced as noted on structural drawings, beginning with course 400 mm above bearing, unless otherwise specified or indicated.
2. Place reinforcement additionally in courses 200 mm, 400 mm and 800 mm above and below openings, and extending 600 mm beyond jambs of openings.
3. Where changes in wall thickness occur, extend reinforcement of lesser width 450 mm beyond changes of width.

4. Lap reinforcement a minimum of 150 mm at splices.
5. Do not run reinforcement through control joints.
6. Wherever walls and partitions intersect one another, or each other, continue reinforcement through. Do not carry reinforcement through intersections where lateral support anchors are installed or at intersections of walls and partitions with solid piers.
7. Bond cavity walls together with cavity-wall ties staggered in alternate course and spaced not to exceed 800 mm horizontally and 600 mm vertically. Provide additional ties spaced not more than 400 mm apart within 200 mm of openings and on each side of control and expansion joints, except where wythes are bonded together with masonry returns or otherwise.
8. Install vertical reinforcing to size and spacing as shown on Drawings. Fill voids with minimum 10 MPa grout.
9. Properly position vertical bar reinforcement in concrete masonry pilasters, columns, and walls and secure against displacement.
10. Provide two 15M size reinforcing bars grouted vertically into masonry unit cores on both sides of masonry openings. One bar per cell.
11. Solidly fill block cores containing vertical reinforcement or anchor bolts with grout.
12. Lap splices 30-bar diameters minimum. Clear distance between vertical bars and masonry units shall be 15 mm.
13. Provide 20M size reinforcing bars full height, each cell, complete with 25MPa concrete as shown on drawings.

.23 Deflection Space:

.1 Incorporate a deflection space between tops of non-load-bearing walls and partitions and structure to prevent transference of structural loads to masonry.

.2 Fill deflection space with glass fibre board compressed to 50% of original thickness to completely seal space.

.3 Co-ordinate laying of masonry with installation of lateral support specified in this Section and as provided by Section 05 50 00.

.24 Penetrations of Masonry:

.1 Fill voids of masonry to within 19 mm of structural members, pipes, ducts and conduit that penetrate masonry walls and partitions, unless otherwise indicated.

.2 Keep masonry units similarly clear of such penetrations.

.3 Finish mortar smooth at face of masonry.

.4 Pack remainder of annular void surrounding penetrating item with fire separation packing to within 12.7 mm of face of masonry to allow for sealant.

.25 Shrinkage Control Joints:

.1 Incorporate vertical shrinkage control joints in walls of which concrete masonry units are a part.

.2 Install control joints at junctions of walls and columns, at intersections of unit concrete masonry load-bearing walls, and wherever indicated on Drawings, and otherwise in wall with no openings, at a maximum spacing of 6000 mm o/c. Carry joints full height of walls.

.3 Ensure complete vertical separation through walls incorporating control joints. Make control joints 9.5 mm wide, rake back 19 mm at junctures with concrete, and leave joints free and clear for caulking, as specified in Section 07 92 10.

.4 Construct control joints of standard block and fill void between block with 20 MPa concrete grout to form a continuous key full height of joint by installation of continuous building paper between concrete key and block on one side of joint.

.26 Expansion Joints:

.1 Incorporate expansion joints in walls where indicated on Drawings.

.2 Maintain expansion joints free of mortar with temporary filler when laying masonry. Pack joints full height with glass fibre board compressed to 50% of original thickness.

.3 Leave clean space in joints for caulking as specified in Section 07 92 10.

.27 Fire Separations:

.1 Construct fire separation walls tightly to construction at perimeter, and without openings or voids.

.2 Do not reduce the thickness of masonry fire separations to less than the thickness indicated for the required fire separation rating.

.3 All load bearing and non-load bearing partitions shall carry to the underside of structure above.

.4 All openings in partitions, even above ceilings shall be patched to maintain sound and fire separation.

.5 In partitions and walls not required to be fire separations, fill space between partitions and structural elements with rock wool compressible filler to maintain complete sound separation.

.6 In fire separations, spaces to be firestopped in accordance with Section 07 84 00 – Firestopping.

.7 Use U.L.C. labeled mortar for all patching in fire separations.

.28 Lateral Support Anchors:

.1 Vertical:

.1 At intersecting and abutting load bearing walls, use prefabricated corners and tees to match horizontal reinforcing.

.2 At intersection of non-load bearing walls with load bearing or non-load bearing walls, use corrugated galvanized ties.

.3 At wood parapet and similar conditions, use model BL404 with BLT9 ties, all by BlokLok. Ensure ties extend a minimum of 50 mm into the brick or block outer wythe.

.29 Bonding

.1 Walls of two or more widths: bond using metal ties in accordance with

subsection 5.6 of CAN3-A371.

.2 Submit procedure and obtain approval by Architect.

.3 In cavity walls, keep all cavity spaces free of mortar and debris by placing a wood strip on the ties. Retain strip on a wire line and pull up level and clean off droppings prior to placing next course of ties. Install mortar control device at 300 mm o.c. horizontally, in a staggered pattern so as to overlap each other on each side. Install in every 2nd course above foundation and shelf angles.

.30 Thru-wall flashing and Thru-wall Building Paper at Control Joints

.1 Install thru-wall flashing at ground floor elevation in all walls on foundations.

.2 Leave 2" (50 mm) of thru-wall flashing or building paper hanging, projecting off all lintels and all required locations. Architect will review prior to cutting.

.3 Cutting protruding flashing: This procedure is to ensure that thru-wall flashing is installed where intended.

.31 Base Course Detail

.1 Provide square base block in areas of porcelain tile installation for porcelain cove base and fitted corners. Contractor to grind upper 50mm of block corner to match upper courses of bullnose block walls Refer to Details

.32 Cold Weather Protection

.1 Refer to the Ontario Masonry Contractor's Association's provision and publications. Include for tarped heated enclosures, heated mortar mixing pans - no non-freeze additives such as calcium will be tolerated on this project.

3.3 ADJUSTMENT AND CLEANING

.1 Patch damaged masonry in walls which have been rejected as unacceptable.

.2 Point all holes in mortar joints except weepholes.

.3 Point all voids in concrete unit masonry faces.

.4 Cut out defective mortar joints to a minimum depth of 13 mm and repoint.

.5 Clean concrete masonry units with dry brushes and as otherwise recommended by the supplier to remove mortar and stains.

.6 Do not use wire brushes for cleaning.

.7 Should specified cleaning methods be insufficient, proceed with other methods only with approval.

.8 Protect adjacent materials, construction and finished surfaces from damage while cleaning.

.9 Ensure that all efflorescence and mortar deposits are removed from surfaces to receive coating.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 03 30 00 - Cast-in-Place Concrete.

.3 Section 04 21 13 – Masonry.

.4 Section 05 12 23 - Structural Steel.

.5 Section 05 21 00 - Steel Joist Framing.

.6 Section 05 31 00 - Steel Deck.

.7 Section 06 10 11 – Rough Carpentry.

.8 Section 08 91 00 – Interior Glazed Guardrail System.

.9 Section 09 91 22 - Painting.

1.2 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 Steamless.

.2 ASTM A143/A143M-07, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

.3 ASTM A269-10, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.4 ASTM A307-07b, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.5 ASTM A325-10, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

.6 ASTM A563-07a, Standard Specification for Carbons and Alloy Steel Nuts.

.2 Canadian Institute of Steel Construction (CISC)

.1 CISC/CPMA 2.75, A Quick-drying Primer for Use on Structural Steel.

.3 Canadian Standards Association (CSA International)

.1 CAN/CSA-A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/ Methods of Test for Concrete.

.2 CAN/CSA-G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel.

.3 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.4 CAN/CSA-S16.1-09, Limit States Design of Steel Structures.

.5 CSA S136-07, North American Specification for the Design of Cold-Formed Steel Structural Members.

.6 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.

.7 CSA W59-03,Welded Steel Construction (Metal Arc Welding) (Imperial Version).

.4 NAAMM, The National Association of Architectural Metal Manufacturers.

1.3 DESIGN REQUIREMENTS

.1 Design details and connections, where not shown on Drawings, in accordance with CAN/CSA-S16.1 and CSA S136.

1.4 SUBMITTALS

.1 Shop Drawings

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.5 QUALITY ASSURANCE

.1 Retain a Professional Engineer, licensed in the Province of Ontario, with experience in Work of comparable complexity and scope, to perform the following services as part of the Work of this Section:

.1 Design steel stairs, handrails and railings, and metal fabrication items that are required to resist live, dead, lateral, wind, or seismic loads.

.2 Review, stamp, and sign shop drawings.

.2 Workmanship: Fabricate Work of this Section to meet the required class of workmanship indicated below in accordance with AMP 555, Section 8.

.1 Class 1: for use on direct exposed to view fabricated items:

.1 Exposed surfaces are finished smooth with pitts, mill marks, nicks, burrs, sharp edges, and scratches filled or ground off. Defects should not show when painted, polished, or finished.

.2 Welds should be concealed where possible. Exposed welds are ground to small radius with uniform sized cove unless otherwise noted.

.3 Distortions should not be visible to the eye.

.4 Exposed joints are fitted to a hairline finish.

.3 Execute welding by firms certified in accordance with CSA W47.1 Division 1 or 2.1. Ensure welding operators are licensed per CSA W47.1 for types of welding required by Work.

.4 Perform stainless steel work in accordance with NAAMM, Code of Standard Practice for the Metal Industry, Workmanship, Class 1.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Packing, Shipping, Handling and Unloading:

.1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Storage and Protection:

.1 Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.

.2 Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Divert unused metal materials from landfill to metal recycling facility approved by Consultant.

Part 2 Products

2.1 MATERIALS

.1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 350 for tubes and Grade 300W for Plates and Flat Shapes.

.2 Welding materials: to CSA W59.

.3 Bolts and anchor bolts: to ASTM A307.

.4 Stainless steel tubing: to ASTM A269, Type 302 or 304 alloy, Seamless welded with AISI No. 4 finish.

.5 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

.6 Steel bar grating: Bearing bar sizes and spacing as recommended by manufacturer to suit intended application. Grating as manufactured by Borden Metal Products Ltd., Fisher & Ludlow Ltd. or McNichols Co. Grating type as selected by the Consultant.

.7 Drilled inserts: Mega by ITW Construction Products or HSL by Hilti Inc. heavy-duty anchors, sizes as shown.

.8 Concrete forms: As required for intended application, Sonotube by Sonoco Ltd. or approved alternative.

.9 Concrete: Minimum 20.684 MPa concrete conforming to CAN/CSA-A23.1/A23.2.

2.2 PRIMERS, COATINGS AND SHOP PAINTING

.1 Interior Steel in Dry Areas: Quick drying oil alkyd conforming to CISC/CPMA 2.75.

.2 Exterior Steel, Interior Steel in Unheated Areas, Steel Embedded in Concrete**:** Hot dip galvanized conforming to CSA G164, minimum Z275 coating. Galvanizing of structural steel components and loose lintels: refer to Section 05 12 23.

.3 Galvanized Coating Touch-Up**:** Inorganic zinc rich primer. For use on galvanized fabrications where touch up is to remain unpainted in finished work; Carbozinc 11WB by Carboline Company, Catha-Coat 305 by Devoe Coatings or Zinc Clad XI by Sherwin Williams.

.4 Apply two (2) shop coat(s) of primer or coating as indicated above and according to manufacturers recommendations. Do not prime aluminum, stainless steel or those components to be galvanized or encased in concrete.

.5 Use primer unadulterated, as provided by manufacturer. Paint on dry surfaces free from rust scale and grease. Do not paint when temperature is lower than 10 deg. Celsius and rising.

.6 Clean surfaces to be field welded; do not paint.

2.3 FASTENINGS

.1 Use nuts and bolts conforming to ASTM A307, A325, and A563 as applicable.

.1 For interior work, use cadmium-plated fastenings where other protection is not specified.

.2 For exterior work, use Type 300 or 400 stainless steel.

2.4 ANCHORS AND SHIMS

.1 For exposed anchorage of aluminum, if applicable, use stainless steel and otherwise to match metal anchored. For non-exposed work, anchors and shims may be galvanized steel.

.2 Epoxy anchors: As manufacturer by Hilti Inc. or approved alternative to suit application.

2.5 PIPE

.1 To ASTM A53, extra strong steel pipe for bollards.

2.6 BITUMINOUS PAINT

.1 Alkali-resisting to meet specified requirements of CAN/CGSB-1.108, Type 2. Use to insulate contact between dissimilar metals.

2.7 GROUT

.1 Grout: non shrink, non ferrous grout, pre mixed ‘M Bed Standard’ manufactured by Sika Canada Inc., or ‘Masterflow Plus 713’by Master Builders/Degussa, or ‘V-3’ by W.R. Meadows of Canada Ltd., or ‘NS Grout’ by Euclid Canada.

2.8 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.

.3 Where possible, fit and shop assemble work, ready for erection.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

.5 Weld all connections where possible, and bolt where not possible unless indicated otherwise on drawings.

.6 Weld all stainless steel by the Argon Arc Process. Grind smooth and polish joints, crence-free, and flush without seams.

2.9 LIST OF MISCELLANEOUS METAL FABRICATIONS

.1 This Section includes, but is not limited to the following list. Note: Galvanize all exterior items and other items noted. Prime paint all interior items.

.1 Anchors, Bolts, Inserts, Sleeves for Work in this Section.
.2 Hangers and Supports (for Work in this Section).
.3 Lintels (if not by Structural Steel).
.4 Shelf Brackets
.5 Masonry lateral support angles.
.6 Shelf Angles.
.7 Closure plates (for exposed HSS and W-flange columns)
.8 Channel door frames.
.9 Supports for Motorized Gymnasium Dividing Curtain
.10 Miscellaneous steel brackets, supports and angles.
.11 Tube framing.

Part 3 Execution

3.1 GENERAL

.1 Supply and install all miscellaneous metal work indicated on the Drawings and not indicated in work of other Sections in addition to items listed below.

3.2 EXAMINATION

.1 Examine previously installed Work, upon which this Section depends, verify dimensions and condition of existing Work, and coordinate repairs, alterations, and rectification if necessary. Commencement of Work of this Section is deemed to signify acceptance of existing, prior conditions.

.2 Obtain Consultant's written approval prior to field cutting or altering of structural members.

3.3 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. Spray or brush apply a minimum of three (3) coats of zinc-rich paint to achieve a dry film thickness of 8 mils. Apply a finish coat of aluminum paint to provide a colour blend with the surround galvanizing.

3.4 LINTELS

.1 Fabricated from CAN/CSA-G40.20/G40.21-M, Grade 350W, size and location as shown, width to be not less than 25 mm less than width of wall and extend 200 mm beyond opening at each end.

.2 Unless otherwise shown, fabricate lintels in block walls of steel sections.

3.5 MASONRY LATERAL SUPPORT ANGLES

.1 Supply only, to Section 04 22 00 for installation, all horizontal lateral support anchors at top of non-load-bearing masonry walls.

.2 Refer to Structural Drawings for size and spacing of required support anchors. Provide drilled holes as required for anchorage.

.3 Galvanized for all exterior wall and unheated and high humidity locations.

3.6 SHELF ANGLES

.1 Of size indicated on drawings and as specified in structural steel specifications, with adjustable inserts for vertical adjustment and slotted holes for horizontal; galvanized.

3.7 CHANNEL DOOR FRAMES

.1 Structural channel sections, selected for trueness of web and flange, with joints welded and ground smooth.

.2 Supply bar stop and bent bar anchors for anchorage to masonry or concrete as required.

.3 Fit frames with temporary spreaders to prevent frame from springing out of shape.

3.8 MISCELLANEOUS STEEL BRACKETS, SUPPORTS AND ANGLES

.1 Supply and install or supply for installation by trades responsible, all loose steel brackets, supports and angles where indicated, except where such brackets, supports and angles are specified under work of other Sections. Drill for countersunk screws, expansion anchors and anchor bolts.

.2 Unless otherwise specified, prime paint for interior installation; galvanized finish for exterior installation.

3.9 TUBE FRAMING

.1 Provide steel tube framing for garbage enclosure gates as required for installation under Section 06 10 11. Finish: Galvanized.

3.10 GALVANIZED STEEL

.1 Galvanize steel members, fabrications, and assemblies after fabrication by the hot dip process in accordance with CSA G164, minimum Z275 coating.

.2 Galvanize bolts, nuts and washers and iron and steel hardware components in accordance with CSA G164.

.3 Safeguard products against steel embrittlement in conformance with ASTM A143.

.4 Design features which may lead to difficulties during galvanizing shall be pointed out prior to dipping.

.5 The composition of metal in the galvanizing bath shall be not less than 98.0% zinc.

3.11 STAINLESS STEEL WORK

.1 Take all necessary precautions to safeguard against latent surface discolouration due to disturbance of the natural protective oxide coating of the material or to contamination from other sources.

.2 Workmanship shall be the best standard practice for this type of work. Execute stainless steel work in accordance with the applicable instructions set forth in Atlas Stainless Steels' "Technical Data" handbook on stainless steel.

.3 Do all stainless steel fabrication in clean shops, located away from areas where carbon steel is burnt, ground, or cut with abrasive wheels to ensure that carbon steel dust will not be embedded into the stainless steel, and as follows:

.1 In fabrication of stainless steel do not use tools and dies which have been used on carbon steels.

.2 Ensure tools and dies use for forming and cutting stainless steel are free of nicks and other damage.

.3 Do not use carbon grits and grinding wheels which will imbed foreign particles into stainless steel surfaces. Use only stainless steel wool when wool polishing is required.

.4 Stainless steel items, on which rust stains appear, shall be replaced with new fabricated material.

3.12 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.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 03 10 00 – Concrete Forms and Accessories.

.2 Section 05 50 00 – Metal Fabrications.

.3 Section 08 11 14- Steel Doors and Frames.

.4 Section 09 91 22 – Painting.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
.2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
.3 CAN/CSA O80 Series M-08, Wood Preservation.
.4 CAN/CSA O121-08, Douglas Fir Plywood.
.5 CAN/CSA-O141-05 (R2009), Softwood Lumber.

.2 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber 2005.

1.3 SUBMITTALS

.1 Shop drawings:

.1 Submit shop drawings in accordance with Section 01 33 00 Submittal Procedures.

.1 Garbage enclosure gate, trellis and acoustic wood wall construction, assembly, elevations, sections and interfacing with other Work.
.2 Garbage enclosure and gate details shall indicate fasteners, anchorage assemblies and components and erection details.

.2 Samples:

.1 Submit the following samples in accordance with Section 01 33 00 Submittal Procedures.

.1 Two 300 mm long samples of trellis, enclosure and gate components, showing finish and size.

1.4 QUALITY ASSURANCE

.1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood identification: by grade mark in accordance with applicable CSA standards.

.3 Plywood, OSB and wood based composite panel construction sheathing identification: by grademark in accordance with applicable CSA standards.

.4 Lumber quality: Carefully select individual pieces so that knots and obvious defects will not interfere with placing bolts, proper nailing or making proper connections.

.5 Each piece of pressure treated lumber and fire retardant treated lumber shall be shop marked with the pressure treatment brand and ULC monogram respectively, in accordance with CAN/CSA O80-M.

.6 Dimensions of lumber shall conform to dressed sizes specified in CAN/CSA-0141 unless actual dimensions are otherwise indicted or specified.

.7 Dimensional references to lumber on Drawings and in Specifications are to nominal sizes unless actual dimensions are indicated. Such actual dimensions shall be dry size.

.8 Lumber defects: Discard wood with defects which will render a piece unable to serve its intended function. Lumber will be rejected by Consultant for excessive warp, twist, bow, crook, mildew, fungus, or mould, as well as for improper cutting and fitting, whether or not it has been installed.

1.5 ENVIRONMENTAL REQUIREMENTS

.1 When it is required that wood maintain dimensional stability and tolerances to ensure accurate installation of later work, store and install it only in dry areas, and where no further installation of moist materials is contemplated.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Divert unused wood materials from landfill to recycling, reuse, composting facility approved by Consultant.

.3 Do not dispose of preservative treated wood through incineration.

.4 Do not dispose of preservative treated wood with materials destined for recycling or reuse.

.5 Dispose of treated wood, end pieces, wood scraps and sawdust at sanitary landfill approved by Consultant.

.6 Dispose of unused wood preservative material at official hazardous material collections site approved by Consultant.

.7 Do not dispose of unused preservative material into sewer system, into streams, lakes, onto ground or in other locations where they will pose health or environmental hazard.

Part 2 Products

2.1 LUMBER MATERIAL

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:

- .1 CAN/CSA-O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:

- .1 Douglas fir Graded 122-C, construction or No. 2 Pine, pressure treated in accordance with CSA 080M.
- .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.

.3 Framing Lumber:

- .1 Western Red Cedar species, well seasoned, processed and stamped at the same mill with appropriate grade markings. Conform to requirements of standard grading rule for Canadian Lumber of National Lumber Grades Authority (NLGA) with latest supplement, approved by Canadian Lumber Standard Administrative Board, as follows:
  - .1 Posts: `Structural No.2 or Better' grade, with dressed smooth surfaces.
  - .2 Fence Boards and Framing: `No.2 Clear or Better' grade with dressed smooth surfaces.

2.2 PANEL MATERIALS

.1 Douglas fir plywood (DFP): to CSA O121, standard construction, good one side with waterproof adhesive. Thicknesses as shown on drawings.

2.3 ACCESSORIES

.1 Nails, spikes, staples, screws, bolts anchors lag screws, special fastening devices and supports required for erection of all carpentry components: to CSA B111. Use galvanized components where exposed to exterior atmosphere.

.2 Rough Hardware (cedar): Provide rough hardware such as nails, spikes, staples, bolts, nuts, washers, screws, clips, strap iron and including hardware for temporary enclosures. Nails shall be spiral type. All nails, spikes and staples shall conform to CSA B111. All rough hardware shall be galvanized unless otherwise noted.

.3 Surface applied wood preservative: Green coloured copper napthenate or 5% pentachlorophenol solution, water repellant preservative or same copper based preservative as used for shop impregnation, in accordance with CAN/CSA O80.

.4 Fire retardant treatment of lumber and plywood: ‘Dricon’ fire retardant treatment by J. A. Biewer or approved equivalent, conforming to CAN/CSA-O80.20 and CAN/CSA-

O80.27 respectively, to provide a flame spread rating of 25 or less in accordance with CAN/ULC-S102.

.5 Gate Hardware: Provide all heavy duty gate hardware as required for complete and secure installation including but not limited to gate hinges, rods, springs, padlock hasps, handles and position holders as approved by the Consultant.

.6 Tube Forms: Spirally wound, adhesive laminated fibre paper tube forms having bursting pressure of 965 kPa, coated with hot wax, diameters as required, `Handiform', or `Permaform' by Perma Tubes Ltd., or `Sonotube' by Sonoco Limited.

.7 Concrete: Minimum 20.684 MPa (3,000 psi) concrete conforming to CAN/CSA-A23.1/A23.2.

2.4 FINISHES

.1 Galvanizing: to CAN/CSA-G164, use galvanized fasteners for exterior work and interior highly humid areas.

Part 3 Execution

3.1 GENERAL

.1 Supply and install all other carpentry shown on drawings or as required for completion of work. Co-operate with other trades in installing items supplied by other sections, cut openings in woodwork when so required and make good disturbed surfaces.

3.2 PREPARATION

.1 Do all wood framing in accordance with the Ontario Building Code and Can3-086M-1983.

.2 Machine dressed work shall be slow fed using sharp cutters and finished members shall be free from drag, feathers, slivers or roughness of any kind.

.3 Frame materials with tight joints rigidly held in place.

.4 Design construction methods for expansion and contraction of the materials.

.5 Erect work plumb, level, square and to required lines.

.6 Be responsible for methods of construction for ensuring that materials are rigidly and securely attached and will not be loosened by the work of other trades.

3.3 ERECTION

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.2 Countersink bolts where necessary to provide clearance for other work.

3.4 FURRING AND BLOCKING

.1 Supply and install furring and blocking, required.

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

3.5 ROUGH BUCKS AND NAILERS

.1 Install wood bucks and nailers, as indicated, including wood bucks and linings around frames for doors and windows.

.2 Except where indicated, otherwise, use material at least 38 mm thick secured with 9 mm bolts located within 300 mm from ends of members and uniformly spaced at 1200 mm between.

.3 Countersink bolts where necessary to provide clearance for other work.

3.6 SUPPORTS FOR MECHANICAL UNITS

.1 Performed by Section 07 50 16. Refer to Section 07 50 13 for work division.

3.7 PRESSURE TREATED WOOD

.1 Use wood pressure treated in accordance with CSA 080M for all wood members in contact with exterior walls and roofs.

.2 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

3.8 FIRE RETARDANT LUMBER

.1 Use fire retardant lumber for blocking/framing in ceiling\ spaces, partitions and bulkheads.

3.9 INSTALLATION OF HOLLOW METAL FRAMES

.1 Set frames plumb and square in their exact location and at correct elevation. Firmly block and brace to prevent shifting. Shim up where required to ensure proper alignment dimensions from finished floor to head of frame. Install temporary wood spreaders at mid-height.

.2 Where pressed steel frames are installed in concrete walls, secure frames to concrete using lead expansion shields and anchor bolts through pipe sleeves. Perform drilling of concrete as required. Fill recessed bolt heads flush to frame face with approved metal filler and sand smooth.

.3 Install fire rated door frames in accordance with requirements of National Fire Code Volume 4, produced by The National Fire Protection Association (NFPA 80).

3.10 BACKBOARDS

.1 Provide electrical equipment backboards for mounting electrical equipment as indicated. Use 19mm thick plywood on 19 x 38 mm furring around spacing, perimeter and at maximum 300 mm intermediate.

3.11 WALL SHEATHING

.1 Sheath exterior and interior walls as indicated and locations where exterior cladding requires intermediate fastening between supports or if the exterior cladding requires solid backing.

.2 Apply lumber wall sheathing so that all ends are supported with end joints staggered.

.3 Apply panel-type sheathing board so that vertical joints are staggered if the sheathing is applied horizontally and a gap of not less than 1.6 mm left between sheets of plywood.

3.12 WOOD GARBAGE ENCLOSURE GATE

.1 Fabricate and install garbage enclosure gate in accordance reviewed shop drawings complete with all gate hardware.

.2 Tube forms:

- .1 Accurately layout post holes and drill holes in ground, 2 times diameter of tube forms using power driven auger. Depth of post holes shall be 203 mm below frost line.
- .2 Cut tube forms to lengths required. Install tube forms in post holes. Brace tube forms vertically by backfilling around tube forms in maximum 203 mm lifts and compacting each lift until refusal.
- .3 Set wood gate posts in tube forms and securely brace into position, plumb and accurately aligned with other posts until concrete has set.
- .4 Fill tube forms with concrete to the required level. Rod concrete with reinforcing steel rod to eliminate air pockets. Provide sloped top of concrete post footings around posts to provide drainage.

.3 Adjust and lubricate gate hardware for smooth and efficient operation.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 Fire stopping and smoke seals within mechanical assemblies (i.e. inside ducts, dampers) and electrical assemblies (i.e. inside cable trays) are specified in Division 26 and 33 respectively.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM).

.1 ASTM E814-10, Standard Test Method for Fire Tests of Penetration Firestop Systems.

.2 Underwriter=s Laboratories of Canada (ULC)

.1 ULC-S115-06, Fire Tests of Firestop Systems.

1.3 SYSTEM DESCRIPTION

.1 Firestopping Materials: CSA-S115M and ASTM E814 to achieve a fire protection rating as noted on Drawings.

.2 It is the intent of this Section that in conjunction with Divisions 26 and 33 a competent, single source be responsible for the firestopping and smoke seals of the entire project.

1.4 SUBMITTALS

.1 Product data:

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

.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.

.2 Samples:

.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit duplicate 300 x 300 mm samples showing actual firestop material proposed for project.

.3 Certification:

.1 Submit certified documentation from manufacturer for each worker performing Work of this Section.

.2 Submit installer's and Product manufacturer's certification verifying compliance with the Contract Documents and conformance with ASTM E814 and CAN/ULC S115.

1.5 QUALITY ASSURANCE

.1 Manufacturer: Company specializing in manufacturing products of this Section with minimum five years documented experience.

.2 Applicator: Approved, licensed and supervised by the manufacturer of firestopping materials. Company with minimum five years documented experience.

.3 Product: Manufactured under ULC Follow-up Program. Each container or package shall bear ULC label.

1.6 REGULATORY REQUIREMENTS

.1 Conform to applicable code for fire protection ratings.

.2 Provide certificate of compliance for authority having jurisdiction indicating approval.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver and store materials in a dry, protected area, off ground in original, undamaged, sealed containers with manufacturer's labels and seas intact.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

1.9 PROJECT AND SITE CONDITIONS

.1 Application temperature and ventilation as per Manufacturer's instructions.

1.10 SEQUENCING AND SCHEDULING

.1 Sequence work to permit installation of firestopping and smoke seal materials to be installed after adjacent work is complete and before closure of spaces.

Part 2 Products

2.1 MATERIALS

.1 A/D Firebarrier Firestop Systems, by A/D Fire Protection Systems Inc., capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN4-S115 and not to exceed opening sizes for which they are intended.

.2 Mineral Wood Backing Insulation: ULC labeled, preformed non-combustible material (A/D Firebarrier Mineral Wool) by A/D Fire Protection Systems Inc.

.3 Retainers: Clips to support mineral wool.

.4 Firestopping Sealant: ULC labeled, single component silicone bases, A/D Silicone Firebarrier Sealant by A/D Fire Protection Systems Inc.

.5 Firestopping Seal: ULC labeled, single component water-base seal, A/D Firebarrier Seal by A/D Fire Protection Systems Inc.

.6 Firestopping Foam: ULC labeled, two components silicone foam, A/D Firebarrier RTV Foam by A/D Fire Protection Systems Inc.

.7 Firestopping Mortar: ULC labeled, non-combustible fibre reinforced, foamed cement mortar, A/D Firebarrier Mortar by A/D Fire Protection Systems Inc.

.8 Damming Material: In accordance with tested assembly being installed as applicable and as acceptable to authorities having jurisdiction.

Part 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.

.5 Verify that openings are ready to receive the Work of this Section.

.6 Confirm compatibility of surfaces to receive firestopping and smoke seal materials.

.7 Beginning of installation means acceptance of existing surfaces and substrate.

3.2 INSTALLATION

.1 Install firestopping in wall cavities in accordance with the OBC 3.1.11., in cavities 25mm and greater, spaced 3.0m max. vertically and 20m max. horizontally.

.2 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.

.3 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.4 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.5 Tool or trowel exposed surfaces to a neat finish.

.6 Remove excess compound promptly as work progresses and upon completion.

.7 Apply in sufficient thickness to achieve rating to uniform density and texture.

.8 Protect installed material until cured or set.

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:

.1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.

.2 Top of fire-resistance rated masonry and gypsum board partitions.

.3 Intersection of fire-resistance rated masonry and gypsum board partitions.

.4 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.

.5 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.

.6 Openings and sleeves installed for future use through fire separations.

.7 Around mechanical and electrical assemblies penetrating fire separations.

.8 Refer to Drawings for horizontal and vertical fire stop locations and for typical firestopping detail at cavity wall, for top of wall fire separation assembly and for fire separation locations.

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

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 07 92 10 - Joint Sealing: Caulking of joints between frames and other building components.

.3 Section 08 71 10 - Door Hardware - General: Supply of finish hardware, including weatherstripping and mounting heights.

.4 Section 09 91 23 - Interior Painting.

.5 Section 09 91 13 - Exterior Painting.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM International)

.1 ASTM A653/A653M-[01a], Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM B29-[92(1997)], Specification for Refined Lead.

.3 ASTM B749-[97], Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.181-[99], Ready-Mixed Organic Zinc-Rich Coating.

.2 CGSB 41-GP-19Ma-[84], Rigid Vinyl Extrusions for Windows and Doors.

.3 Canadian Standards Association (CSA International)

.1 G40.20/G40.21-[98], General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CSA W59-[M1989(R2001)], Welded Steel Construction (Metal Arc Welding) (Metric Version).

.4 Canadian Steel Door Manufacturers' Association, (CSDMA).

.1 CSDMA, Specifications for Commercial Steel Doors and Frames, [1990].

.2 CSDMA, Recommended Selection and Usage Guide for Commercial Steel Doors, [1990].

.5 National Fire Protection Association (NFPA)

.1 NFPA 80-[99], Standard for Fire Doors and Fire Windows.

.2 NFPA 252-[99], Standard Methods of Fire Tests of Door Assemblies.

.6 Underwriters' Laboratories of Canada (ULC)

.1 CAN4-S104-[80(R1985)], Fire Tests of Door Assemblies.

.2 CAN4-S105-[85(R1992)], Fire Door Frames Meeting the Performance Required by CAN4-S104.

.7 CAN/ULC-S701-[01], Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.8 CAN/ULC-S702-[97], Thermal Insulation, Mineral Fibre, for Buildings.

.9 CAN/ULC-S704-[01], Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

1.3 DESIGN REQUIREMENTS

.1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35ºC to 35ºC.

.2 Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.

1.4 WORK INCLUDED

.1 A single manufacturer shall fabricate products included within the scope of this Section.

.2 Manufacturer shall be a member in good standing of the Canadian Steel Door Manufacturers Association (CSDMA).

.3 Supply only of steel frame products including frames, transom frames, sidelight and window assemblies with provision for glazed, paneled or louvered openings, fire labeled and non-labeled, as scheduled or detailed by the Consultant.

.4 Supply only of flush steel doors with provision for glazed, paneled or louvered openings, insulated and un-insulated, fire labeled, with or without temperature rise ratings and non-labeled, as scheduled or detailed by the Consultant.

.5 Supply only of steel panels, similar in construction to steel doors, with flush or abetted bottoms for steel frames, transom frames, sidelight and window assemblies, fire labeled and non-labeled, as scheduled or detailed by the Consultant.

1.5 RELATED WORK

.1 Building-in of frame product into unit masonry, previously placed concrete, structural or steel or wood stud walls.

.2 Supply and installation of wood, plastic or composite core doors.

.3 Supply and installation of builders' hardware except as specified for acoustic assemblies.

.4 Drilling and tapping for surface mounted or non-templated builders' hardware.

.5 Caulking of joints between frame product and other building components.

.6 Supply and installation of gaskets or weather-strip.

.7 Supply and installation of louvers or vents.

.8 Supply and installation of glazing materials.

.9 Site touch-up and painting.

.10 Wiring for electronic or electric hardware.

.11 Field measurements.

.12 Fasteners for frame product in previously placed concrete, masonry or structural steel.

.13 Steel lintels, posts, columns or other load-bearing elements.

.14 Field welding.

1.6 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed, or louvred, arrangement of hardware and fire rating and finishes.

.3 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and reinforcing and fire rating finishes.

.4 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

.5 Submit test and engineering data, and installation instructions.

1.7 REQUIREMENTS

.1 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104M [NFPA 252] for ratings specified or indicated.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling.

.3 Divert unused paint and sealant materials from landfill to official hazardous material collections site approved by Consultant.

.4 Do not dispose of unused paint and sealant materials into sewer systems, into lakes, streams, onto ground or in other locations where it will pose health or environmental hazard.

.5 Divert unused metal materials from landfill to metal recycling facility approved by Consultant.

.6 Divert unused wood materials from landfill to recycling, reuse or composting facility wherever possible.

.7 Damaged or broken glazing materials are not recyclable. These materials must not de disposed of with materials destined for recycling.

1.9 TESTING AND PERFORMANCE

.1 Door constructions covered by this specification shall be certified as meeting Level "A" (1,000,000 cycles) and Twist Test Acceptance Criteria (deflection not to exceed 6.4 mm /13.6kg force, total deflection at 136.1kg force not to exceed 63.5 mm and permanent deflection not to exceed 3.2 mm) when tested in strict conformance with ANSI-A250.4-1994. Test shall be conducted by an independent nationally recognized accredited laboratory.

.2 Fire labeled product shall be provided for those openings requiring fire protection and temperature rise ratings, as determined and scheduled by the Architect. Doors, frames, transom frames and sidelight assemblies shall be tested in strict accordance with CAN4-S106. Product shall be listed by Underwriters Laboratories of Canada under an active Factory Inspection Program and shall be constructed as detailed in Follow-Up Service procedures issued to the manufacturer.

.3 Should any door or frame specified by the Architect to be fire rated, not qualify for labeling due to design, hardware, glazing or any other reason, the Consultant shall be so advised before manufacturing commences.

.4 Core materials for exterior doors shall attain a thermal resistance rating of RSI 1.06 (R6.0) when tested in accordance with ASTM C177 or ASTM C518.

.5 Product shall be manufactured by a firm experienced in the design and production of standard and custom commercial steel door and frame assemblies, the integration of builders' or electronic hardware and glazing materials and their impact on the scope of work.

.6 Manufacturer shall be assessed and registered as meeting the requirements of Quality Systems under ISO 9001.

.7 Product quality shall meet standards set by the Canadian Steel Door Manufacturers Association.

1.10 TEST REPORTS

.1 All alternates to this specification shall be submitted to the Architect for acceptance ten (10) days prior to bid date, complete with test reports from independent, nationally recognized testing authorities, certifying that:

.1 Steel door and frame assemblies furnished under this section meet the acceptance criteria of ANSI-A250.4-1994, Level "A".

.2 Insulated door cores furnished in exterior doors under this Section meet the specified thermal resistance rating.

.2 All reports shall include name of testing authority, date of test, location of test facility, descriptions of test specimens, procedures used in testing and indicate compliance with acceptance criteria of the test.

1.11 WARRANTY

.1 All steel door and frame product shall be warranted from defects in workmanship for a period of one (1) year from date of shipment.

.2 All steel door and frame product shall be warranted against rust perforation for a period of ten (10) years when the installed and finish painted with a commercial quality paint to the manufacturers recommendations.

.3 Finish paint adhesion on all door and frame product shall be warranted for a period of ten (10) years when the product has been properly cleaned and finish painted with a commercial quality paint applied as recommended by the paint manufacturer. This warranty shall not exceed that provided by the paint manufacturer.

Part 2 Products

2.1 MATERIALS

.1 Doors shall be fabricated from tension leveled steel to ASTM A924-M97, galvanized to ASTM A653-M97, Commercial Steel (CS), Type B, coating designation ZF75, known commercially as paintable Galvanneal.

.1 Acceptable Manufacturer: Flemming

.2 Acceptable Alternate Manufacturer: Trillium Steel Doors Limited, or others meeting these exact specifications outlined in this section and accepted in writing during the tender period.

.2 Door Cores:

.3 Honeycomb:

.1 Structural small cell (25.4 mm maximum) kraft paper “honeycomb”. Weight: 36.3 kg per ream (minimum), density: 16.5 kg/m^3 (minimum), sanded to the required thickness.

.4 Polystyrene:

.1 Rigid extruded, fire retardant, closed cell board, density 16kg/m^2, thermal values: RSI 1.06 minimum, conforming to ASTM C578.

.5 Temperature Rise Rated (TRR):

.1 Solid slab core of non-combustible, inorganic composite to limit temperature rise on the “unexposed” side of door to 250°C at 30 or 60 minutes, as required by governing building code requirements and determined and scheduled by the Architect.

.6 Adhesives:

.1 Honeycomb Cores and Steel Components: Heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement or ULC approved equivalent.

.7 Interlocking Edge Seams:

.1 Resin reinforced polychloroprene (RRPC), fire resistant, high viscosity, sealant/adhesive or UL approved equivalent.

.8 Polystyrene Cores:

.1 Heat resistant, epoxy based, low viscosity, contact cement.

.9 Primer:

.1 Rust inhibitive touch-up only.

.10 Exterior Top Caps:

.1 Rigid polyvinylchloride (PVC) extrusion.

2.2 DOOR FABRICATION

.1 This section is based on doors and frames as manufactured by Fleming. Doors and frames by other manufacturers are acceptable subject to be similar to the one specified and meeting the terms of this section.

.2 Doors shall be swinging, 44.4 mm thick of the types and sizes indicated on the Architect's schedules or drawings.

.3 Exterior doors shall be lock seam, flush.

.4 Face sheets for exterior doors shall be fabricated from (16) gauge steel.

.5 Longitudinal edges of exterior doors shall be fully welded, ground smooth with no visible seams.

.6 Face sheets of interior doors shall be fabricated from 18 gauge steel, except for heavy traffic doors (noted **HT** in Door Schedule) face sheet to be 16 gauge.

.7 Longitudinal edge of heavy traffic doors (noted **HT** in Door Schedule) shall be mechanically interlocked, fully welded, ground smooth with no visible seams. Do not fill seams.

.8 Interior doors shall be stiffened, insulated and sound deadened with honeycomb core laminated under pressure to each face sheet.

.9 Stiffened, insulated and sound deadened with Fleming's propriety core where Temperature Rise Rated (TRR) fire labeled doors are specified on the Architect's schedules.

.10 Longitudinal edges of interior doors shall be mechanically interlocked, adhesive assisted with edge seams and tack-welded every 150 mm and filled flush.

.11 Door faces of all steel doors shall be fabricated without visible seams, free of scale, pitting, coil brakes, buckles and waves.

.12 Formed edges shall be true and straight with a minimum radius for the thickness of steel used.

.13 Lock and hinge edges shall be beveled 3 mm in 50 mm unless builders' hardware or door swing dictates otherwise.

.14 Top and bottom of doors shall be provided with inverted, recessed, 16 gauge steel end channels, welded to each face sheet at 150 mm on center maximum.

.15 Exterior doors shall be provided with factory installed flush PVC top caps. Fire labeled exterior doors shall be provided with factory installed flush steel top caps.

.16 Unless ineligible due to design, size, hardware or glazing specified on the Architects' or hardware Suppliers' schedules or details, fire labeled doors shall be provided for those openings requiring fire protection ratings and temperature rise ratings, as determined and scheduled by the Architect.

.17 Exterior doors and high traffic doors shall be internally reinforced with 20 gauge continuous; interlocking steel stiffeners at 150mm O.C. max, with voids between stiffeners filled and insulated with 24kg/m3 density loose batt type fiberglass material to suit fully welded design.

.18 Doors shall be factory blanked, reinforced, drilled and tapped for fully templated mortised hardware only, in accordance with the final approved schedule and templates provided by the hardware supplier.

.19 Doors shall be factory blanked and reinforced only for mortised hardware that is not fully templated.

.20 Doors shall be factory reinforced only for surface mounted hardware.

.21 Templated holes 12.7mm diameter and larger shall be factory prepared, except mounting and through bolt holes, which shall be by the contractor responsible for installation on site, at the time of application. Templated holes less than 12.7mm diameter shall be factory prepared only when required for the function of the device (for knobs, levers, cylinders, thumb or turn pieces) or when these holes over-lap function holes.

.22 Drilling and tapping for surface mounted hardware or mortised hardware that is not fully templated shall be by the contractor responsible for installation on site, at the time of application.

.23 Hinge and pivot reinforcements shall be 10 gauge steel minimum high frequency type reinforcing.

.24 Hinge reinforcements for acoustic doors and doors in excess of 2450mm rabbet height shall be 10 gauge minimum with each cutout provided with 114.3mm heavy weight (4.6mm) high frequency type.

.25 Lock, strike and flush bolt reinforcements shall be 12 gauge steel minimum.

.26 Reinforcements for concealed closers and holders shall be 12 gauge steel minimum.

.27 For surface mounted hardware, reinforcements shall be 16 gauge steel minimum.

.28 All pairs of fire labeled doors shall be provided with 12 gauge steel surface mounted flat bar astragal, shipped loose for application on site, by the contractor responsible for installation.

.29 Pairs of doors up to 2450mm x 2450mm, to 1½ hour fire rating maximum shall be provided without astragals. Lock edge seam of such doors shall be tacked-welded and ground smooth. All other fire labeled pairs shall be provided with 12 gauge steel surface mounted flat bar astragal, shipped loose for application on site, by the contractor responsible for installation.

.30 Where electrically or electronically operated hardware is specified on the Architects' schedules or details of the final approved schedule and templates provided by the hardware supplier, hardware enclosures and/or junction boxes, where indicated on the templates, shall be provided and interconnected with CSA Approved 12.7mm diameter conduit and connectors.

.31 Prepare doors to receive security door contacts – refer to electrical drawings for locations. Door contacts to be installed at 100 mm from the latch side door edge.

2.3 GLAZING

.1 Where 6mm thick glazing materials are specified on the Architects schedules or details, doors shall be provided with 20 gauge steel glazing trim and snap-in glazing stops.

.2 Where other that 6mm glazing is specified on the Architect's schedules or details, doors shall receive 20 gauge steel trim and screw fixed glazing stops. Screws shall be #6 x 32mm oval head scrulox (self-drilling) type at 300mm on center maximum.

.3 Glazing trim and stops shall be accurately fitted, butted at corners, with removable glazing stops located on the 'push' side of the door.

.4 Provide frames as required to suit fire rated glazing specified in Specification Section 08 80 50. Frames to accommodate multi-layered intumescent glazing to meet ¾ hour fire-resistance rating.

2.4 LOUVER

.1 Where specified on the Architect's schedules or details, non-labeled doors shall be prepared on accordance with the louver manufacturer's details.

.2 Where specified on the Architect's schedules or details, fire labeled doors shall be prepared for UL listed sight-proof fusible link louvers in accordance with the louver manufacturer's details.

.3 Louvers shall be supplied and installed by others.

2.5 FINISHING

.1 Remove weld slag and splatter from exposed surfaces.

.2 All tool marks, abrasions and surface blemishes shall be filled and sanded to present smooth uniform surfaces.

.3 On exposed surfaces where zinc coating has been removed during fabrication, doors shall receive a factory applied touch-up primer.

.4 Primer shall be fully cured prior to shipment.

2.6 PANELS

.1 Panels shall be fabricated form the same materials, construction and finished in the same manner as doors as specified in Section 2.1.

2.7 PRIMER

.1 Touch-up prime CAN/CGSB-1.181.

2.8 PAINT

.1 Field paint steel doors and frames in accordance with Section[s] [09 91 23 - Interior Painting], [09 91 13 - Exterior Painting]. Protect weatherstrips from paint. Provide final finish shall be free of scratches or other blemishes.

2.9 FRAMES FABRICATION GENERAL

.1 Steel:

.1 Frame product shall be fabricated from tension leveled steel to ASTM A924-M97, galvanized to ASTM A653-M97, Commercial Steel (CS), Type B, coating designated ZF75, known commercially as paintable Galvanneal.

.2 Primer:

.1 Rust inhibitive touch up only.

.3 Miscellaneous:

.1 Door Silencers: GJ-64, Single Stud rubber/neoprene type

.2 Thermal Breaks: Rigid polyvinylchloride (PVC) extrusion

.3 Fiberglass: Loose batt type, density: 24kg/m^3 (minimum), conforming to ASTM C665.

.4 General:

.1 All steel frame product shall be as manufactured by Fleming of the types, sizes and profiles indicated on the Architects' schedules or details.

.2 Exterior frames shall be thermally broken, Fleming *Therma-Frame* Series, fabricated from 16 gauge steel.

.3 Exterior frame product shall be supplied profile welded (PW)

.4 Interior and exterior sections of thermally broken frames shall be separated by a continuous PVC thermal break.

.1 Thermally broken sections shall not be assembled by means of screws, grommets or other fasteners and welds shall not cause thermal transfers between interior and exterior surfaces of the frame sections.

.2 Closed sections (mullions and center rails) of thermally broken frames shall be factory insulated with 24kg/m^3 loose batt type fiberglass material.

.5 Insulation of open sections (jambs, heads and sills) on exterior frame product shall be provided and installed by the contractor responsible for installation.

.6 Interior frames shall be Fleming F-Series, fabricated from 16 gauge steel.

.7 Interior frame product shall be supplied profile welded (PW)

.8 Knocked-down and knocked-down drywall frames shall not be acceptable.

.9 Jambs, heads, mullions, sills and center rails shall be straight and uniform throughout their lengths.

.10 Frame product shall be square, free of defects, wraps or buckles.

.11 Corner joints shall be profile welded (PW) (continuously welded on the inside of the profiles' faces, rabbets, returns and soffit intersections with exposed faces filled and ground to a smooth, uniform, seamless surface)"

.12 Joints at mullions, transom bars, sills or center rails shall be coped accurately, butted and tightly fitted, with faces securely welded, matching corner joint faces.

.13 All steel mullions will be fabricated from the same materials as specified for the steel frames. Steel mullions will be fabricated as a fully assembled three piece unit consisting of a front, back and full height one piece attachment clip as per Fleming F Series. The attachment clip will completely fill the stop area of the mullion on both sides and span the void between each side forming a grid channel like structure. Mullions used as hinge mullions or strike mullions between doors will be filled with grout by the general contractor either prior to or following installation of the frame. The head of the frame shall have an opening sufficient for the grout to be poured in to the mullion.

.14 Mullions shall be fabricated with continuous 20 gauge galvanneal steel internal reinforcing clips.

.15 Frame product shall be fabricated with integral door stops having a minimum height of 16mm.

.16 Glazing stops shall be formed 20 gauge steel, 16mm height channel, accurately fitted, butted at corners and fastened to frame sections with #6 x 32mm oval head scrulox (self-drilling) type screws at 300mm on center maximum.

.17 Where required due to site access, as indicated on the Architects' schedules or details, when advised by the contractor responsible for co-ordination or installation, or when

shipping limitations so dictate, frame product shall be fabricated in sections for splicing in the field.

.1 Field spliced jambs, heads and sills shall be provided with 16 gauge steel splice plates securely welded into one section, extending 100mm minimum each side of splice joint.

.2 Field splices at closed sections (mullions or center rails) shall be 16 gauge steel splice angles securely welded to the abutting member. Face of splice angle shall extend 100mm minimum into closed sections when assembled.

.3 Field splice joints shall be welded, filled and ground to present a smooth uniform surface by the contractor responsible for installation after assembly.

.18 Each door opening shall be provided with two (2) temporary steel jamb spreaders welded to the base of the jambs or mullions to maintain proper alignment during shipping and handling. Spreaders shall be removed by the contractor responsible for installation prior to anchoring of frame to floor.

.19 Each door opening shall be prepared for GJ-64 or equivalent, single stud door silencers, three (3) for single door openings, two (2) for double door openings. Silencers shall be shipped loose for installation by the contractor after finish painting.

.20 Unless ineligible due to design, size, hardware or glazing specified on the Architects' or Hardware Suppliers' schedules or details, fire labeled frame product shall be provided for those openings required fire protection ratings as determined and scheduled by the Architect.

.21 Hardware Preparations:

.1 Frame product shall be blanked, reinforced, drilled and tapped for fully template mortised hardware only, in accordance with the final approved schedule and template provided by the hardware supplier.

.2 Frame product shall be factory blanked and reinforced only for mortised hardware that is not fully template.

.3 Frame product shall be reinforced only for surface mounted hardware.

.4 Drilling and tapping for surface mounted hardware or mortised hardware that is not fully template shall be by the contractor responsible for installation on site, at the time of application.

.5 Frames shall be prepared for 114.3mm standard weight hinges (minimum).

.6 Hinge and pivot reinforcements shall be 10 gauge steel minimum reinforcing, high frequency type shall be provided.

.7 Hinge reinforcements for acoustic frames and frames in excess of 2450mm rabbet height shall be 10 gauge minimum with each cutout provided with 114.3mm heavy weight (4.6mm) high frequency type.

.8 Strike reinforcements shall be 16 gauge steel minimum.

.9 Reinforcements for surface mounted hardware, concealed closers and holders and flush bolts shall be 12 gauge steel minimum.

.10 Mortised cutouts shall be protected with 22 gauge steel minimum guard boxes.

.11 Where electrically or electronically operated hardware is specified on the Architects schedules or details or the final approved schedule and templates provided by the hardware supplier, hardware enclosures and/or junction boxes,

where indicated on templates, shall be provided and inter-connected with CSA Approved 12.7mm diameter conduit and connectors.

.12 Prepare frames to receive security door contacts – refer to electrical drawings for locations. Door contacts to be installed at 100 mm from the latch side door edge.

.22 Anchorage:

.1 Frame product shall be provided with anchorage appropriate to floor, wall and frame construction.

.2 Each wall anchor shall be located immediately above or below each hinge reinforcement on the hinge jamb and directly opposite on the strike jamb, except as indicated below.

.3 Frame product installed in unit masonry partitions shall be provided with 4.0mm diameter steel wire anchors, 18 gauge steel adjustable stirrup and strap or "T" type anchors as conditions dictate.

.4 Where frame product is installed prior to construction of the adjacent wall, each jamb shall be provided with 16 gauge steel floor anchors. Each anchor shall be provided with two (2) holes for mounting to the floor and shall be securely welded to the inside of the jamb.

.5 Floor anchors for thermally broken exterior frames shall be designed so as not to permit thermal transfers from exterior to interior surfaces of the frame sections.

.6 Frame product installed in drywall partitions shall be provided with 20 gauge steel snap-in or "Z" type stud type anchor.

.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. Anchor preparations and guides shall also be located immediately above or below the intermediate hinge reinforcing and directly opposite on the strike jamb. Each preparation shall be provided with 16 gauge anchor bolt guides.

.8 Anchor bolts and expansion shell anchors for the above preparations shall be provided by the contractor responsible for installation.

.9 After sufficient tightening of the anchor bolts, the heads shall be welded do as to provide a non-removable application. Welded bolt head and dimple shall be filled and ground to present a smooth uniform surface by the contractor responsible for installation, prior to finish painting.

.10 Where indicated on the Architects' schedules or details, channel extensions shall be provided from the top of the frame assembly to the underside of the structure above. Extensions shall be fabricated from 12 gauge steel formed channel, mounting angles welded to inside of frame head and adjusting brackets. Formed channels, adjusting brackets and fasteners shall be shipped loose. Channels shall be mechanically connected to mounting angles and adjusting brackets with supplied fasteners, on site, by contractor responsible for installation.

.23 Finishing:

.1 Remove weld slag and spatter from exposed surfaces.

.2 All tool marks, abrasions and surface blemishes shall be filled and sanded to present smooth and uniform surfaces.

.3 On exposed surfaces where zinc has been removed during fabrication, frame product shall receive a factory applied touch-up primer.

.4 Primer shall be fully cured prior to shipment.

2.10 SIZES AND TOLERANCES

.1 All sizes and tolerances shall be in accordance with the Canadian Steel Door Manufacturers Association "Recommended Dimensional Standards for Commercial Steel Doors and Frames" as follows:

.1 Widths of door openings shall be measured from inside of frame jamb rabbet with a tolerance of +1.6mm, -0.8mm.

.2 Heights of door openings shall be measured from the finished floor (exclusive of floor coverings) to the head rabbet of the frame with a tolerance of $\pm$ 1.2mm.

.3 Unless builders' hardware dictates otherwise, doors shall be sized so as to fit the above openings and allow a 3mm clearance at jambs and head. A clearance of 19mm between the bottom of the door and the finished floor (exclusive of floor coverings) shall be provided. Tolerances on door sizes shall be $\pm$ 1.2mm.

.4 Manufacturing tolerances on formed frame profiles shall be $\pm$ 0.8mm for faces, door stop heights and jamb depths. Tolerances for throat openings and door rabbet shall be $\pm$ 1.6mm and $\pm$ 0.4mm respectively. Hardware cutout dimensions shall be as per template dimensions, +0.4mm, -0.

2.11 HARDWARE LOCATIONS

.1 Hardware preparations in frame product shall be as noted below and locations on doors shall be adjusted for clearances specified in 2.4.

.2 Top of upper hinge preparation for 114.3mm hinges shall be located 180mm down from head, transom mullion or panel as appropriate. The top of the bottom hinge preparation for 114.3mm hinges shall be located 310mm from finished floor as defined in 2.4.3. Intermediate hinge preparations shall be spaced equally between top and bottom cutouts. For dutch door frames, top and bottom hinge locations shall be as above, with the tops of intermediate hinges located at 930mm and 1403mm from finished floor.

.3 Strike preparations for unit, integral, cylindrical and mortise locks and roller latches shall be centered 1033mm from finished floor. Strikes for deadlocks shall be centered at 1200mm from finished floor. Strikes for panic or fire exit hardware shall be located as per device manufacturer's templates.

.4 Push and/or pulls on doors shall be centered 10701mm from finished floor.

.5 Preparations not noted above shall be as per hardware manufacturer's templates.

.6 Hardware preparation tolerances shall comply with the ANSI A115 series standards.

Part 3 Execution

3.1 SITE AND PROTECTION OF MATERIALS

.1 The contractor responsible for installation shall remove wraps or covers from door and frame product upon delivery at building site.

.2 All materials shall be thoroughly inspected upon receipt and all discrepancies, deficiencies and/or damages shall be immediately reported in writing to the supplier, All damage shall be noted on the carriers' Bill of Landing.

.3 Contractor responsible for installation shall ensure all materials are properly stored on planks or dunnage in a dry location. Product shall be stored in a vertical position, spaced with blocking to permit air circulation between them. Materials shall be covered to protect them from damage from any cause.

.4 Contractor shall notify the supplier in writing of any errors or deficiencies in the product itself before initiating any corrective work.

3.2 INSTALLATION GENERAL

.1 Install labelled steel fire rated doors and frames to NFPA 80 except where specified otherwise.

.2 Install doors and frames to CSDMA Installation Guide.

.3 Install doors and frames in accordance with the Door and Hardware Institute "Installation guide for doors and hardware".

.4 Set frame product plumb, square, aligned, without twist at correct elevation.

.5 Frame Product Installation Tolerances:

.1 Plumbness tolerance, measured through a line from the intersecting corner of vertical members and the head to the floor, shall be $\pm$ 1.6mm.

.2 Squareness tolerance, measured through a line 90^0 from one jamb at the upper corner of the product, to the opposite jamb, shall be $\pm$ 1.6mm.

.3 Alignment tolerance, measured on jambs, through a horizontal line parallel to the plane of the wall, shall be $\pm$ 1.6mm.

.4 Twist tolerance, measured at face corners of jambs, on parallel lines perpendicular to the plane of the wall, shall be $\pm$ 1.6mm.

.6 Fire labeled product shall be installed in accordance with NFPA-80.

.7 Secure anchorages and connections to adjacent construction.

.8 Brace frame product rigidly in position while building-in. Remove temporary steel shipping jamb spreaders. Install wood spreaders at mid points of frame rabbet height and at floor level to maintain frame widths. Provide vertical support at center of head for openings exceeding 1250mm in width. Remove wood spreaders after product has been built-in.

.9 Frame product in unit masonry shall be fully grouted in place.

.10 Install doors maintaining clearances outlined in Section 2.4.

.11 Install louvers and vents.

.12 Adjust operable parts for correct clearances and function.

.13 Steel surfaces shall be kept free of grout, tar or other bonding materials or sealers.

.14 Any grout or other bonding material shall be cleaned from products immediately following installation.

.15 Exposed field welds shall be finished to present a smooth uniform surface and shall be touched-up with a rust inhibitive primer.

.16 Exposed surfaces that have been scratched or otherwise marred during shipment, installation or handling shall be touched-up with a rust inhibitive primer.

.17 Finish paint in accordance with Section 099116 and 099123.

.18 Install glazing materials and door silencers.

3.3 INSPECTION

.1 In accordance with Section 01 11 00, upon assignment of an inspection agency the following inspections shall be performed:

- .1 review of shop drawings for compliance with specification
- .2 shop inspection during production. Should inspection notification not be given suitable to review fabrication, destructive testing of one or more doors will be undertaken either in the shop or on site at no additional cost to the owner. Doors destroyed for invasive inspection shall be replaced as part of the contract price.

.2 upon notification of initial door inspection, contractor shall notify inspector to witness installation practice and at periodic points for duration of installation period.

3.4 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation.

.2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.5 GLAZING

.1 Install glazing for doors and frames in accordance with Section 08 80 50 - Glazing.

END OF SECTION

Part 1 General

1.1 GENERAL NOTES

.1 Find the door Schedule on the following pages.

.2 This schedule MUST be read in conjunction with a complete set of drawings.

.3 Refer to the 800 series of AD Drawings for door and frame types and details.

1.2 ABBREVIATIONS CODE

.1 1. The following abbreviations are used in the Door Schedule.

.2	ALUM.	Aluminum
.3	ANNO.	Anodized Finish
.4	B/F	Barrier-Free
.5	Code	Reference
.6	DC	Door Contact (security)
.7	FRG	Fire Rated Glass
.8	HM	Hollow Metal
.9	HT	Heavy Traffic – see spec for welded seams, special reinforcing.
.10	LG	Laminated Glass
.11	P	Paint
.12	PL	Plastic Laminate Finish on Wood Door
.13	TP	Tempered Glass
.14	WD	Laminate Faced Wood Door
.15	20 MIN	20 minute fire rating
.16	45 MIN	45 minute fire rating

1.3 DOOR SCHEDULE

.1 Door Schedule designation “DC” refers to “Door Contacts” used in the security system. Refer to Electrical Drawings and Division 26 Specifications for locations, zoning and description of system.

END OF SECTION

DOOR	ROOM	DOOR								FRAME					REMARKS
#	NAME	WIDTH	HEIGHT	FIRE	H.T.	TYPE	MAT'L	FIN	GLASS	TYPE	MAT'L	FIN	DC	GLASS	
FIRST FLOOR - INTERIOR RENOVATION AREA															
1080 D	GYMNASIUM	950	2150	-	-	A	HM	P	-	1	HM	P	-	-	LOCKSET
X1119 A	CUSTODIAN	EXISTING DOOR TO REMAIN						P	-	EXISTING FRAME TO REMAIN		P	-	-	
1100A A	WASHROOM	762	2150	-	HT	A	HM	P	-	1	HM	P	-	-	PRIVACY SET TO HAVE COLOURED OCCUPIED/UNOCCUPIED INDICATORS. LOCKSET, EMERGENCY CALL SYSTEM, AND SIGN. PRIVACY HARDWARE. UNDERCUT 12MM DOOR SWEEP, CLOSER, DOOR STOP.
1100B A	WASHROOM	762	2150	-	HT	A	HM	P	-	1	HM	P	-	-	PRIVACY SET TO HAVE COLOURED OCCUPIED/UNOCCUPIED INDICATORS. LOCKSET, EMERGENCY CALL SYSTEM, AND SIGN. PRIVACY HARDWARE. UNDERCUT 12MM DOOR SWEEP, CLOSER, DOOR STOP.
1100C A	WASHROOM	762	2150	-	HT	A	HM	P	-	1	HM	P	-	-	PRIVACY SET TO HAVE COLOURED OCCUPIED/UNOCCUPIED INDICATORS. LOCKSET, EMERGENCY CALL SYSTEM, AND SIGN. PRIVACY HARDWARE. UNDERCUT 12MM DOOR SWEEP, CLOSER, DOOR STOP.
1100D A	BF WR	965	2150	-	HT	A	HM	P	-	1	HM	P	-	-	B/F DOOR OPERATOR, POWER DOOR LOCK, OCCUPANCY LIGHT, EMERGENCY CALL SYSTEM AND SIGN. DOOR SWEEP, CLOSER, DOOR STOP AND UNDERCUT 12MM.
1100E A	WASHROOM	762	2150	-	HT	A	HM	P	-	1	HM	P	-	-	PRIVACY SET TO HAVE COLOURED OCCUPIED/UNOCCUPIED INDICATORS. LOCKSET, EMERGENCY CALL SYSTEM, AND SIGN. PRIVACY HARDWARE. UNDERCUT 12MM DOOR SWEEP, CLOSER, DOOR STOP.
1100F A	WASHROOM	762	2150	-	-	A	HM	P	-	1	HM	P	-	-	PRIVACY SET TO HAVE COLOURED OCCUPIED/UNOCCUPIED INDICATORS. LOCKSET, EMERGENCY CALL SYSTEM, AND SIGN. PRIVACY HARDWARE. UNDERCUT 12MM DOOR SWEEP, CLOSER, DOOR STOP.

DOOR	ROOM	DOOR								FRAME					REMARKS
#	NAME	WIDTH	HEIGHT	FIRE	H.T.	TYPE	MAT'L	FIN	GLASS	TYPE	MAT'L	FIN	DC	GLASS	
1100G A	BF WR	965	2150	-	-	A	HM	P	-	1	HM	P	-	-	B/F DOOR OPERATOR, POWER DOOR LOCK, OCCUPANCY LIGHT, EMERGENCY CALL SYSTEM AND SIGN. DOOR SWEEP, CLOSER, DOOR STOP AND UNDERCUT 12MM.
1100H A	WASHROOM	762	2150	-	-	A	HM	P	-	1	HM	P	-	-	PRIVACY SET TO HAVE COLOURED OCCUPIED/UNOCCUPIED INDICATORS. LOCKSET, EMERGENCY CALL SYSTEM, AND SIGN. PRIVACY HARDWARE. UNDERCUT 12MM DOOR SWEEP, CLOSER, DOOR STOP.
1100I A	WASHROOM	762	2150	-	-	A	HM	P	-	1	HM	P	-	-	PRIVACY SET TO HAVE COLOURED OCCUPIED/UNOCCUPIED INDICATORS. LOCKSET, EMERGENCY CALL SYSTEM, AND SIGN. PRIVACY HARDWARE. UNDERCUT 12MM DOOR SWEEP, CLOSER, DOOR STOP.
1100J A	WASHROOM	762	2150	-	-	A	HM	P	-	1	HM	P	-	-	PRIVACY SET TO HAVE COLOURED OCCUPIED/UNOCCUPIED INDICATORS. LOCKSET, EMERGENCY CALL SYSTEM, AND SIGN. PRIVACY HARDWARE. UNDERCUT 12MM DOOR SWEEP, CLOSER, DOOR STOP.
1102 A	BF WR	965	2150	-	-	A	HM	P	-	1	HM	P	-	-	B/F DOOR OPERATOR, POWER DOOR LOCK, OCCUPANCY LIGHT, EMERGENCY CALL SYSTEM AND SIGN. DOOR SWEEP, CLOSER, DOOR STOP AND UNDERCUT 12MM.

PART 1 - GENERAL

1.1 This hardware schedule has been prepared by:

Rivett Architectural Hardware Ltd.
111 Industrials Drive
Whitby, ON, L1N 5Z9

Ed Wetheral
Architectural Sales Consultant

Phone 905.668.4455
Email:Ed@rivett.com

PART 2 - FINISHING HARDWARE SCHEDULE

Refer to the Finishing Hardware List dated January 22, 2025 on the following pages.

Rivett Architectural Hardware Ltd.
Door Listing
AJAX H.S - WASHROOM & GYM RENO - 105 BAYLY ST. E, AJAX, ON

Schedule 200736
Date Jan 22/25

Door Number	Set Number
1080D	1
1100A A	3
1100B A	3
1100C A	3
1100D A	4
1100E A	3
1100F A	3
1100G A	4
1100H A	3
1100I A	3
1100J A	3
1102 A	4
X1119 A	2

Rivett Architectural Hardware Ltd.
Hardware Schedule
AJAX H.S - WASHROOM & GYM RENO - 105 BAYLY ST. E, AJAX, ON

Schedule 200736
Date Jan 22/25

Set # 1

1 SGLE. DR. # 1080D GYMNASIUM 1080/1081 TO NEW GYM STORAGE LHR

1 -950 x 2150 x 45 x PSF x HMD

		Qty			
:	:	3	EA	HINGE	BB1168-114 X 101-NRP-626
:	:	1	EA	STOREROOM LOCK	L9080P X 03B X 626
:	:	1	EA	CLOSER C/W SPRING STOP	4040XPH X SPR CUSH X 689
:	:	1	EA	KICKPLATE	190S X 203 X 914 X 630

Set # 2

1 SGLE. DR. # X1119 A CORRIDOR 1004 TO CUSTODIAL ROOM 1119 RH

1 -EXISTING FRAME & DOOR REMAINS

		Qty			
:	:	1	EA	EXISTING HARDWARE	EXISTING REMAINS

Set # 3

1 SGLE. DR. # 1100A A GENDER NEUTRAL W.R LOBBY TO WASHROOM 1100A LH
1 SGLE. DR. # 1100B A GENDER NEUTRAL W.R LOBBY TO WASHROOM 1100B LH
1 SGLE. DR. # 1100C A GENDER NEUTRAL W.R LOBBY TO WASHROOM 1100C LH
1 SGLE. DR. # 1100E A GENDER NEUTRAL W.R LOBBY TO WASHROOM 1100E RH
1 SGLE. DR. # 1100F A GENDER NEUTRAL W.R LOBBY TO WASHROOM 1100F LH
1 SGLE. DR. # 1100H A GENDER NEUTRAL W.R LOBBY TO WASHROOM 1100H RH
1 SGLE. DR. # 1100I A GENDER NEUTRAL W.R LOBBY TO WASHROOM 1100I RH
1 SGLE. DR. # 1100J A GENDER NEUTRAL W.R LOBBY TO WASHROOM 1100J RH

8 -762 x 2150 x 45 x PSF x HMD

		Qty			
:	:	24	EA	HINGE	BB1168-114 X 101- 626
:	:	8	EA	PRIVACY C/W INDICATOR	L9044 X 03B X OS-OCC X 626
:	:	8	EA	CLOSER	4040XP X 689
:	:	8	EA	CONCEALED STOP @ 100 DEG STOP	103S X 630
:	:	3	EA	KICKPLATE	190S X 203 X 711 X 630
:	:	8	EA	SWEEP	W24S X 3'-0" X 628
:	:	8	EA	SIGNAGE	SUPPLIED BY OTHERS
:	:	8	EA	WALL BOXES WITH COVERS	FUTURE USE
:	:	8	EA	CONDUIT WITH PULL STRING	FUTURE USE

CONDUIT & WALL BOXES TO BE ROUGH IN ONLY FOR FUTURE INSTALL

Rivett Architectural Hardware Ltd.
Hardware Schedule
AJAX H.S - WASHROOM & GYM RENO - 105 BAYLY ST. E, AJAX, ON
Schedule 200736
Date Jan 22/25

Rivett Architectural Hardware Ltd.
Hardware Schedule
AJAX H.S - WASHROOM & GYM RENO - 105 BAYLY ST. E, AJAX, ON
Schedule 200736
Date Jan 22/25

Set # 4

1 SGLE. DR. # 1100D A GENDER NEUTRAL W.R LOBBY TO B/F WASHROOM RH
1 SGLE. DR. # 1100G A GENDER NEUTRAL W.R LOBBY TO B/F WASHROOM LH
1 SGLE. DR. # 1102 A CORRIDOR 1003 TO BARRIER FREE WASHROOM 1102 RH

3 -965 x 2150 x 45 x PSF x HMD

		Qty			
:	:	9	EA	HINGE	BB1168-114 X 101- 626
:	:	3	EA	STOREROOM LOCK	L9080P X 03B X 626
:	:	3	EA	DOOR OPERATOR	SW200i X SINGLE HSG X 628
:	:	3	EA	DOOR OPERATOR ADD ON	SW200i ADD FOR INSWING ARM
:	:	3	EA	OCCUPIED & EMERGENCY KIT SURF	#OCC-2-EMR-S ILL KIT
:	:	3	EA	ELECTRIC STRIKE	1600CLB X 630
:	:	3	EA	WALL STOP	232W X 626
:	:	3	EA	KICKPLATE	190S X 203 X 914 X 630
:	:	3	EA	SWEEP	W24S X 4'-0" X 628
:	:	3	EA	SIGNAGE	SUPPLIED BY OTHERS
:	:	3	EA	V-1072A-ST/V-1072B-ST INTERCOM	SUPPLIED BY OTHERS
				INTERCOM SYSTEM TO BE TIED TO OFFICE	

OCC-2-EMR-S KIT INCLUDES

2 EA BUTTON CM45/4 X 630

2 EA ILLUMINATED BOX CM-54GR

2 EA SIGN CM-54/SE1

CONTROLLER CX-33

1 EA ASSISTANCE REQUESTED CM-AF501SO (RECESSED BOX BY OTHERS)

1 EA POWER CONTROLER CX-PS13 V3

3 SURFACE BOXES CM-34BL

1 EA PUSH TO LOCK BUTTON CM45/8 X 630

1 EA SURFACE BOX CM-43CBL

1 EA DOOR CONTACT CX-MDC

1 EA CM-AF540SO PUSH FOR EMERGENCY BUTTON/ANNUNCIATOR (RECESSED BOX BY OTHERS)

1 EA TRANSFOMER 24VAC

1 EA SIGN CM-SE21A

MAIN 110V POWER SUPPLY & LOW VOLTAGE WIRING & MOUNTING BOXES FOR ASSOCIATED ACTUATORS & ACCESSORIES TO BE DONE BY ELECTRICAL DIVISION.
INSTALLATION OF POWER OPERATOR AND ASSOCIATED ELECTRONIC ACCESSORIES TO BE DONE BY HARDWARE SUPPLIER.

RIVETT ARCHITECTURAL HARDWARE LTD.

B/F WASHROOM DOOR C/W AUTOMATIC OPERATOR & #OCC2 EMR-S-ILL KIT

CM-AF501SO: English
Single Gang LED Annunciator c/w Sounder,
'ASSISTANCE REQUESTED'
TO BE MOUNTED ON EXTERIORIOR SIDE OF DOOR
G.C. TO MOUNT 2"X4" SIINGLE GANG BOXES AT THESE LOCATIONS

OPERATOR NORMALLY INSTALLED ON PUSH SIDE OF DOOR. CUSTOM PULL ARM IS REQUIRED IF OPERATOR HAS TO BE INSTALLED ON PULL SIDE OF DOOR.

ELECTRICAL SERVICE 120 VAC
50/60 HZ. 15/20A. BY
ELECTRICAL CONTRACTOR

6 LOW VOLTAGE 22 AWG STRANDED WIRES FROM OPERATOR TO *EACH ACTIVATION DEVICE*

CX-33 WASHROOM CONTROL UNIT (MOUNTED IN DOOR OPERATOR HEADER CASE)

DOOR OPERATOR | CX-33

CX-MDC MAGNETIC DOOR CONTACT SWITCH WIRED TO CX-33 TOO RE-SET SYSTEM ONCE DOOR IS CLOSED 2 WIRE BY INSTALLER

6 LOW VOLTAGE 22 AWG STRANDED WIRES FROM OPERATOR

2 LOW VOLTAGE 18 GAUGE STRANDED WIRES FROM OPERATOR TO ELECTRIC STRIKE

CM-AF540SO: English
Mushroom pushbutton/Annunciator, stainless steel faceplate, push/pull, 'PRESS FOR EMERGENCY ASSISTANCE'
TO BE MOUNTED NEXT TO TOILET
G.C. TO MOUNT 4" X 4" DOUBLE GANG BOX AT THIS LOCATION

CM45/4-CM54GR CM-54/SE1
PUSH TO OPEN PUSH BUTTON
MOUNTING HEIGHT TO BE 900mm MIN. TOO 1100mm MAX.
MOUNT OUT SIDE WASHROOM
G.C. TO MOUNT CM54I BOX AT THIS LOCATION

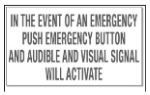
CM45/4-CM43CBL
PUSH TO OPEN PUSH BUTTON
MOUNTING HEIGHT TO BE 900mm MIN. TOO 1100mm MAX.
MOUNT IN SIDE WASHROOM
G.C. TO MOUNT CM43CBL BOX AT THIS LOCATION

CM45/8-CM5GR CM-54/SE1
PUSH TO LOCK PUSH BUTTON
MOUNTING HEIGHT TO BE 900mm MIN. TOO 1100mm MAX.
MOUNT INSIDE WASHROOM
G.C. TO MOUNT CM54I BOX AT THIS LOCATION

ELECTRIC STRIKE FAIL-SAFE OR ***FAIL – SECURE FOR FIRE RATED APPLICATIONS***

STOREROOM FUNCTION LEVER LOCK

HOLLOW METAL OR WOOD FLUSH DOOR AND FRAME BY OTHERS



CM-SE21A
English solid white sign, 6"H x 10 5/8"W (152mm x 270mm) 'IN THE EVENT OF AN EMERGENCY PUSH EMERGENCY BUTTON AND AUDIBLE AND VISUAL SIGNAL WILL ACTIVATE'

PULL SIDE BUTTONS
NO CLOSER THAN
600 mm – 23 ½"
BEYOND DOOR SWING

REQUIRES 3 SINGLE GANG BOX INTERIOR
REQUIRES 1 DOUBLE GANG BOX INTERIOR
REQUIRES 2 SINGLE GANG BOX EXTERIOR

EXPLANATION OF USE:

B/FREE OPERATION

1. TO OPEN DOOR ACTIVATE THE DOOR BY THE EXTERIOR HANDICAPPED PUSHPLATE AND THE DOOR WILL SLOWLY POWER OPEN, TIME OUT AND SLOWLY CLOSE.
2. TO LOCK DOOR FOR PRIVACY ACTIVATE PUSH TO LOCK SWITCH. POWER WILL BE CUT TO EXTERIOR HANDICAPPED PUSH PLATE CREATING PRIVACY.
3. ALSO ON ACTIVATION OF THE INTERIOR PUSH TO LOCK SWITCH THE EXTERIOR LIGHTED BUTTON & SIGN WILL LITE UP.
4. TO EXIT WASHROOM ACTIVATE INTERIOR HANDICAPPED PUSHPLATE AND THE DOOR WILL SLOWLY OPEN.

MANUAL NON B/FREE OPERATION

5. IN A ***NON FIRE RATED*** APPLICATION, IF THE WASHROOM IS VACANT THE DOOR CAN BE MANUALLY PUSHED OPEN AS THE ELECTRIC STRIKE WILL NOT BE ENGAGGED.
6. IN A ***FIRE RATED*** APPLICATION A KEY WILL BE REQUIRED TO OPERATE THE DOOR MANUALLY THE KEY WILL UNLOCK THE STOREROOM FUNCTION LOCKSET AS THE ELECTRIC STRIKE MUST BE ENGAGED TO MEET THE FIRE CODE REQUIERMENT FOR SELF LATCHING. OR EXTERIOR ACTUATOR WILL OPEN DOOR WHEN NOT OCCUPIED.

EMERGENCY CALL SYSTEM

IN THE EVENT OF AN EMERGENCY, ACTIVATING THE "PRESS FOR EMERGENCY ASSISTANCE" BUTTON WILL RELEASE THE ELECTRIC STRIKE AND WILL ACTIVATE SOUNDERS AND ILLUMINATE SIGNS.

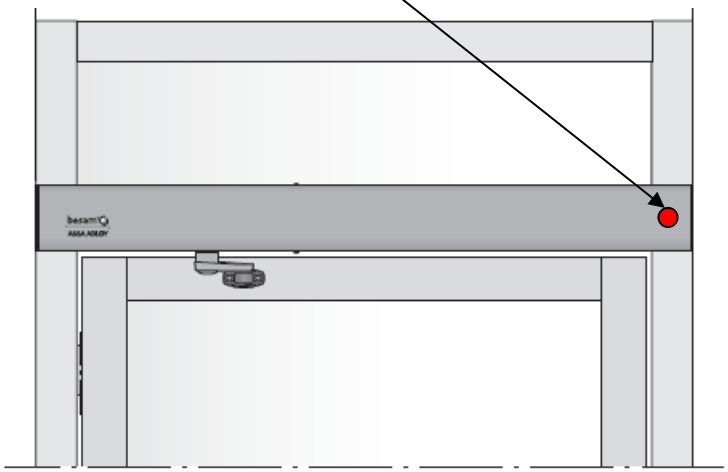
NOTES:

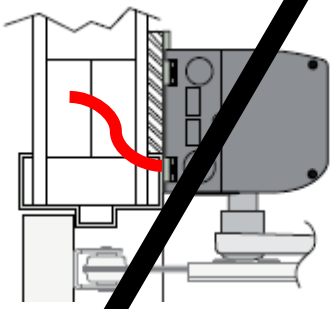
1. THIS WIRING SCHEMATIC DIAGRAM IS APPLICABLE TO BESAM POWERSWING OR SW200i DOOR OPERATORS ONLY. COORDINATE WITH RIVETT ARCHITECTURAL HARDWARE FOR WIRING DETAILS.
2. DOOR OPERATOR SYSTEM SHALL BE SUPPLIED AND INSTALLED BY RIVETT ARCHITECTURAL HARDWARE LTD.
3. 120VAC WIRING TO DOOR OPERATOR HEADER AND LOW VOLTAGE WIRING WITH ELECTRCIAL BOXES FOR SWITCHES WILL BE BY ELECTRICAL CONTRACTOR

RIVETT ARCHITECTURAL HARDWARE LTD.

STANDARD WIRE LOCATIONS FOR DOOR OPERATORS

SUPPLY VOLTAGE & LOW VOLTAGE CONTROL WIRES TO EXIT AT STRIKE SIDE OF FRAME, OR AT 36" FROM HINGE EDGE OF DOOR ON DOUBLE DOOR APPLICATION. LEAVE SUFFICENT WIRE TO REACH TO OPPOSITE SIDE OF DOOR.

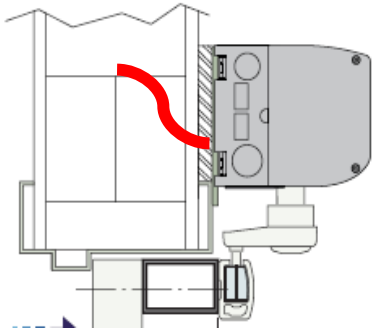




STANDARD PUSH SIDE MOUNTED OPERATOR

WIRES TO EXIT THROUGH FRAME AT STRIKE OF THE FRAME AS SHOWN

IF IT IS A DOUBLE DOOR APPLICATION THEN WIRES TO EXIT 36" FROM HINGE EDGE OF DOOR.



CUSTOM PULL SIDE MOUNTED OPERATOR

WIRES TO EXIT BETWEEN 1" & 3" ABOVE FRAME AT STRIKE SIDE OF THE FRAME AS SHOWN.

IF IT IS A DOUBLE DOOR APPLICATION THEN WIRES TO EXIT 36" FROM HINGE EDGE OF DOOR.

1 General

1.1 **SECTION INCLUDES**

.1 Labour, Products, equipment and services necessary for terrazzo restoration Work in accordance with the Contract Documents.

1.2 **REFERENCES**

.1 CSA A23.1, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

.2 CAN/CSA A3000, Cementitious Materials Compendium.

.3 TTMAC, Terrazzo, Tile and Marble Association of Canada

1.3 **SUBMITTALS**

.1 Product data:
- .1 Submit duplicate copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:
  - .1 Performance criteria, compliance with appropriate reference standard(s), characteristics, limitations, and trouble-shooting protocol.
  - .2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings:
- .1 Submit shop drawings in accordance with Section 01 33 00 indicating:
  - .1 Terrazzo layout.
  - .2 Perimeter conditions, junctions with dissimilar materials.
  - .3 Setting details.

.3 Certificates: Submit manufacturer's certificates stating that materials supplied are in accordance with this specification.

.4 Closeout submittals: Submit recommended maintenance instructions and listing of recommended maintenance Products for incorporation into Operations and Maintenance Manuals in accordance with Section 01 78 23.

1.4 **QUALITY ASSURANCE**

.1 Installer qualifications: Perform Work of this Section by a company that has expertise and proven experience in the installation of terrazzo units of a similar size and nature.

1.5 **SITE CONDITIONS**

.1 Do not install Work of this Section outside of the following environmental ranges without the Consultant's and Product manufacturer's written acceptance:
- .1 Ambient air and surface temperature: 15^0C to 45^0C.
- .2 Precipitation: None.

.2 Install temporary protection and facilities to maintain the Product manufacturer's, and specified, environmental requirements for 7 Days before, during, and 7 Days after installation.

2 Products

2.1 **MATERIALS**

.1 Cement: Portland cement to meet specified requirements of CAN/CSA A3000, Normal or High-Early strength. Use white portland cement in white matrix.

.2 Sand: To meet specified requirements of CSA A23.1, sharp, screened, washed. Use white sand in white matrix.

.3 Water: Potable, free from acids, alkalies, oil, or organic materials.

.4 Divider Strips: To match existing material and size.

.5 Topping:
- .1 Marble Chips: To meet specified requirements of Terrazzo, Tile and Marble Association of Canada, match existing size gradation and colour.
- .2 Colour pigments: Pure mineral, alkali-resistant, non-fading, colour to match existing.

.6 Cleaner: To meet specified requirements of #1000 Series of Terrazzo, Tile and Marble Association of Canada.

.7 Sealer: To meet specified requirements of #2000 Series of Terrazzo, Tile and Marble Association of Canada.

.8 Floor Finish: To meet specified requirements of Type #3001 of Terrazzo, Tile and Marble Association of Canada.

.9 Curing Agent: Non-staining, maximum moisture retention 0.015 grams, to meet specified requirements of Terrazzo, Tile and Marble Association of Canada.

2.2 **MIXES**

.1 Underbed:
- .1 One part cement to four parts sand by volume.

.2 Add water to product stiff mix, but use no more than four gals/80 lb. bag of cement to make workable.

.2 Topping:

.1 Marble chip aggregate and cement mixed dry with colour pigments to match existing. Grind a small area to determine the true colours of existing terrazzo and chip gradation.

.2 Water shall not exceed 18 L /bag of cement.

.3 Prepare topping by mechanical mixing with materials added in the following order: one-half of aggregate, total of cement, water, remaining aggregate.

3 Execution

3.1 EXAMINATION

.1 Ensure that environmental conditions and backing surfaces have been provided according to specified requirements. Do not proceed with work until satisfied that installation will meet specified standard.

3.2 PREPARATION

.1 Take extreme care that surfaces adjacent to terrazzo work are protected from staining by terrazzo materials, and that slurry is not tracked into other building areas any time during installation.

.2 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.3 Sweep backing surfaces clean of all loose materials, and remove the debris. Clean off contaminants which would cause a defective installation.

.4 Locate and prepare for equipment or accessories recessed in finished terrazzo work.

.5 Cut terrazzo at panel joints where repair/extension is required.

3.3 INSTALLATION

.1 General:

.1 Installation shall match existing type. Profile of base shall match existing. Where bases are of different profiles, install new base of profile to match finished installation.

.2 When patching terrazzo, extend area to nearest divider strip in all directions.

.2 Underbed for Bonded Installation:

.1 Wet backing surfaces with water, remove excess, and when surface water has dried, slush into soaked backing a neat portland cement grout.

.2 Immediately following application of grout, place underbed, spread evenly, and screed to true levels to receive specified topping.

.3 Divider Strips:
- .1 Install divider strips in underbed while it is still semi-plastic.
- .2 Locate divider strips accurately. Set them straight, aligned, to line up with existing and at correct level; make junctions tight; and firmly trowel them along edges into underbed to ensure anchorage.
- .3 Set edging strips at junctions with other floor finishes to provide precisely for their thicknesses and finished levels after grinding. At openings set edging strips under doors.
- .4 Extend divider strips at right angles across borders.

.4 Placing of Topping:
- .1 Let underbed cure for at least 24 hours.
- .2 Wet top of underbed with water, remove excess, and when surface water had dried slush into soaked underbed a neat Portland cement grout of same colour cement and pigment as for matrix.
- .3 Apply topping to slurry or underbed while it is still wet.

3.4 TOPPING

.1 Standard Finish:
- .1 Into wet topping surface of floors, sprinkle wet aggregate of same materials in same proportions as specified for topping.
- .2 Apply so that finish surfaces match existing.

.2 Surface Preparation:
- .1 After finish aggregates are added, immediately roll floor topping with a heavy roller to compact and to remove excess water and cement. Pack bases.
- .2 Hand trowel all terrazzo surfaces to expose divider strips level with topping.

.3 Curing:
- .1 Cure topping for a minimum of six days following placing.
- .2 Cure to ensure that topping is kept damp until cement is hydrated.
- .3 Use wet mats or sand, paper or plastic sheets, or liquid curing compound.

3.5 FINISHING

.1 Grind terrazzo surfaces by machine. Hand rub places inaccessible to grinding machines.

.2 Constantly flood surfaces with water during grinding.

.3 For initial grinding, use 24 to 60 grit carborundum stones.

.4 After initial grinding, wash surfaces clean, remove all residue from holes and voids, and thoroughly rinse with only water.

.5 Trowel plastic grout, of same mix and colour as matrix, into holes and voids of wetted surface, and remove excess. When grout begins to set, work it into holes and voids with burlap or excelsior pads, and remove excess.

.6 Cure grout for a minimum of 48 hours as specified above for curing.

.7 Give final grinding with 120 grit stones and water.

.8 Wash off surfaces thoroughly after grinding.

.9 Provide carborundum strips on landings at stariwells as shown on drawings.

3.6 SITE TOLERANCES

.1 Finish surfaces shall be level or straight within a tolerance of 1.6 mm between division strips.

3.7 REPAIR

.1 Before Project completion, remove and replace defective, off-colour, and damaged work. Defective work shall include areas where distribution of surface aggregate is visually different from surrounding area. Removed areas shall be completely bounded by divider strips or edges. Regrout and regrind surfaces left with open fissures and holes.

3.8 CLEANING

.1 Scrub terrazzo surfaces with an abundance of clean water. Use machine scrubbers where possible for floors.

.2 Rinse with clean water and allow to dry.

.3 Remove dust with heavy-duty vacuum cleaner.

.4 If further cleaning is required, use Terrazzo, Tile and Marble Association of Canada #1001 cleaner in accordance with their specifications.

.5 Sealing:

- .1 As soon as possible after final cleaning, apply a coat of sealer. Wipe off excess before it dries.
- .2 Just before completion of Project, clean terrazzo, as specified above, and apply a second coat of sealer as before.
- .3 Apply two coats of floor finish.

3.9 **PROTECTION**

.1 Prevent all traffic and work on newly laid floors by barricading areas for at least 24 hours following installation.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 04 21 13 – Masonry.

.3 Section 06 10 11 – Rough Carpentry.

.4 Section 09 22 16 – Non-structural Metal Framing.

.5 Section 09 91 22 – Painting.

.6 Supply of access doors for mechanical and electrical devices in mechanical and electrical sections.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM C1396/C1396M-09a, Specification for Gypsum Board.

.2 ASTM C475/C475M-02(2007), Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.3 ASTM C514-04(2009)e1, Specification for Nails for the Application of Gypsum Board.

.4 ASTM C840-08, Specification for Application and Finishing of Gypsum Board..

.5 ASTM C1002-07, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.6 ASTM C1047-10, Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-71.25-M88, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.

1.3 SUBMITTALS

.1 Product data: Submit copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:

.1 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.

.2 Product transportation, storage, handling and installation requirements.

.2 Shop drawings: Submit shop drawings in accordance with Section 01 33 00 indicating adjacent construction, elevations, sections and details, dimensions, thickness, finishes and relationship to adjacent construction.

1.4 QULAITY ASSURANCE

.1 Qualifications: Execute the Work of this Section by skilled, qualified, and experienced workers trained in the installation of the Work of this Section.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in original packages, containers or bundles bearing manufacturers brand name and identification.

.2 Store materials inside, level, under cover. Keep dry. Protect from weather, other elements and damage from construction operations and other causes.

.3 Handle gypsum boards to prevent damage to edges, ends or surfaces. Protect metal accessories and trim from being bent or damaged.

1.6 SITE ENVIRONMENTAL REQUIREMENTS

.1 Maintain temperature minimum 10 degrees C, maximum 21 degrees C for 48 hours prior to and during application of gypsum boards and joint treatment, and for at least 48 hours after completion of joint treatment.

.2 Apply board and joint treatment to dry, frost free surfaces.

.3 Ventilation: Ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard AND packaging material for recycling.

.3 Divert unused gypsum from landfill to gypsum recycling facility for disposal approved by Consultant.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Consultant.

.5 Divert unused wood materials from landfill to recycling facility approved by Consultant.

.6 Divert unused paint and caulking material from landfill to official hazardous material collections site approved by Consultant.

.7 Do not dispose of unused paint and caulking materials into sewer systems, into lakes, streams, onto ground or in other locations where it will pose health or environmental hazard.

Part 2 Products

2.1 MATERIALS

.1 Standard board (GB - regular): to ASTM C1396/C1396M, 13 mm, 16 mm or 19 mm thick as indicated, tapered edges.

.2 Standard board (GB- fire rated): to ASTM C1396/C1396M, X Rated, 16 mm or 19 mm thick or as indicated, tapered edges.

.3 Water-resistant board (WRGB): 13 mm water resistant, tapered edges (WRGB in Finish Schedule).

.4 Abuse resistant/Fire rated: to ASTM C1396/C1396M, Fire-Rated Type X, 5/8" thick, "Abuse Resistant Fire Code" gypsum board panels, tapered edges, by CGC, Fibrerock interior AquaTuff panel. All gypsum board to have anti-microbial and anti-mould properties.

.5 Exterior gypsum sheathing: 12 mm thick Dens Glass Gold by Georgia-Pacific Products, CertainTeed Gypsum Canada Inc., GlasRoc Sheathing & GlasRoc Sheathing Type X or approved alternative.

.6 Flexible gypsum board: ASTM C1396; gypsum board 6 mm thick of maximum practical lengths to minimize end joints, unless indicated otherwise. Acceptable Manufacturers: CGC Inc., CertainTeed, or others meeting these specifications.

.7 Structural steel studs: Refer to structural drawings and specifications.

.8 All gypsum board to have Anti-Microbial and Anti Mold properties.

.9 Acceptable Manufacturers: CGC Inc., CertainTeed, or others meeting these specifications.

.10 Nails: to ASTM C514.

.11 Steel drill screws: to ASTM C1002.

.12 Stud adhesive: to CAN/CGSB-71.25.

.13 Laminating compound: as recommended by manufacturer, asbestos-free.

.14 Concrete Anchors: Phillips Red Head TW-614 or equivalent. Do not use powder activated fasteners for ceiling support.

.15 Tie Wire: #16 ga. galvanized soft annealed steel wire.

.16 Caulking: Acoustical sealant.

.17 38 mm thick mineral wool batts ULC labeled, if indicated on drawings.

.18 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, 0.5 mm base thickness commercial sheet steel with G90 zinc finish, perforated flanges, and one piece length per location.

.19 Sealants: in accordance with Section 07 92 10 - Joint Sealing.

.20 Insulating strip: rubberized, moisture resistant, 3 mm thick cork OR closed cell neoprene strip, 12 mm wide, with self sticking permanent adhesive on one face, lengths as required.

.21 Joint compound: to ASTM C475, asbestos-free.

.22 Plywood: In accordance with Section 06 10 11 - Rough Carpentry.

Part 3 Execution

3.1 ERECTION

.1 Do application and finishing of gypsum board in accordance with ASTM C840 except where specified otherwise.

.2 Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C840 except where specified otherwise.

.3 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.4 Install work level to tolerance of 1:1200.

3.2 APPLICATION

.1 Do not apply gypsum board until bucks, anchors, blocking, sound attenuation, electrical and mechanical works are approved.

.2 Apply single layer gypsum board to metal furring or framing using screw fasteners and laminating adhesive. Maximum spacing of screws 300 mm on centre.

.1 Single-Layer Application:

.1 Apply gypsum board on ceilings prior to application of walls in accordance with ASTM C840.

.2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.

.2 Double-Layer Application:

.1 Install gypsum board for base layer and exposed gypsum board for face layer.

.2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250 mm.

.3 Apply base layers at right angles to supports unless otherwise indicated.

.4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 250 mm with base layer joints.

.3 Apply water-resistant gypsum board where wall tiles are to be applied and adjacent slop sinks. Apply water-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads. Do not apply joint treatment on areas to receive tile finish.

.4 Apply gypsum board to concrete block or poured concrete surfaces, where indicated, using laminating adhesive.

.5 Apply type X gypsum board where indicated, in accordance with U.L.C. requirements and with supplement to the National Building Code of Canada to obtain the required fire protection, fire rating and fire separation.

.6 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.

.7 Where indicated on drawings, staple blanket to wallboard in accordance with ULC design requirements. Blanket shall be continuous and tightly fitted between studs and at perimeter.

.8 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.

.9 Install gypsum board with face side out.

.10 Coordinate wallboard installation with installation of plywood by Section 06 10 11 – Rough Carpentry.

.11 Do not install damaged or damp boards.

.12 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

.13 Where a floor or roof structural member interferes with an interior partition wall at which a smoke or fire separation is required, a gypsum board enclosure with a fire rating not less than required for the wall must be provided to continue the required, a gypsum board enclosure with a fire rating not less than required for the wall must be provided to continue the required separation to the floor or roof above (typical)

3.3 INSTALLATION

.1 Comply with ASTM C840. Install gypsum board in accordance with manufacturer's written instructions.

.2 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre, unless otherwise indicated.

.3 Install casing beads around perimeter of suspended ceilings.

.4 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.5 Construct control joints of preformed units or two back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint.

.6 Provide continuous polyethylene dust barrier behind and across control joints.

.7 Locate control joints where indicated or at changes in substrate construction, at approximate 10 m spacing on long corridor runs.

.8 Install control joints straight and true.

.9 Construct expansion joints at building expansion and construction joints. Provide continuous dust barrier.

.10 Install expansion joint straight and true.

.11 Install cornice cap where gypsum board partitions do not extend to ceiling.

.12 Fit cornice cap over partition, secure to partition track with two rows of sheet metal screws staggered at 300 mm on centre.

.13 Splice corners and intersections together and secure to each member with 3 screws.

.14 Seal with acoustical sealant at ceilings, floors, wall intersections and all penetrations such as electrical outlets.

.15 Install access doors to electrical and mechanical fixtures specified in respective sections.

.1 Rigidly secure frames to furring or framing systems.

.16 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.17 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with Association of the Wall and Ceiling Industries (AWCI) International Recommended Specification on Levels of Gypsum Board Finish:

.1 Levels of finish:

.1 Level 0: No tapping, finishing or accessories required.

.2 Level 1: Embed tape for joints and interior angles in joint compound. Surfaces to be free of excess joint compound; tool marks and ridges are acceptable.

.3 Level 2: Embed tape for joints and interior angles in joint compound and apply one separate coat of joint compound over joints, angles, fastener heads and accessories; surfaces free of excess joint compound; tool marks and ridges are acceptable.

.4 Level 3: Embed tape for joints and interior angles in joint compound and apply two separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.

.5 Level 4: Embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.

.6 Level 5: Embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; apply a thin skim coat of joint compound to entire surface; surfaces smooth and free of tool marks and ridges.

.18 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.19 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.

.20 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.21 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

.22 Apply one coat of white primer sealer over surface to be textured. When dry apply textured finish in accordance with manufacturer's instructions.

.23 Mix joint compound slightly thinner than for joint taping.

.24 Apply thin coat to entire surface using trowel or drywall broadknife to fill surface texture differences, variations or tool marks.

.25 Allow skim coat to dry completely.

.26 Remove ridges by light sanding or wiping with damp cloth.

.27 Provide protection that ensures gypsum drywall work will remain without damage or deterioration at time of substantial completion.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).

.1 ASTM C645-09a, Specification for Nonstructural Steel Framing Members.

.2 ASTM C754-09a, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

1.3 DESIGN REQUIREMENTS

.1 Design ceiling suspension system in accordance with manufacturer's printed directions and ASTM C754.

.2 Design ceiling system for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

.3 Design hanger anchor and entire suspension system static loading not to exceed 25% of their ultimate capacity including lighting fixture dead loads.

.4 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.

.5 Design subframing as necessary to accommodate, and to circumvent, conflicts and interferences where ducts or other equipment prevent the regular spacing of hangers.

1.4 SUBMITTALS

.1 Product data:

.1 Submit copies of manufacturer's Product data in accordance with Section 01 33 00 indicating:

.2 Performance criteria, compliance with appropriate reference standard, characteristics, and limitations.

.3 Product transportation, storage, handling and installation requirements.

.2 Shop drawings: Submit shop drawings in accordance with Section 01 33 00 indicating adjacent construction, elevations, sections and details, dimensions, thickness, finishes and relationship to adjacent construction.

.3 Certifications: Submit written certification stating that suspended ceiling system is designed for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

1.5 QUALITY ASSURANCE

.1 Qualifications: Execute the Work of this Section by skilled, qualified, and experienced workers trained in the installation of the Work of this Section.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling.

.3 Divert unused metal materials from landfill to metal recycling facility approved by Consultant.

.4 Divert unused gypsum materials from landfill to recycling facility approved by Consultant.

Part 2 Products

2.1 MATERIALS

.1 Non-load bearing channel stud framing: to ASTM C645, roll formed from 0.59mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum lath and metal lath. Knock-out service holes at 150 mm centres.

.2 Floor and ceiling tracks: to ASTM C645, in widths to suit stud sizes, 30 mm legs for floor track, 50 mm for ceiling track.

.3 Metal channel stiffener: 38 mm size, 2 mm thick cold rolled galvanized steel.

.4 Metal Accessories: As recommended by manufacturer for complete and secure installation.

Part 3 Execution

3.1 ERECTION

.1 Install ceiling and stud systems in accordance with manufacturer's written instructions and reviewed shop drawings.

.2 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum.

.3 Place studs vertically at 400 mm on centre and not more than 50 mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.

.4 Erect metal studding to tolerance of 1:1000.

.5 Attach studs to bottom track using screws.

.6 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.7 Install steel frames and anchor frames securely to studs using minimum of three (3) anchors per jamb for jambs up to 2100 mm high and a minimum of four (4) anchors per jambs for jambs over 2100 mm high.

.8 Provide two (2) studs at each side of openings wider than stud centre specified.

.9 Install, cut to length, piece of runner horizontally over door frames and at top and bottom of rough opening in glazed partitions.

.10 Provide 38 mm x 89 mm vertical and horizontal wood studs secured between metal studs for attachments of bathroom fixtures, accessories, cabinet work, and other fixtures, including grab bars, towel rails, attached to steel stud partitions.

.11 Install steel stud or furring channel between studs for attaching electrical and other boxes.

.12 Extend all partitions to underside of deck above for sound and fire separation.

.13 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.

3.2 CEILING FURRING

.1 Install runners level to tolerance of 3 mm over 3.5 m. Provide runners at interruptions of continuity and change in direction.

.2 Frame with furring channels, perimeter of openings to accommodate access panels, light fixtures, diffusers, grilles, etc.

.3 Furr for bulkheads within or at termination or ceilings.

.4 Install furring channels at 400 mm o.c. maximum.

3.3 WALL FURRING

.1 Install steel furring, as indicated.

.2 Frame opening and around built-in equipment on four (4) sides with channels.

.3 Box-in beads, columns, pipes, and around exposed services.

3.4 FIRE RATED ASSEMBLIES

.1 If required, install Metal Stud System and Furring in accordance with appropriate ULC Design and with supplement to the National Building Code of Canada.

3.5 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 07 92 10 - Joint Sealing.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/Ceramic Tile Institute (CTI)

.1 ANSI A108/A118/A136.1-10, Installation of Ceramic Tile.

.2 American Society for Testing and Materials (ASTM International) International

.1 ASTM C144-04, Specification for Aggregate for Masonry Mortar.
.2 ASTMC206 - 03(2009) Standard Specification for Finishing Hydrated Lime.
.3 ASTM C 207-06, Specification for Hydrated Lime for Masonry Purposes.
.4 ASTM C979-05, Specification for Pigments for Integrally Coloured Concrete.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
.2 CAN/CGSB-75.1-M88, Tile, Ceramic.

.4 Canadian Standards Association (CSA International)

.1 CAN/CSA-A3000-08, Cementitious Materials Compendium.

.5 Terrazzo Tile and Marble Association of Canada (TTMAC)

.1 Tile Specification Guide 09300, Tile Installation Manual.
.2 Tile Maintenance Guide.

1.3 SUBMITTALS

.1 Product data:

.1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
.2 Include manufacturer's information on:
.1 Ceramic tile, marked to show each type, size, and shape required.
.2 Chemical resistant mortar and grout (Epoxy and Furan).
.3 Cementitious backer unit.
.4 Dry-set Portland cement mortar and grout.
.5 Divider strip.
.6 Elastomeric membrane and bond coat.
.7 Reinforcing tape.
.8 Levelling compound.
.9 Latex-Portland cement mortar and grout.

.10 Commercial Portland cement grout.
.11 Organic adhesive.
.12 Slip resistant tile.
.13 Waterproofing isolation membrane.
.14 Fasteners.

.2 Shop drawings:
.1 Submit shop drawings in accordance with Section 01 33 00 indicating:
.1 Tile layout, patterns, and colour arrangement.
.2 Perimeter conditions, junctions with dissimilar materials.
.3 Setting details.

.3 Samples:
.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
.2 Base tile: submit 300 x 300 mm sample panels of each colour, texture, size, and pattern of tile.
.3 Floor tile: submit 300 x 300 mm sample panels of each colour, texture, size, and pattern of tile.
.4 Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, colour, and size.
.5 Adhere tile samples to [11] mm thick plywood and grout joints to represent project installation.
.6 Prepare a 2 m x 3m Mock up sample on site to ensure demonstration of installation details and quality control.

.4 Certificates: Submit manufacturer's certificates stating that materials supplied are in accordance with this specification.

.5 Closeout submittals: Submit recommended maintenance instructions and listing of recommended maintenance Products for incorporation into Operations and Maintenance Manuals in accordance with Section 01 78 00.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in containers with labels legible and intact and grade-seals unbroken.

.2 Store material so as to prevent damage or contamination.

.3 Store materials in a dry area, protected from freezing, staining and damage.

.4 Store cementitious materials on a dry surface.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal packaging material in appropriate on-site bins for recycling.

.3 Unused adhesive, sealant and coating materials must be disposed of at an official hazardous material collections site as approved by the Consultant.

.4 Unused adhesive, sealant and coating materials must not be disposed of into the sewer system, into streams, lakes, onto the ground or in other location where it will pose a health or environmental hazard.

.5 Broken ceramic materials must be diverted from landfill to a local facility as approved by Consultant.

1.6 ENVIRONMENTAL CONDITIONS

.1 Maintain air temperature and structural base temperature at ceramic tile installation area above 12 ºC for 48 h before, during, and 48 h after, installation.

.2 Do not install tiles at temperatures less than 12 ºC or above 38 ºC.

.3 Do not apply epoxy mortar and grouts at temperatures below 15 ºC or above 25 ºC.

1.7 EXTRA MATERIAL

.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide minimum 5% of each type and colour of tile required for project for maintenance use. Store where directed.

.3 Maintenance material to be of same production run as installed material.

1.8 EXTENDED WARRANTY

.1 Submit a warranty for entire wall tile installation, covering materials and labour and the repair or replacement of defective work in accordance with the Contract, but for three (3) years total.

Part 2 Products

2.1 FLOOR TILE

.1 Porcelain floor tile (Designation: POR): to CAN/CGSB-75.1.

.1 Acceptable Materials: Size 300 mm x 600 mm; “NuStone” by Centura, “Regal” by Olympia Tile, “Ultra Modern” by Daltile, or “Anchorage” by Daltile, all in matte finish. Allow for one (1) field colour from manufacturer’s full line and two (2) accent floor tiles.

.2 Locations: Refer to Room Finish Schedule for locations.

.3 Install in a running bond pattern, with a one third staggered joint.

.4 Provide prefabricated movement joints in conjunction with slab saw cuts approx. 3500-6000mm distance (refer to floor pattern drawing).

.2 Porcelain floor tile Cove Base (Designation: POR): to CAN/CGSB-75.1.

.1 Acceptable Materials: Size 100 mm x 300 mm 'sit-on' cove base; "Vitra", by Centura or "Omnia", by Olympia Tile, all in matte finish. Allow for two (2) colours from manufacturer's Category/Group 2 colours. Include all inside and outside corner pieces compatible with bullnose masonry block corners.

.3 Porcelain mosaic floor tile (Designation: CMT): 50 x 50 porcelain mosaic floor tile to CAN/CGSB-75.1.

.1 Acceptable materials: "Vitra", by Centura or "Quebec", by Olympia Tile. 2 colours from full range in matte non-slip finish.

.2 Include cove base, top slope edges, fitted corners; include all pieces and trims. Contractors to fit around bullnose block walls.

.3 Locations: Floors in all Showers

2.2 WALL TILE

.1 Ceramic tile (Designation: CWT): to CAN/CGSB-75.1, Type 5, Class MR 4, 100mm x 406mm x 6 mm size, glazed surface. Thin-set application.

1.1.1 Acceptable Materials: Daltile (American Olean) Colour Story Wall 4" x 16". Upt to 10 colours to be selected from full range of offering.

.1 Provide surface bullnose top cove S44D9/4" x 16" where indicated.

.2 Provide coves, corners, reveals, surf caps, inners and outers as required to complete the work.

.1 Tile Edging: Purpose-made, anodized aluminum, polished chrome finish, metal edge strips as manufactured Schluter Systems at all exposed tile edging: Profile – JOLLY; thickness as required for tile and tile set.

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 Bullnose shapes for external corners including edges.

.2 Coved shapes for internal corners.

.3 Special shapes for:

.1 Base to floor internal corners to provide integral coved vertical and horizontal joint.

.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.

.3 Wall top edge internal corners to provide integral coved vertical joint with bullnose top edge.

.4 Wall top edge external corners to provide bullnose vertical and horizontal joint edge.

.5 Provide cove and bullnose shapes for where indicated and required to complete tile work.

2.4 MORTAR AND ADHESIVE MATERIALS

.1 Manufacturer's of commercial mortar, grout and adhesive having Product considered acceptable for use:

.1 Mapei

.2 Laticrete

.3 Flextile

.2 Walls: Mortarcrete Latex Mortar conforming to ANSI A108/A118/A136.1, manufactured by L & M Ceramo Inc.

.3 Floors:

.1 Cement Mortar: Mixture of 1 part Portland cement, 4 parts dry sand and 1/10 hydraulic lime. Materials shall conform to the following:

.2 Portland Cement: To CAN/CSA-A3000, Type 10.

.3 Hydrated Lime: To ASTM C-206 or 207, Type 5.

.4 Sand: To ASTM C144, passing 1.6 mm sieve.

.5 Water: Potable, containing no contaminants which cause efflorescence.

.6 Thin Set Mortar: ANSI A108/A118/A136.1, field mixed, blended sand-Portland cement-latex mortar, "Kerabond/Keralastic by Mapei.

.1 Acceptable Alternates: "Laticrete 4237 distributed by Ceratec Inc., or Flextile 52 thin set.

.2 Latex Additive: "Cemtex" by Master Builders, Laticrete 2022" distributed by Ceratec Inc.,

2.5 GROUT

.1 Colouring Pigments:

.1 Pure mineral pigments, limeproof and nonfading, complying with ASTM C979.

.2 Colouring pigments to be added to grout by manufacturer.

.3 Job coloured grout are not acceptable.

.4 Use in Commercial Portland Cement Grout, Dry-Set Grout, and Latex-Portland Cement Grout.

.2 Chemical-Resistant Grout for Walls:

.1 Epoxy grout: to ANSI A108/A118/A136.1, having quality, colour and characteristics to match epoxy bond coat. Adhesive and grout by same manufacturer.

.2 Epoxy Grout: "Latapoxy SP-100" Stainless, chemical resistant epoxy grout by Laticrete International. Colour from manufacturer's full range. Alternate: Kerapoxy by Mapei.

.3 Floors:

.1 Polymer modified grout as manufactured by MAPEI.

2.6 WATERPROOFING MEMBRANE

.1 Waterproof Membrane System made from black, cold-applied, self-curing, liquid rubber polymer and an integral reinforcing fabric.

.2 'Mapelastic' by Mapei or '9235 Waterproofing' by Laticrete International Inc.

2.7 ACCESSORIES

.1 Prefabricated Movement Joints: purpose made Schluter, Dilex-KSN aluminum, sized as required for tile and mortar bed. Colour to be selected by consultant. To be installed directly above slab saw-cuts. Refer to floor pattern drawing for locations.

.2 Reinforcing mesh: 50 x 50 x 1.6 x 1.6 mm galvanized steel wire mesh, welded fabric design, in flat sheets.

.3 Divider strips:

.1 Laminated strips, core 32 x 3 mm black neoprene, outsides (both sides) brass 32 x 1.29 mm complete with anchors, both sides spaced at 150 mm on centre.

.2 Brass complete with anchors, both sides spaced at 150 mm on centre.

.4 Cleavage plane: polyethylene film to CGSB 51-34.

.5 Transition Strips: purpose made metal extrusion; stainless steel type.

.6 Reducer Strips: purpose made metal extrusion; stainless steel type; maximum slope of 1:2.

.7 Sealant: in accordance with Section 07 92 10 - Joint Sealing.

.8 Floor sealer and protective coating: to tile and grout manufacturers recommendations.

2.8 MIXES

.1 Portland Cement:

.1 Scratch coat: 1 part portland cement, 1/5 to 1/2 parts hydrated lime to suit job conditions, 4 parts sand, 1 part water, and latex additive where required. Adjust water volume depending on water content of sand.

.2 Slurry bond coat: portland cement and water mixed to creamy paste. Latex additive may be included.

.3 Mortar bed for floors: 1 part portland cement, 4 parts sand, 1 part water. Adjust water volume depending on water content of sand.

.4 Mortar bed for walls and ceilings: 1 part portland cement, 1/5 to 1/2 parts hydrated lime to suit job conditions, 4 parts sand and 1 part water. Adjust water volume depending on water content of sand.

.5 Levelling coat: 1 part portland cement, 4 parts sand, minimum 1/10 part latex additive, 1 part water including latex additive.

.6 Bond or setting coat: 1 part portland cement, 1/3 part hydrated lime, 1 part water.

.7 Measure mortar ingredients by volume.

.2 Dry set mortar: mix to manufacturer's instructions.

.3 Organic adhesive: pre-mixed.

.4 Mix bond and levelling coats, and grout to manufacturer's instructions.

.5 Adjust water volumes to suit water content of sand.

2.9 PATCHING AND LEVELING COMPOUND

.1 Portland cement base, acrylic polymer compound, manufactured specifically for resurfacing and levelling concrete floors. Products containing gypsum are not acceptable.

.2 Have not less than the following physical properties:

.1 Compressive strength - 25 MPa.

.2 Tensile strength - 7 MPa.

.3 Flexural strength - 7 MPa.

.4 Density - 1.9.

.3 Capable of being applied in layers up to 50 mm thick, being brought to feather edge, and being trowelled to smooth finish.

.4 Ready for use in 48 hours after application.

2.10 CLEANING COMPOUNDS

.1 Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and levelling compounds and elastomeric waterproofing membrane and coat.

.2 Materials containing acid or caustic material are not acceptable.

Part 3 Execution

3.1 WORKMANSHIP

.1 Install tiles in accordance with manufacturer's instructions and TTMAC Specification Guide 09300 Tile Installation Manual. Manufacturer's installation instructions govern over TTMAC Installation Manual.

.2 Waterproofing membrane: Apply with a trowel on prepared substrate to a total dry film thickness of 1.143 mm in accordance with manufacturer’s printed directions. Carry up walls to 50 mm high.

.3 Apply tile [or backing coats] to clean and sound surfaces.

.4 Fit tile around corners, fitments, fixtures, drains and other built-in objects. Maintain uniform joint appearance. Cut edges smooth and even. Do not split tiles.

.5 Maximum surface tolerance 1:800.

.6 Make joints between tile uniform and approximately [1.5 mm] wide, plumb, straight, true, even and flush with adjacent tile. Ensure sheet layout not visible after installation. Align patterns.

.7 Lay out tiles so perimeter tiles are minimum 1/2 size.

.8 Install floor tiles as per pattern. Layout and install flash cove tile first, before floor tile, ensuring a flush edge on the horizontal surface by feathering to masonry walls as required to produce a straight line on the floor. Install floor tiles to pattern supplied by Architect at a later date. Contact consultant to review when approximately no more than 10 sq. m has been installed.

.9 Sound tiles after setting and replace hollow-sounding units to obtain full bond.

.10 Make internal angles square, external angles rounded.

.11 Make internal angles square, external angles chamfered at 45° with narrow tile strip.

.12 Construct cove base, as described using all special pieces available for inside and outside corners.

.13 For Floors: Use bull nose edged tiles at termination of wall tiles, except where tiles abut projecting surface or differing plane.

.14 Seal grouted joints with sealer.

.15 Keep building expansion joints free of mortar or grout.

.16 For Walls: Use round edged tiles at termination of wall tile panels, except where panel abuts projecting surface or differing plane.

.17 Install divider strips at junction of tile flooring and dissimilar materials.

.18 Allow minimum 24 h after installation of tiles, before grouting.

.19 Clean installed tile surfaces after installation and grouting cured.

3.2 FLOOR TILE

.1 Install in accordance with TTMAC to applicable thinset detail.

3.3 FLOOR SEALER AND PROTECTIVE COATING

.1 Apply in accordance with manufacturer's instructions.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals.

.3 Section 06 10 10 - Rough Carpentry: Wood strapping.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C635-07, Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

.2 ASTM C636-08, Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

.3 ASTM E1264-08e1, Classification for Acoustical Ceiling Products.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.

1.3 DESIGN CRITERIA

.1 Design ceiling suspension systems in accordance with ASTM C636 and manufacturer's printed directions.

.2 Design tile ceiling system for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority. Acoustic panel system is not designed to carry the weight of electrical equipment.

.3 Design hanger anchor and entire suspension system static loading not to exceed 25% of their ultimate capacity including lighting fixture dead loads.

.4 Design tile 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. Acoustic panel system is not designed to carry the weight of mechanical and electrical equipment.

.5 Design subframing as necessary to accommodate, to avoid conflicts and interferences where ducts or equipment prevent regular spacing of hangers.

.6 Maximum deflection 1/360 of span to ASTM C635 deflection test.

1.4 SUBMITTALS

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

.2 Shop drawings: Submit shop drawings in accordance with Section 01 33 00 indicating:

.1 Suspension system layout including hangers and supports for acoustic tile system.

.2 Acoustic panel system including suspension system, hangers, supports and panel sizes and locations.

.3 Conditions at abutting, intersecting, and penetrating construction.

.4 Dimensioned locations of lighting fixtures, diffusers, sprinkler heads and other items that pierce the ceiling plane.

.3 Samples: Submit two each 300 x 300 mm samples of each individual tile and grid type in accordance with Section 01 33 00.

.4 Certificates: Submit written certification stating that suspended ceiling system is designed for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

1.5 REGULATORY REQUIREMENTS

.1 Fire-resistance rated floor/ceiling and roof/ceiling assembly: certified by a Canadian Certification Organization accredited by Standards Council of Canada.

1.6 QUALITY ASSURANCE

.1 Mock-up:

.1 Construct one 4 m^2 mock-up for each type of ceiling system incorporating typical light fixture and other typical mechanical and electrical fixtures.

.2 Test the adequacy of the suspension system to support the fixtures without deflection of ceiling or failure of hanging wire anchorage. Supply copy of Test Results to Consultant.

.3 Change materials and installation methods if tests indicate proposed system is inadequate and re-test as necessary until system approved.

.4 Give early notice to Consultant and Mechanical and Electrical Trades and co-operate with them in selecting suitable location for sample ceiling and timing of installation and test.

.5 Do not commence general installation work until sample ceiling approved, then install ceiling to conform with approved samples.

.6 Mock-up may form part of final Work, if acceptable to Consultant. Remove and dispose of mock-ups which do not form part of Work.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Permit wet work to dry before commencement of installation.

.2 Maintain uniform minimum temperature of 15^0C and humidity of 20 - 40 % before and during installation.

.3 Store materials in work area 48 hours prior to installation.

1.9 EXTRA MATERIALS

.1 Provide extra materials of acoustic units in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide acoustical units amounting to 2 % of gross ceiling area for each pattern and type required for project.

.3 Extra materials to be from same production run as installed materials.

.4 Clearly identify each type of acoustic unit, including colour and texture.

.5 Store where directed by Consultant.

1.10 DELIVERY, STORAGE AND HANDLING

.1 Transport, handle and store material in manner to prevent warp, twist, damage to panel edges and surfaces in accordance with Manufacturer's recommendations.

.2 Any warped and/or damaged panels and trim shall be rejected and be replaced by new, straight, undamaged and acceptable material at no cost to Owner.

.3 Bent, twisted or otherwise damaged Tee grid suspension components shall not be used under any circumstances. Replace such damaged items with new undamaged material at no additional cost to Owner.

.4 Store material in warm, dry place away from water and the elements. Protect against undue loading stresses and shock.

.5 All packaged material shall be delivered in original manufacturers wrappers and containers with labels and seals intact. All cartons shall bear U.L. label.

Part 2 Products

2.1 MATERIALS

.1 Acoustic units for suspended ceiling system: to CAN/CGSB-92.1 and ASTM E1264.

.2 Acoustic Ceiling Panels, Designation LAP: Acoustic Ceiling Panels, wet formed mineral fibre panels, by Armstrong World Industries Canada Inc. (Contact: Ruth Shannon; cell: 416-540-5284). Colour: White; Types as noted below:

.3 **Panel Types**:

.1 Type 1: LAP: 600 x 1200 mm x 15.9 mm thick; ‘Fine Fissured’ with medium texture, Square Lay-In, #1729; Location: For use at classroom areas and any additional areas as indicated.

.4 Acceptable alternates: similar purpose-designed high humidity ceiling panels by CGC Interiors and CertainTeed Ceilings Canada.

.5 Suspension system: 23.8 mm (15/16") "Prelude XL" exposed tee bar grid, including wall moulding, by Armstrong. Colour: white. Acceptable alternate: similar suspension system by CGC Interiors, Oakville and Chicago Metallic Corp. Grid sizes to suit ceiling panel types as shown on drawings.

.6 Hangers: 2.6 mm galvanized soft annealed steel wire.

.7 Accessories: splices, clips, retainers, etc., as required for complete and secure installation of suspension system.

.8 Adhesive: low VOC type recommended by acoustic unit manufacturer.

.9 Staples, nails and screws: to CSA B111 non-corrosive finish as recommended by acoustic unit manufacturer.

2.2 EXAMINATION

.1 Do not install acoustical panels and tiles until work above ceiling has been inspected by Consultant.

2.3 INSTALLATION

.1 Install acoustical ceiling systems in accordance with manufacturer's written instructions, reviewed shop drawings, and ASTM C636, listed in order of precedence.

.2 Install acoustic units parallel to building lines with edge unit not less than 50% of unit width.

.3 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding.

.4 Support suspension system main runners at 1200 oc maximum with hangers from structure. Assembly shall support super-imposed loads. Maximum permissible deflection, 1/360 of span.

.5 Attach cross member to main runner to provide rigid assembly.

.6 Install suspension assembly to manufacturer's written instructions.

.7 Install flush edge moulding at junction of acoustic unit ceiling and other materials around entire length of joint. Secure to construction. Butt joints neatly, square and true in alignment.

.8 Set acoustic units in place.

.9 Set all ceiling levels by the use of transit or laser level.

.10 Remove and replace acoustic tiles with broken edges, or damaged, marked, discoloured, soiled, or stained faces.

.11 Provide for Owner twelve (12) complete, undamaged ceiling tiles, sealed and boxed. Leave in location as directed by Architect.

2.4 INTERFACE WITH OTHER WORK

.1 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.

2.5 ADJUSTMENTS AND CLEANING

.1 Clean soiled or discoloured surfaces of exposed work on completion of work.

.2 Replace components which are visibly damaged, marred or uncleanable.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 06 40 00 - Architectural Woodwork.

.3 Section 05 12 23 – Structural Steel for Buildings.

.4 Section 05 50 00 – Metal Fabrications.

.5 Section 08 11 14 – Metal Doors and Frames.

.6 Section 09 91 27 – Finish and Colour Notes.

.7 Section 09 91 30 – Door and Room Finish Schedule.

1.2 REFERENCES

.1 Architectural Painting Specifications Manual, Master Painters Institute (MPI).

1.3 WARRANTY

.1 Upon completion of the work, contractor shall warrant that the work has been performed with respect to the standards and requirements incorporated in the MPI specification manual-latest edition.

1.4 ENVIRONMENTAL PERFORMANCE REQUIREMENTS

.1 Do not apply paint finish in areas where dust is being generated.

.2 Conform to requirements of MPI Manual.

.3 Comply with the requirements of Section 01 35 30- Health and Safety.

1.5 JOB MOCK-UP

.1 Complete a mock-up room to be reviewed and approved by Owner, Consultant for approval on application of block filler and finish paint coats.

1.6 SCHEDULING OF 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 any changes in work schedule.

.3 Schedule painting operations to prevent disruption of occupants in and about the building.

1.7 EXTRA MATERIALS

.1 Submit one - four litre can of each type and colour of [primer] [stain] [finish coating]. Identify colour and paint type in relation to established colour schedule and finish system.

.2 Deliver to Contractor and store where directed.

1.8 DELIVERY, HANDLING AND STORAGE

.1 Labels shall clearly indicate:

- .1 Manufacturer's name and address.
- .2 Type of paint or coating.
- .3 Compliance with applicable standard.
- .4 Colour number in accordance with established colour schedule.

.2 Remove damaged, opened and rejected materials from site.

.3 Provide and maintain dry, temperature controlled, secure storage.

.4 Observe manufacturer's recommendations for storage and handling.

.5 Store materials and supplies away from heat generating devices.

.6 Store materials and equipment in a well ventilated area with temperature range [7]^{0}C to [30]^{0}C.

.7 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.8 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.

.9 Remove paint materials from storage only in quantities required for same day use.

.10 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

.11 Fire Safety Requirements:

- .1 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.
- .2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.9 FINISHES AND COLOURS

.1 Review the requirements outlined in Section 099127, Finish Schedule and Colour Notes. A separate colour schedule will be issued after contract award.

.2 Allow for 14 colours total from all formulations for this project.

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Paint, stain and wood preservative finishes and related materials (thinners, solvents, etc.,) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.

.2 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.

.3 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

.4 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into ground the following procedures shall be strictly adhered to:

.1 Retain cleaning water for water-based materials to allow sediments to be filtered out.

.2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.

.3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.

.4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.

.5 Empty paint cans are to be dry prior to disposal or recycling (where available).

.5 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

.6 Set aside and protect surplus and uncontaminated finish materials: [___]. Deliver to or arrange collection by [employees], [individuals], or [organizations] for verifiable re-use or re-manufacturing.

.7 Close and seal tightly partly used sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.

Part 2 Products

2.1 MATERIALS

.1 Acceptable Manufacturer's: Where MPI code numbers are not referenced, use Products from one of the following manufacturers:

.1 Benjamin Moore & Co. Ltd.

.2 Canadian Industries Ltd.

.3 ICI (Glidden) Paints.

.4 Para Paints.

.5 Pratt & Lambert Inc.

.6 SICO Coatings.

.7 The Sherwin-Williams Company.

.2 Manufacturers of intumescent coatings having Product considered acceptable for use:

.1 A/D Fire Protection Systems Inc.

.2 Carboline.

.3 Acrylic paint: Low VOC, 100% acrylic latex paint with primer and top coat; 'Dryfall Paint' by Rodda Paint or approved alternative for use at Mechanical Room Ceiling.

.4 Paint materials for paint systems shall be products of a single manufacturer.

.5 Acceptable products: Per MPI Manual and as listed.

.6 Paint materials for each paint system to be products of a single manufacturer.

.7 Use low-VOC and low-odour paints only.

Part 3 Execution

3.1 GENERAL

.1 Prepare surfaces to receive paint per MPI Manual.

.2 For doors supplied by Relocatable Contractor as indicated in the Door Finish schedule, clean and re-prime all surfaces prior to painting. Refer to AD drawings for Door Finish Schedule.

.3 Structural steel members: To conform to applicable Architectural Exposed Structural Steel (AESS) Categories.

3.2 APPLICATION

.1 Sand and dust between each coat to remove defects visible from distance up to 1.5 m.

.2 Finish closets and alcoves as specified for adjoining rooms.

.3 Apply each coat at the proper consistency. Each coat of finish should be fully dry and hard before applying the next coat, unless the manufacturer's instructions state otherwise.

.4 Method of application to be as approved by Consultant. Conform to manufacturer's application instructions unless specified otherwise.

.5 Brush and Roller Application:

.1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.

.2 Work paint into cracks, crevices and corners.

.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Consultant.

.5 Remove runs, sags and brush marks from finished work and repaint.

.6 Spray application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.3 Apply paint in a uniform layer, with overlapping at edges of spray pattern.

.4 Brush out immediately all runs and sags.

.5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.

.7 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access and only when specifically authorized by Consultant.

.8 Apply coats of paint as a continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.9 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.10 Sand and dust between coats to remove visible defects.

.11 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.

.12 Finish inside of cupboards and cabinets as specified for outside surfaces.

.13 Finish closets and alcoves as specified for adjoining rooms.

.14 Finish top, bottom, edges and cut-outs of doors after fitting as specified for door surfaces.

3.3 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Refer also to Finish Notes in Section 099127- Finish and Colour Notes.

.2 Paint exposed conduits, pipes, hangers and other mechanical and electrical equipment occurring in finished areas as well as inside cupboards and cabinet work. Colour and texture to match adjacent surfaces, except as noted otherwise. Coordinate with mechanical trades applying banding and labeling after pipes have been painted. Do not paint white PVC covers on exposed mechanical water, drain and other lines

.3 Paint gas piping standard yellow where visible on roof or in service spaces. Do not paint gas meter or gas equipment in wall niche yellow—colour to later selection by Architect.

.4 Paint surfaces inside of ductwork and elsewhere behind grilles where visible using primer and one coat of matte black paint.

.5 Paint both sides and edges of plywood backboards for equipment before installation.

.6 Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

3.4 PAINT SYSTEMS

.1 System references listed are based on Chapters 4A and 4B of MPI Manual and are Premium Grade, unless noted otherwise.

.2 Install painting systems in accordance with manufacturer's written instructions. Provide number of coats as recommended by manufacturer.

3.5 INTERIOR FINISHES

.1 Wood, where applicable:

- .1 Doors, miscellaneous trim: INT. 1-A, Alkyd Semi-Gloss Finish, Premium Grade
- .2 Casework and miscellaneous wood items:
  - .1 Exterior surfaces: INT. 1-A, Alkyd Semi-Gloss Finish, Premium Grade
  - .2 Interior surfaces: INT. 1-A, Alkyd Semi-Gloss Finish, Premium Grade
  - .3 Wood Benches and Upper Shelves: INT. 2-F, Stained Alkyd Satin Finish, Premium Grade.
  - .4 Gym Storage Shelves: INT. 3-A, Stain Finish, Custom Grade

.2 Gypsum board: INT.4-B, Latex Eggshell Finish, Premium Grade.

.3 Acoustical wall panels: INT. 6-A, Latex Flat Finish, Custom Grade.

.4 Concrete Block: INT.8-C -modified; Latex Semi-Gloss Finish, Premium Grade. Modified system refers to all work where 2 full coats of block filler shall be applied.

.5 Concrete Block (P-GF): Two-coats of 100% zero VOC epoxy, Premium Grade - shown on Room Finish Schedule as P-GF (Paint - Gloss) finish.

.6 Concrete Floors (S.CONC); refer to Section 033505 - Concrete Floor Hardeners and Sealers for liquid sealer.

.7 Concrete Floors (EWPM); refer to Section 099724 for Concrete Floor Sealer Finish.

.8 Exposed Cast in Place Concrete ceilings: INT. 8-A, Latex Flat Finish, Premium Grade

.9 Exposed Precast Concrete ceilings: INT. 8-A, Latex Flat Finish, Custom Grade

.10 Miscellaneous metal:

- .1 Primed: INT. 12-A, Alkyd Semi-Gloss Finish, Premium Grade
- .2 Galvanized: INT. 13-A, Alkyd Semi-Gloss Finish, Premium Grade
- .3 INT. 12-G, Water based Epoxy finish, two coats on a rust inhibitive primer for all exposed steel on Stairs 1S1 & 1S2 including exposed steel nosing at porcelain tile stair landing, stair stringer, pickets and railings".

.11 Galvanized metal: INT. 13-A, Alkyd Semi-Gloss Finish, Premium Grade

.12 Hollow Metal Doors and Frames: Without exception, all wipecoated Galvanized Hollow Metal Doors, Frames and Screens, interior and exterior shall be field cleaned with solvent, galvanized prime paint coated and then finished with INT. 13-A Premium Grade, Gloss Finish. Base coat primer shall be submitted for review in advance or door/frame painting shall be rejected by Consultant. For hollow metal framed windows, finish coat to be a metallic exterior premium grade gloss finish to match anodized aluminum windows. Colour to be confirmed by the Architect during Construction.

.13 Gymnasium Painting:

.1 Note that painting of gymnasium acoustic deck and structural steel is part of painting contract (typ.).

.2 Allow for single colour for deck and joists.

.3 Allow for complete painting of all hangers and equipment brackets including but not limited to basket ball backstops, electrical pipe rails, mechanical equipment fan cages, mechanical ductwork, conduit, etc.

.14 Other Painting:

.1 Allow for single colour for deck and joists in locations other than the Library.

.2 Allow for complete painting of all hangers and equipment brackets including but not limited to, electrical and mechanical equipment, etc.

.3 painting deck/floor slab and structural steel is part of painting contract.

.15 Painting of Elevator/Lift doors and frames are not part of the painting contract.

3.6 EXTERIOR PAINTING

.1 Pavement markings: EXT. 7-A, Zone Marking Alkyd Finish, Premium Grade. Refer to AD drawings for pavement markings and symbols.

.2 Exterior exposed steel: Shop primed with an inorganic zinc primer over commercial blast cleaning 63-75 micrometers (2-3 mils). Field coat of 75-100 micrometers (3-4 mils) of high build epoxy. Colour to be selected by the Consultant.

.3 Miscellaneous metal:

.1 Primed: EXT. 11-A-Gloss, Premium Grade

.2 Galvanized: EXT. 12-A-Gloss, Premium Grade

.4 Galvanized metal: EXT. 12-A-Gloss, Premium Grade.

.5 Steel - high heat: EXT. 15-A

3.7 INSPECTIONS

.1 Provide Architect with all formulations at outset of project.

.2 Provide inspections by representative of the Master Painters Institute (MPI) in compliance with the terms of the Canadian Painting Contractors Association Inspection and Guarantee Program.

.3 Cooperate at all times with the paint inspection agency in the performance of their duties as required as part of the work of this Section.

.4 MPI inspection costs to be paid from Cash Allowance.

END OF SECTION

Part 1 General

1.1 GENERAL FINISH NOTES

.1 The Material and Colour Schedule will be issued by the Consultant after tender. It shall be read in conjunction with the Drawings, Specifications, Room Schedule and Door Schedule. Colour and material references named will be based on one manufacturer, as carried by the Contractor or, in the case that no specific manufacturer is carried, based on the Consultant's choice.

.2 Approved alternative manufacturers will be acceptable only as indicated in the specifications. However, approved alternate products submitted must match the products named in the Specification to the Consultant's selection. Alternate products other than those named in the specifications will not be allowed unless previously approved by the Consultant.

.3 Consult Consultant prior to painting any surface not included in the formulae as listed.

.4 Final colour for exterior painted surfaces and prominent interior areas shall be approved on the job site by the Consultant.

.5 Provide one (1) accent paint wall in each classroom. Architect to confirm accent paint location and colour at later date.

.6 Paint samples: Contractor to submit paint samples for all areas required to "Match Adjacent Finish".

.7 All similar paint formulations are to be identical when dry. Variations in tone, texture or sheen shall not be accepted.

.8 Submit two 300 mm x 300 mm paint samples of each colour required for approval by the Architect.

.9 Exact locations of accent paint called for in the Material and Colour Schedule, to be issued after Contract award, not specifically identified on the drawings are to be verified on site with the Consultant.

1.2 EXTERIOR FINISH NOTES

.1 All exposed metal (doors, frames, lintels, stairs, handrails, mechanical equipment, etc.) to be painted except for prefinished metal louvres, stainless steel, and aluminum. Mechanical equipment is to be painted whether delivered to the site prepainted or not (exhaust fans, goosenecks, exhaust stacks, supports, HVAC units, HRU units, etc.). Colours to match adjacent material-generally either to match brick or tan to match flashing or siding material. Do not paint exposed white PVC pipe covers on interior. Architect will advise on jobsite which other items mentioned above, if any, do not require painting.

.2 All unfinished metal work provided by landscaping is to be painted by Section 099122- Painting.

1.3 INTERIOR FINSIH NOTES

.1 All heating units, recessed convectors, grilles, pipes, access panels, hangers and miscellaneous exposed metal work (except stainless steel or anodized aluminum) to be painted to match the surfaces on which they occur unless noted otherwise on the colour schedule, prefinished in suitable colour or directed by the Consultant. If prefinished equipment is damaged, it shall be re-painted. Painting to be by formulations specified in Section 099122- Painting.

.2 All interior fitments, casework, millwork, etc. to be melamine unless otherwise noted. Refer to Sections for specific requirements regarding materials, construction, finishes and hardware. Note that drawer and cupboard interiors are to be considered as exposed surfaces and will therefore be finished.

.3 Do not paint over nameplates, identification tags, etc.

.4 Make good all existing surfaces and finishes that are damaged during construction.

1.4 ABBREVIATIONS LEGEND

.1 The following abbreviations are used in the Room Finish Schedule (Refer to Section 09 91 30- Room Finish Schedule).

.2

Code	Reference
.3 AF	Athletic Flooring
.4 ASD	Acoustic Steel Deck
.5 BK	Brick
.6 CB	Concrete Block
.7 CPT	Carpet
.8 CMT	Ceramic Mosaic Tile
.9 CWT	Ceramic Wall Tile
.10 DP	Dry Paint
.11 EP	Paint - Epoxy
.12 EXP	Exposed Ceiling
.13 EWPM	Exposed Waterproof Membrane
.14 FAB	Fabric Acoustic Panels
.15 FAP	Fibreglass Acoustic Panel
.16 GB	Gypsum Board
.17 GWT	Glass Wall Tile
.18 HWD	Hardwood Sprung Floor

.19	LAP	Lay-in Acoustic Panel
.20	LAP(CER)	Lay-in Acoustic Panel with Ceramic Coating
.21	LVT	Luxury Vinyl Tile
.22	MST	Masonite (matte black smooth side up)
.23	PC	Poured concrete (architectural finish)
.24	PCP	Perforated Ceiling Panel
.25	PF	Pre-Finished
.26	POR	Porcelain Tile
.27	PMP	Perforated Metal Panels
.28	P.GF	Paint - Gloss Finish
.29	PT	Paint
.30	PWD	Plywood Sprung Floor
.31	RR	Resilient Rubber
.32	S.CONC	Sealed Concrete
.33	SF	Safety Flooring
.34	SAB	Solid Acoustic Blocks
.35	SGT	Structural Glazed Tile
.36	SPT	Sports Flooring (sheet)
.37	STL	Steel Framing and Insulated Back Pan
.38	TEC	Solid Board Acoustic Panels (Tectum)
.39	VCT	Vinyl Composite Tile
.40	VHB	Vented Hardwood Base
.41	WS	Wood Slat
.42	WRGB	Water-Resistant Gypsum Board
.43	WRT	Weight Room Tile

END OF SECTION

PART 1 - GENERAL

1.1 General Notes

1. Find the **Room Finish Schedule** on the following pages.

2. This schedule MUST be read in conjunction with a complete set of drawings.

3. Refer to interior elevations, plans sections and reflected ceiling plans to coordinate finish notes and extents of materials.

4. Refer to various specifications sections for different types of materials including, but not limited to:
   .1 Flooring materials such as resilient tile.
   .2 Ceiling materials such as Lay-In Acoustical panel (LAP).
   .3 Acoustical wall treatment.

END OF SECTION

ROOM FINISH SCHEDULE		FLOOR		WALL		CEILING			REMARKS
NO.	NAME	FIN.	BASE	MAT'L	FIN.	MAT'L	FIN.	HEIGHT(mm)	
GROUND FLOOR									
1036	EX. GYMNASIUM	EX	EX	EX.CB	-	EXP.	EX.WD	7040	PATCH PAINT BASE, WALL & STRUCTURE WHERE REQUIRED AFTER REMOVAL OF PARTITION WALL
1037	EX. GYMNASIUM	EX	EX	EX.CB	-	EXP.	EX.WD	7040	PATCH PAINT BASE, WALL & STRUCTURE WHERE REQUIRED AFTER REMOVAL OF PARTITION WALL
X1080	EX. GYMNASIUM	EX	EX	EX.CB / GB	P NEW GB WALL	EXP.	P NEW BULKHEAD	8315	PATCH BASE AT NEW STORAGE ROOM GB WALL
1080A	GYM STORAGE	EX	EX	EX.CB / GB	P	EXP.		8315	PATCH BASE AT NEW STORAGE ROOM GB WALL
X1081	EX. GYMNASIUM	EX	EX	EX.CB / GB	P NEW GB WALL	EXP.	P NEW BULKHEAD	8315	PATCH BASE AT NEW STORAGE ROOM GB WALL
X1003	EX. CORRIDOR	EX. TER / TER	EX.TER./ TER.	EX.CB, EX.WD, EX.BR,& CB.	P	EX. LAP & EX. GYP	-	EX.	
X1117	EX. MECHANICAL ROOM	EXISTING							
X1119	EX. CUSTODIAN	EX. S.CON. / S.CONC.	-	EX.CB &SGT, CB	PT	EXP	-	EX.	
1100	GENDER NEUTRAL WR LOBBY	EX. TERR / TERR	CWT	GB, CB	PT	LAP	-	2540	
1100A	WASHROOM	POR	CWT	EXT.SGT, GB	PT/CWT	GYP	PT	2540	REFER TO ELEVATIONS FOR EXTEND OF CWT.
1100B	WASHROOM	POR	CWT	GB	PT/CWT	GYP	PT	2540	REFER TO ELEVATIONS FOR EXTEND OF CWT.
1100C	WASHROOM	POR	CWT	GB	PT/CWT	GYP	PT	2540	REFER TO ELEVATIONS FOR EXTEND OF CWT.
1100D	BF WASHROOM	POR	CWT	GB	PT/CWT	GYP	PT	2540	REFER TO ELEVATIONS FOR EXTEND OF CWT.
1100E	WASHROOM	POR	CWT	GB	PT/CWT	GYP	PT	2540	REFER TO ELEVATIONS FOR EXTEND OF CWT.
1100F	WASHROOM	POR	CWT	GB	PT/CWT	GYP	PT	2540	REFER TO ELEVATIONS FOR EXTEND OF CWT.
1100G	BF WASHROOM	POR	CWT	GB	PT/CWT	GYP	PT	2540	REFER TO ELEVATIONS FOR EXTEND OF CWT.
1100H	WASHROOM	POR	CWT	GB	PT/CWT	GYP	PT	2540	REFER TO ELEVATIONS FOR EXTEND OF CWT.
1100I	WASHROOM	POR	CWT	GB	PT/CWT	GYP	PT	2540	REFER TO ELEVATIONS FOR EXTEND OF CWT.

ROOM FINISH SCHEDULE		FLOOR		WALL		CEILING			REMARKS
NO.	NAME	FIN.	BASE	MAT'L	FIN.	MAT'L	FIN.	HEIGHT(mm)	
1100J	WASHROOM	POR	CWT	EX.SGT, GB	PT/CWT	GYP	PT	2540	REFER TO ELEVATIONS FOR EXTEND OF CWT.
1102	BF WASHROOM	POR	CWT	EX.SGT, GB	PT/CWT	GYP	PT	2540	REFER TO ELEVATIONS FOR EXTEND OF CWT.

ABBREVIATIONS:

	SGT - Structural Glazed Tile	CB - Concrete Block		PT - Paint		CWT - Ceramic Wall Tile
	POR - Porcelain Tile	S.CONC - Sealed Concrete		EXP - Exposed		LAP - Lay-In Acoustic Ceiling Tile
	BR - Brick	GB - Gypsum Wall Board		WD- Wood		TER- TERRAZO

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 10 28 10 – Plastic Toilet Compartments.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM A167-99 (2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.2 ASTM A653/A653M-09a Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian Standards Association (CSA)

.1 CAN/CSA-B651-04, Barrier-Free Design.

.2 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.3 SUBMITTALS

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

.2 Product data: Submit Product data indicating each washroom accessory describing size, finish, details of function, attachment methods, hardware and locks, description of rough-in frame, and building-in details of anchors for grab bars.

.3 Shop drawings of units for use by the handicapped shall be distinctly marked and cross-referenced to the corresponding article in the specifications.

.4 Closeout submittals: Submit for each Product operation and maintenance instructions for incorporating into the Operations and Maintenance Manuals in accordance with Section 01 78 00.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

1.5 MAINTENANCE

.1 Maintenance Tools: Provide special tools necessary for accessing, assembly/disassembly or removal of toilet, bath and cleaning accessories in accordance with requirements specified in Section 01 78 00.

Part 2 Products

2.1 GENERAL

.1 Work of this Section to include the below list of items.

2.2 MATERIALS

.1 Ferrous Steel: Sheet, cold-rolled furniture steel, double annealed, mill stretched and leveled, and fully pickled. Otherwise, steel shall be hot-rolled or cold-rolled of alloy to suit needs of fabrication, use, and appearance.

.2 Galvanized Steel: For sheet, Z275 zinc coating designation in accordance with ASTM A653. For irregular sections, hot dip galvanized to comply with CSA G164.

.3 Stainless steel sheet metal: to ASTM A167, Type 304, with No. 4 finish.

.4 Anchors and Fastenings: Where exposed, use stainless steel and otherwise to match metal anchored. Where non-exposed, use the same as that specified for exposed, or use galvanized steel. Anchors and fastenings shall be of the type appropriate for the substrate to which accessory unit is secured.

2.3 COMPONENTS

.1 Hand Dryers – Surface Mounted (HD): refer to Electrical specifications.

.2 Fixed Grab Bars (GB / GBL): 32 mm outside diameter; 1.2 mm thick stainless steel; pended non-slip finish; round or oval concealed flange attachments, as described below:

.1 Straight Profile (GB): e.g. Frost Model 1001-DP-24. Or Bobrick B-6806
.2 L-Shaped Profile (GBL): e.g. Frost Model 1003-DP-30x30. Or Bobrick B-6898.99
.3 All bars to have concealed mounting hardware
.4 Quantity: refer to drawings
.5 All bars to withstand horizontal and vertical pull of 2.2 Kn
.6 Location: Washrooms, refer to contract drawings.

.3 Backrest (BB): Bobrick B-5892
.1 Quantity: refer to drawings
.2 Location: Barrier Free Washrooms, refer to drawings.

.4 Convenience Shelves (CS): Model B295x16 by Bobrick
.1 Quantity: refer to drawings
.2 Location: Staff Washroom and Washrooms where noted, refer to drawings.

.5 Toilet Paper Dispenser (TD):
.1 SUPPLIED BY OWNER, Installed by Contractor
.2 Quantity: refer to drawings
.3 Location: Washrooms , refer to drawings.

.6 Soap Dispenser (SD): Liquid wall mounted soap dispenser
.1 SUPPLIED BY OWNERS, Installed by Contractor
.2 Quantity: refer to drawings

.3 Location: refer to drawings.

.7 Sanitary Napkin Disposal (SN): Frost 620 Surface Mounted Napkin Disposal
.1 Quantity: refer to drawings
.2 Location: Washrooms, refer to drawings

.9 Sanitary Napkin Dispenser (ND): Frost 615-5 Recessed Double Napkin/Tampon Vendor
.1 Quantity: refer to drawings
.2 Location: Washrooms, refer to drawings

.10 Safety Release Coat Hook (BH):

.1 Refer to drawings for locations.

.2 High strength polycarbonate coat hook with safety release weight under downward pressure to not exceed 12 kg (26 lbs.)

.3 Supply all suitable mounting hardware for a vandal proof, secure installation using stainless steel sleeve bolts on partition doors or panels. Do not supply standard Robertson or Phillips head screws.

.4 Acceptable Materials: Bobrick B-983.

.6 Locations:

.1 Washrooms

.2 Refer to drawings for locations.

.7 Samples: submit test data and samples for review as specified in Section 013330 – Submittal Procedures.

.11 Mirrors:

.1 Fixed Mirrors (designation Type M):

.1 Best quality, 6 mm thick float glass, with concealed tamperproof clip fasteners.

.2 24 ga., Type 302 or 304 No 4 finish stainless steel frames on all edges and galvanized iron backing with concealed mounts.

.3 Sizes: each unit 457 mm x 762 mm.

.4 Locations: as shown on Drawings.

.5 Acceptable Materials: Bobrick B-1658 1830 ‘Stock series’ model 941TG Tempered Glass; 18” x 30” each.

.12 Acceptable Alternates to those items 2.2.2 – 2.2.16 listed above as manufactured by Bobrick, Bradley, Frost, Hafele, Saferail & ASI/Watrous.

2.4 FABRICATION

.1 Construction**:** Fabricate with materials, component sizes, metal gauges, reinforcing, anchors and fasteners of adequate strength to withstand intended use.

.2 Where specified as frameless, provide stainless steel accessories with one-piece fronts having 90 degree formed returns at their edges and openings.

.3 Where accessory fronts are framed, frame edges, both inside and outside, with 90 degree formed returns continuously welded and ground smooth at the corners. Doors shall also have 90 degree formed returns as specified.

.4 Unless otherwise specified, hinges shall be semi-concealed stainless steel piano hinges extending full-length of hinged element. Provide hinged elements with concealed, mechanically-retained rubber bumpers for silent closing, and shall close flush with faces of fronts or frames.

.5 Ensure that work will remain free of warping, buckling, opening of joints and seams, distortion and permanent deformation.

.6 No exposed fixings permitted. Cut edges and openings square and smooth. Chamfer corners of edges and cut-outs 1.6 mm.

.7 Assembly: Accurately cut, machine and fit joints, corners, copes and mitres so that junctions between components fit together tightly and in true planes.

.8 Fasten work with concealed methods, unless otherwise indicated on Drawings.

.9 Weld all connections where possible, bolt where not possible and cut off bolts flush with nuts. Countersunk bolt heads, and provide method to prevent loosening of nuts. Ream holes drilled for fastening.

.10 Welded joints shall be tight, flush, and in true planes with base metals. Make welds continuous at joints where entry of water into voids of members or assemblies is possible.

.11 Provide for differential movements within assemblies and at junctions of assemblies with surrounding work.

.12 Welds in exposed locations shall be ground and polished smooth.

.13 Finish Work**:** Provide holes and connections for related work installed under other Sections of this specification, if applicable.

.14 Cleanly and smoothly finish exposed edges of materials, including holes.

Part 3 Execution

3.1 INSPECTION OF SECTION

.1 Take site measurements to ensure that work is fabricated to fit surrounding construction around obstructions and projects in place, or as shown on drawings, and to suit service locations.

3.2 INSTALLATION

.1 Verify and coordinate templates, inserts, and rough-in frames and verify exact location of washroom accessories for installation.

.2 Verify there is adequate supports and/or blocking in gypsum wall assemblies prior to installation of washroom accessories.

.3 Provide fastening and mounting kits for washroom accessories.

.4 Install washroom accessory fixtures, accessories, and items in accordance with manufacturer's instructions and CAN/CSA B651-M. Provide exposed tamper-proof screws of stainless steel to match units.

.5 Install all accessories in accordance with manufacturers' instructions at their recommended mounting heights unless noted otherwise on drawings.

.6 Securely fasten accessories plumb, true, square, straight, level, and accurately and tightly fitted together and to surrounding work. Install in locations shown and specified herein. Mounting heights as shown or in accordance with the OBC in the case of barrier-free accessories.

.7 Install grab bars to withstand minimum 408 kg downward pull. Provide necessary reinforcements as required.

.8 Work shall include anchor bolts, bolts, washers and nuts, lag screws, expansion shields, toggles, straps, sleeve brackets, clips, and other items necessary for secure installation, as required by loading and by Jurisdictional Authorities.

.9 Attach work at wood by screws through countersunk holes in metal.

.10 Attach work to masonry with lead plugs and non-corrosive fastenings, to support load with a safety factor of 3. Perform all drilling necessary to install the work.

.11 Insulate between dissimilar metals or between metals and masonry or concrete with bituminous paint, to prevent electrolysis.

.12 Coordinate installation with the work of other trades adjacent to accessories to achieve the reveals or other edge conditions shown, where their front faces are flush with the finished wall surfaces.

.13 Owner to supply and install remainder of washroom accessories not specified here (toilet paper dispensers, etc.). Cooperate with Owner as required.

3.3 CLEANING UP AND ADJUSTMENT

.1 Upon completion of the work, or when directed, remove all traces of protective coatings or paper.

.2 Test mechanisms, hinges, locks and latches, and where necessary, adjust and lubricate and ensure that accessories are in perfect working order.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 03 30 00- Cast-in-Place Concrete.

.3 Section 04 21 13 – Masonry.

.4 Section 05 21 10 – Steel Joists Framing.

.5 Section 05 50 00 – Metal Fabrications.

.6 Electrical Connections : Division 26 (16)

1.2 REFERENCE STANDARDS

.1 All gymnasium equipment shall meet all regulatory requirements of the International Amateur Athletics Federation (I.A.A.F.) for official tournament play as well as all safety standards as set forth by CSA and/or CGSB for the applicable equipment item and/or category, as well as all local codes and regulations.

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Details of attachment to the building structure (walls and roof structure) must bear stamp of a professional engineer licensed to design structures in the Province of Ontario certifying their strength and safety.

.3 Clearly indicate fabrication details, plans, deviations, hardware and installation details.

.4 Take measurements on site of spaces and conditions to which work must conform.

.5 At completion of installation provide written certification from professional engineer that the installation is structurally safe and in accordance with approved shop drawings.

1.4 PROTECTION

.1 Protect work from damage during storage, handling, installation and until building is turned over to the Owner.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material [in appropriate on-site bins] for recycling Divert unused metal materials from landfill to metal recycling facility as approved by Consultant.

.3 Unused paint or coating material must be disposed of at an official hazardous material collections site as approved by Consultant.

.4 Fold up metal banding, flatten and place in designated area for recycling.

1.6 PROTECTION

.1 Protect work from damage during storage, handling, installation and until building is turned over to the Owner.

Part 2 Products

2.1 MATERIALS

.1 Gymnasium Divider Curtain:

.1 Type: Electrically operated, centre drive roll curtain.

.2 Curtains: Abrasion resistant polyester reinforced vinyl for the lower 3m, the remaining upper section being 1¼" net.

.1 curtain weight 25 oz/sq yd minimum.

.2 Tensile strength: 300 lb minimum.

.3 Tear strength: 100 lb minimum

.4 Vinyl curtain and net to meet ULC S109, S102.2 and NFPA 701, flame spread not to exceed 75. Fire label to be fixed permanently to the curtain.

.5 Curtain to have vertical welded seams at 1.5 m interval and side shall be hemmed and quadruple sewn to provide clean and durable edge. Seam strength to equal fabric strength.

.6 Colour: To later selection by Consultant from manufacturer's full range.

.3 Valence: same material as curtain fabric on each side of retracted curtain and motor mechanism so as to fully conceal curtain and motor.

.4 Raising mechanism:

.1 motor drive unit, 3 phases, 208V, equipped with magnetic contractor to reverse movement of the curtain at any point, an emergency break and travel limit switches for up and down position.

.2 Lifting pullies at 3 m o.c. attached to the structure, lifting cables to be 5 mm aircraft type.

.3 All roller chains tension shall be monitored by safety switches.

.4 Hydraulic emergency stopping device shall be installed to prevent the free fall of the curtain or to limit the descending speed.

.5 The operating control shall be spring leader type key switch.

.5 Mounting Hardware:

.1 include all mounting hardware for a complete installation

.2 Refer to structural drawings and include all subframing required to fasten to structure. The curtain mount is to be designed to allow the curtain to be raised within the centre joist space.

.6 Warranty: Total warranty for a period of 5 years

.7 Acceptable products: noting or exceeding these specifications 1100 Series by Corflex Partitions Inc. or Moderco Inc., Arpro Folding partitions, Porter, Hufcor, or Quad.

Part 3 Execution

3.1 FABRICATION

.1 Fix and assemble work in shop where possible.

.2 File and grind exposed welds, smooth and flush. Make exposed welds continuous.

.3 Workmanship shall be best grade of modern shop and field practice known to recognized manufacturers specializing in this work. Accurately fit joints and intersecting members and made in true planes with adequate fastening.

3.2 INSTALLATION

.1 Install work square, plumb, straight, true and accurately fitted.

.2 Included anchors, dowels and fastenings necessary to anchor work together or to work of other trades.

.3 Where installing in masonry, centre equipment between masonry block joints unless indicated otherwise on details. Verify location mounting heights, and dimensions of all units before installation. Anchor in accordance with manufacturer’s printed instructions.

.4 Insulate where necessary to prevent electrolysis between dissimilar materials.

.5 Co-ordinate installation of floor sockets with Section 09 65 19.

.6 Install, connect, make operational and adjust all electrically operated components for proper function.

.7 Deliver to Owner all special tools, accessories, controls, spare parts, etc. which are related to the work of this Section.

3.3 DEMONSTRATION AND CLEANING

.1 Provide demonstration of operation to the Owner and his representatives.

.2 Provide training or maintenance and repairs to the Stage Rigging and Drapery.

END OF SECTION

MECHANICAL SPECIFICATIONS

DDSB AJAX HIGH SCHOOL
WASHROOM & GYM RENOVATION

105 BAYLY ST E, AJAX, ONTARIO, L1S 1P2

Project #: 24110
February 25, 2025

RDZ ENGINEERS LIMITED
17A - 30 Pennsylvania Avenue
Vaughan, Ontario
L4K 4A5

Date	Revision	Description	Prep. By	Check By
February 25, 2025	1	ISSUED FOR TENDER & PERMIT	MH	GR
February 20, 2025	1	ISSUED FOR COORDINATION	MH	GR
January 24, 2025	0	ISSUED FOR REVIEW	MH	GR

END OF SECTION

PROJECT NAME: DDSB Ajax High School
Washroom and Gym Renovation

RDZ PROJECT NUMBER: 24110

Following Supplementary Mechanical Bid Form is submitted by:

….....

(Bidding Company)

….....

(Street Address or P. O. Box No.)

….....

(City, Province and Postal Code)

Dated …… And which is an integral part of Bid Form.

In accordance with Instructions to Bidders, we provide the Supplementary Mechanical Bid Form. We understand that the information provided to be considered an integral part of Bid Form and is to be completed in full.

Where instructions are not provided, submit Supplementary Mechanical Bid Form by time of Bid closing, via e-mail addressed to:

RDZ Engineers Ltd.
Attention : Michael Hughes
e-mail : mhughes@rdzeng.ca

Supplementary Bid Form Signature:

….....

(Signature of Authorized Representative)

….....

(Print Name)

….....

(Title)

LIST OF MANUFACTURERS/SUPPLIERS

We submit, herein, typed or neatly printed, the names of the manufacturers upon whose products our Bid Price is based and which we will supply. If no name is indicated, or if name identified is not listed in issued documents, or if more than one name is indicated for a particular product, we will if requested, provide the base specified manufacturer's product. Where products are named in the specifications with only one (1) manufacturer/supplier, or are not listed herein, we are also prepared to provide the base specified named product. We will provide Canadian manufactured products if costs and quality are similar.

We understand that the first manufacturer specified for any product is the manufacturer upon whose product the design is based, and that the other manufacturers specified for a particular product are manufacturers acceptable to the Owner and whose product produces equivalent quality, performance and size. We further understand if we indicate a manufacturer other than the manufacturer whose product is the basis of the design, we are responsible for ensuring that the product supplied is equivalent in quality, performance and size to the base design product, and that any additional costs incurred as a result of use of such products will be borne by us. Acceptance of non-base specified manufacturers with respect to their equivalency shall be as sole discretion of Consultant.

We also acknowledge that failure to submit this list as specified or failure to submit within time defined may result in provision of base specified manufacturer's product, at discretion of Consultant.

SECTION	PRODUCT	MANUFACTURER/SUPPLIER & CATALOGUE NUMBER
22 42 00	Plumbing Fixtures	
23 30 00	Grilles & Diffusers	
23 82 00	Wall-fin Heaters	

END OF DOCUMENT

1 GENERAL

1.01 REFERENCES

.1 DDSB's front end documents are a part of this Section.

1.02 APPLICATION

.1 This Section specifies requirements that are common to Mechanical Divisions work Sections and it is a supplement to each Section and is to be read accordingly. Where requirements of this Section contradict requirements of DDSB front end documents, conditions of DDSB front end documents to take precedence.

.2 Be responsible for advising product vendors of requirements of this Section.

1.03 DEFINITIONS

.1 "concealed" – means hidden from normal sight in furred spaces, shafts, ceiling spaces, walls and partitions.

.2 "exposed" – means work normally visible, including work in equipment rooms, service tunnels, and similar spaces.

.3 "finished" - means when in description of any area or part of an area or a product which receives a finish such as paint, or in case of a product may be factory finished.

.4 "provision" or "provide" (and tenses of "provide") – means supply and install complete.

.5 "install" (and tenses of "install") – means secure in position, connect complete, test, adjust, verify and certify.

.6 "supply" – means to procure, arrange for delivery to site, inspect, accept delivery and administer supply of products; distribute to areas; and include manufacturer's supply of any special materials, standard on site testing, initial start-up, programming, basic commissioning, warranties and manufacturers' assistance to Contractor.

.7 "delete" or "remove" (and tenses of "delete" or "remove") – means to disconnect, make safe, and remove obsolete materials; patch and repair/finish surfaces to match adjoining similar construction; include for associated re-programming of systems and/or change of documentation identifications to suit deletions, and properly dispose of deleted products off site unless otherwise instructed by Owner and reviewed with Consultant.

.8 "barrier-free" – means when applied to a building and its facilities, that building and its facilities can be approached, entered and used by persons with physical or sensory disabilities in accordance with requirements of local governing building code.

.9 "BAS" – means building automation system; "BMS" – means building management system; "FMS" – means facility management system; and "DDC" means direct digital controls; references to "BAS", "BMS", "FMS" and "DDC" generally mean same.

.10 "governing authority" and/or "authority having jurisdiction" and/or "regulatory authority" and/or "Municipal authority" – means government departments, agencies, standards, rules and regulations that apply to and govern work and to which work must adhere.

.11 "OSHA" and "OHSA" – stands for Occupational Safety and Health Administration and Occupational Health and Safety Act, and wherever either one is used, they are to be read to mean local governing occupational health and safety regulations that apply to and govern work and to which work must adhere, regardless if Project falls within either authority's jurisdiction.

.12 "Mechanical Divisions" – refers to Divisions 20, 21, 22, 23, 25 and other Divisions as specifically noted, and which work as defined in Specifications and/or on drawings is responsibility of Mechanical Contractor, unless otherwise noted.

.13 "Electrical Divisions" – refers to Divisions 26, 27, 28 and other Divisions as specifically noted, and which work as defined in Specifications and/or on drawings is responsibility of Electrical Contractor, unless otherwise noted.

.14 "Consultant" – means person, firm or corporation identified as such in Agreement or Documents, and is licensed to practice in Place of the Work, and has been appointed by Owner to act for Owner in a professional capacity in relation to the Work.

.15 Wherever words "indicated", "shown", "noted", "listed", or similar words or phrases are used in Contract Documents they are understood, unless otherwise defined, to mean product referred to is "indicated", "shown", "listed", or "noted" on Contract Documents.

.16 Wherever words "reviewed", "satisfactory", "as directed", "submit", or similar words or phrases are used in Contract Documents they are understood, unless otherwise defined, to mean that work or product referred to is "reviewed by", "to the satisfaction of", "submitted to", etc., Consultant.

1.04 DOCUMENTS

.1 Documents for bidding include but are not limited to issued Drawings, Specifications and Addenda.

.2 Specification is arranged in accordance with CSI/CSC 50 Division Sections MasterFormat.

.3 Drawings and Specifications are portions of Contract Documents and identify labour, products and services necessary for performance of work and form a basis for determining pricing. They are intended to be cooperative. Perform work that is shown, specified, or reasonably implied on the drawings but not mentioned in Specification, or vice-versa, as though fully covered by both.

.4 Review Drawings and Specifications in conjunction with documents of other Divisions and, where applicable, Code Consultant’s report.

.5 Unless otherwise specifically noted in Specifications and/or on Drawings, Sections of Mechanical Divisions are not intended to delegate functions nor to delegate work and supply of materials to any specific trade, but rather to generally designate a basic unit of work, and Sections are to be read as a whole.

.6 Drawings are performance drawings, diagrammatic, and show approximate locations of equipment and connecting services. Any information regarding accurate measurement of building is to be taken on site. Do not scale Drawings, and do not use Drawings for prefabrication work.

.7 Drawings are intended to convey the scope of work and do not show architectural and structural details. Provide, at your cost, offsets, fittings, transformations and similar products required as a result of obstructions and other architectural and/or structural details but not shown on Drawings.

.8 Locations of equipment and materials shown may be altered, when reviewed by Consultant, to meet requirements of equipment and/or materials, other equipment or systems being installed, and of building, all at no additional cost to Contract.

.9 Specification does not generally indicate specific number of items or amounts of material required. Specification is intended to provide product data and installation requirements. Refer to schedules, Drawings (layouts, riser diagrams, schematics, details) and Specification to provide correct quantities. Singular may be read as plural and vice versa.

.10 Starter/motor control centre (MCC)/variable frequency drive (VFD) schedule drawings are both mechanical and electrical,and apply to work of Mechanical Divisions and Electrical Divisions. Be responsible for reviewing starter, MCC, VFD, and motor specification requirements prior to Bid submission. Confirm and coordinate exact scope of work and responsibility of work between Mechanical Divisions and Electrical Divisions.

.11 Drawings and Specifications have been prepared solely for use by party with whom Consultant has entered into a contract and there are no representations of any kind made by Consultant to any other party.

.12 In the case of discrepancies between the drawings and specifications, documents will govern in order specified in “General Conditions”, however, when scale and date of drawings are same, or where discrepancy exists within specification, most costly arrangement will take precedence.

1.05 METRIC AND IMPERIAL MEASUREMENTS

.1 Generally, both metric and imperial units of measurement are given in Sections of Specification governed by this section. Measurement conversions may be generally "soft" and rounded off. Confirm exact measurements based on application. Where measurements are related to installation and onsite applications, confirm issued document measurements with applicable local code requirements, and/or as applicable, make accurate measurements onsite. Where significant discrepancies are found, immediately notify Consultant for direction.

1.06 EXAMINATION OF DOCUMENTS AND SITE

.1 Carefully examine Documents and visit site to determine and review existing site conditions that will or may affect work, and include for such conditions in Bid Price.

.2 Report to Consultant, prior to Bid Submittal, any existing site condition that will or may affect performance of work as per Documents. Failure to do so will not be grounds for additional costs.

.3 Upon finding discrepancies in, or omissions from Documents, or having doubt as to their meaning or intent, immediately notify Consultant, in writing.

1.07 WORK STANDARDS

.1 Where any code, regulation, bylaw, standard, contract form, manual, printed instruction, and installation and application instruction is quoted it means, unless otherwise specifically noted, latest published edition at time of submission of Bids adopted by and enforced by local governing authorities having jurisdiction. Include for compliance with revisions, bulletins, supplementary standards or amendments issued by local governing authorities.

.2 Where regulatory codes, standards and regulations are at variance with Drawings and Specification, more stringent requirement will apply unless otherwise directed by Owner and reviewed with Consultant.

.3 Supplementary mandatory specification and requirements to be used in conjunction with project include but are not limited to following:

.1 Air-Conditioning, Heating and Refrigeration Institute (AHRI);

.2 Air Movement and Control Association (AMCA);

.3 American Iron and Steel Institute (AISI);

.4 American National Standards Institute (ANSI);

.5 American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., (ASHRAE);

.6 American Society of Mechanical Engineers (ASME);

.7 American Society of Testing and Materials (ASTM);

.8 American Water Works Association (AWWA);

.9 Associated Air Balance Council (AABC);

.10 Building Industry Consulting Services, International (BICSI);

.11 Canadian Gas Association (CGA);

.12 Canadian General Standards Board (CGSB);

.13 Canadian Standards Association (CSA);

.14 Electrical and Electronic Manufacturers Association of Canada (EEMAC);

.15 Electrical Safety Authority (ESA);

.16 Electronic Industries Association (EIA);

.17 Factory Mutual Systems (FM);

.18 Illuminating Engineering Society (IES);

.19 Institute of Electrical and Electronic Engineers (IEEE);

.20 International Standards Organization (ISO);

.21 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS);

.22 National Building Code of Canada (NBC);

.23 National Electrical Manufacturers Association (NEMA);

.24 National Environmental Balancing Bureau (NEBB);

.25 National Fire Protection Association (NFPA);

.26 National Standards of Canada;

.27 NSF International;

.28 Occupational Health and Safety Act (OHSA);

.29 Ontario Building Code (OBC);

.30 Ontario Electrical Safety Code (OESC);

.31 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA);

.32 Technical Standards and Safety Authority (TSSA);

.33 Thermal Insulation Association of Canada (TIAC);

.34 Underwriters' Laboratories of Canada (ULC);

.35 Workplace Hazardous Materials Information System (WHMIS);

.36 Material Safety Data Sheets by product manufacturers;

.37 local utility inspection permits;

.38 Codes, standards, and regulations of local governing authorities having jurisdiction;

.39 additional codes and standards listed in Trade Sections;

.40 Owner's standards.

.4 Provide applicable requirements for barrier free access in accordance with latest edition of local governing building code.

.5 Where any governing Code, Regulation, or Standard requires preparation and submission of special details or drawings for review they are to be prepared and submitted to appropriate authorities. Be responsible for costs associated with these submittals.

.6 Unless otherwise specified, install equipment in accordance with equipment manufacturer's recommendations and instructions, and requirements of governing Codes, Standards, and Regulations. Governing Codes, Standards, and Regulations take precedence over manufacturer's instructions. Notify Consultant in writing of conflicts between Contract Documents and manufacturer's instructions.

.7 Work is to be performed by journeyperson tradesmen who perform only work that their certificates permit, or by apprentice tradesmen under direct on site supervision of experienced journeyperson tradesman. Journeyperson to apprentice ratio is not to exceed ratio determined by the Board as stated in Ontario College of Trades and Apprenticeship Act or local equivalent governing body in Place of the Work.

.8 Journeyperson tradesmen are to have a copy of valid trade certificates available at site for review with Consultant at any time.

.9 Experienced and qualified superintendent is to be on-site at times when work is being performed.

.10 Protect existing areas above, below and adjacent areas of Work from any debris, noise, or interruptions to existing services to satisfaction of Owner and reviewed with Consultant. Maintain in operation existing services to these areas to allow Owner to continue use of these areas. If services that are required to be maintained run through areas of renovations, provide necessary protection to services or reroute, in coordination with Owner and Consultant. Include for required premium time work to meet these requirements.

.11 Work being performed within occupied spaces and work affecting surfaces adjacent to occupied spaces may need to be performed after regular business hours. For areas where spaces are used by Owner on a 24 hours basis or over various hours, coordinate hours of work with Owner on a regular basis to suit Owner's schedule. Execute work at times confirmed with and agreed to by Owner and reviewed with Consultant, so as not to inconvenience Owner's occupation or in any way hinder Owner's use of building. Include for required premium time work to meet these requirements.

.12 Coordinate work inspection reviews and approvals with governing inspection department to ensure construction schedule is not delayed. Be responsible for prompt notification of deficiencies to Consultant and submission of reports and certificates to Consultant.

.13 Properly protect equipment and materials on site from damage and defacement due to elements and work of trades, to satisfaction of Owner and reviewed with Consultant. Equipment and materials are to be in new condition upon Substantial Performance of the Work.

.14 Mechanical piping system work, including equipment, must comply in all respects with requirements of local technical standards authorities and CSA B51, Boiler, Pressure Vessels and Pressure Piping Code. Where required, mechanical work products are to bear a CRN number.

.15 Electrical items associated with mechanical equipment are to be certified and bear stamp or seal of a recognized testing agency such as CSA, UL, ULC, ETL, etc., or bear a stamp to indicate special electrical utility approval.

1.08 PERMITS, CERTIFICATES, APPROVALS AND FEES

.1 Contact and confirm with local authorities having jurisdiction including utility providers, requirements for approvals from such authorities. Obtain and pay for permits, certificates, and approvals required to complete Work.

.2 Be responsible for ensuring that authorities having jurisdiction which require on-site inspection of work, have ample notification to perform inspection, with sufficient lead time to correct deficiencies in a manner that will not impede schedule of completion of Work. If any defect, deficiency or non-compliant is found in work by inspection, be responsible for costs of such inspection, including any related expenses, making good and return to site, until work is passed by governing authorities.

.3 Obtain and submit to Consultant, approval/inspection certificates issued by governing authorities to confirm that Work as installed is in accordance with rules and regulations of local governing authorities and are acceptable.

.4 Include in each copy of operating and maintenance instruction manuals, copies of approvals and inspection certificates issued by regulatory authorities.

1.09 REQUIREMENTS FOR CONTRACTOR RETAINED ENGINEERS

.1 Professional engineers retained to perform consulting services with regard to Project work, i.e. seismic engineer, fire protection engineer or structural engineer, are to be members in good standing with local Association of Professional Engineers, and are to carry and pay for errors and omissions professional liability insurance in compliance with requirements of governing authorities in Place of the Work.

.2 Retained engineer’s professional liability insurance is to protect Contractor's consultants and their respective servants, agents, and employees against any loss or damage resulting from professional services rendered by aforementioned consultants and their respective servants, agents, and employees in regards to the Work of this Contract.

.3 Unless otherwise specified in Division 00 or 01, liability insurance requirements are as follows:

.1 coverage is to be a minimum of $1,000,000.00 CDN inclusive of any one occurrence;

.2 insurance policy is not to be cancelled or changed in any way without insurer giving Owner minimum thirty days written notice;

.3 liability insurance is to be obtained from an insurer registered and licensed to underwrite such insurance in the Place of the Work;

.4 retained consultants are to ascertain that sub-consultants employed by them carry insurance in the form and limits specified above;

.5 evidence of the required liability insurance in such form as may be required is to be issued to Owner, Owner’s Consultant, and Municipal Authorities as required prior to commencement of aforementioned consultant’s services.

1.10 WORKPLACE SAFETY

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials. Submit WHMIS MSDS (Material Safety Data Sheets) for products where required, and maintain one copy at site in a visible and accessible location available to personnel.

.2 Comply with requirements of Occupational Health and Safety Act and other regulations pertaining to health and safety, including worker's compensation/insurance board and fall protection regulations. When working in confined spaces, comply with requirements of Occupational Health and Safety Act - Ontario Regulation 632, "Confined Spaces" and any other applicable Ministry of Labour requirements.

.3 If at any time during course of existing building work, hazardous materials other than those identified in Documents and pertaining to Project Scope of Work, are encountered or suspected that were not identified as being present and which specific instructions in handling of such materials were not given, cease work in area in question and immediately notify Consultant. Comply with local governing regulations with regards to working in areas suspected of containing hazardous materials. Do not resume work in affected area without approval from Owner and reviewed with Consultant.

1.11 PLANNING AND LAYOUT OF WORK

.1 Base installation layout, design, terminations, and supply of accessories, on Contract Documents with specific coordination with reviewed shop drawings.

.2 Plan, coordinate, and establish exact locations and routing of services with affected trades prior to installation such that services clear each other as well as other obstructions. Generally, order of right of way for services to be as follows:

.1 piping requiring uniform pitch;

.2 piping 100 mm (4") dia. and larger;

.3 large ducts (main runs);

.4 cable tray and bus duct;

.5 conduit 100 mm (4") dia. and larger;

.6 piping less than 100 mm (4") dia.;

.7 smaller branch ductwork;

.8 conduit less than 100 mm (4") dia..

.3 Unless otherwise shown or specified, conceal work in finished areas, and conceal work in partially finished and/or unfinished areas to extent made possible by the area construction. Install services as high as possible to conserve headroom and/or ceiling space. Notify Consultant where headroom or ceiling space appears to be inadequate prior to installation of work.

.4 Do not use Contract Drawing measurements for prefabrication and layout of piping, sheet metal work and such other work. Locations and routing are to generally be in accordance with Contract Drawings, however, prepare layout drawings for such work. Use established bench marks for both horizontal and vertical measurements. Confirm inverts, coordinate with and make allowances for work of other trades. Accurately layout work, and be entirely responsible for work installed in accordance with layout drawings. Where any invert, grade, or size is at variance with Contract Drawings, notify Consultant prior to proceeding with work.

.5 Prepare plan and interference drawings (at a minimum drawing scale of 1:50 or ¼"=1' 0") of work for coordination with each trade Contractor. Arrange for preparation of detailed section drawings of ceiling spaces of corridors and any other congested areas. Sections are to be cross referenced with plan drawings so that trades may make use of section drawings. Section drawings to indicate lateral and elevation dimensions of major services within ceiling space. Lateral dimensions are to be from grid lines and elevations from top of floor slab. Obtain from Consultant, engineering drawings for this use. Contractors' interference drawings are to be distributed among other Trade Contractors. Submit drawings to Consultant for review. Failure of General Contractor to prepare and coordinate overall interface drawings of trades does not relieve respective Division Contractor of responsibility to ensure that work is properly planned and coordinated.

.6 Carry out alterations in arrangement of work that has been installed without proper coordination, study, and review, even if in accordance with Contract Documents, in order to conceal work behind finishes, or to allow installation of other work, without additional cost. In addition, make necessary alterations in other work required by such alterations, without additional cost.

.7 Shut-off valves, balancing devices, air vents, equipment and similar products, particularly such products located above suspended ceilings must be located for easy access for servicing and/or removal. Products which do not meet this location requirement are to be relocated to an accessible location at no additional cost.

.8 Be responsible for making necessary changes, at no additional cost, to accommodate structural and building conditions that were missed due to lack of coordination.

1.12 COORDINATION OF WORK

.1 Review Contract Documents and coordinate work with work of each trade. Coordination requirements are to include but not be limited to following:

.1 requirements for openings, sleeves, inserts and other hardware necessary for installation of work;

.2 concrete work such as housekeeping pads, sumps, bases, etc., required for work, and including required dimensions, operating weight of equipment, location, etc.;

.3 depth and routing of excavation required for work, and requirements for bedding and backfill;

.4 wiring work required for equipment and systems but not specified to be done as part of mechanical work, including termination points, wiring type and size, and any other requirements.

.2 Ensure materials and equipment are delivered to site at proper time and in such assemblies and sizes so as to enter into building and be moved into spaces where they are to be located without difficulty.

.3 Wherever possible, coordinate equipment deliveries with manufacturers and/or suppliers so equipment is delivered to site when it is required, or so it can be stored within building, subject to available space as confirmed with Owner and reviewed with Owner, and protected from elements.

.4 Ensure proper access and service clearances are maintained around equipment, and, where applicable, access space for future equipment removal or replacement is not impeded. Comply with code requirements with regards to access space provision around equipment. Remove and replace any equipment which does not meet this requirement.

.5 Where work is to be integrated, or is to be installed in close proximity with work of other trades, coordinate work prior to and during installation.

1.13 PRODUCTS

.1 Be responsible for ordering of products (equipment and materials) in a timely manner in order to meet project-scheduling timelines. Failure to order products to allow manufacturers sufficient production/delivery time to meet project-scheduling timelines is an unacceptable reason to request for other suppliers or substitutions.

.2 Provide Canadian manufactured products wherever possible or required and when quality and performance is obtainable at a competitive price. Products are to be supplied from manufacturer’s authorized Canadian representative, unless otherwise noted. Unless otherwise specified, products are to be new and are to comply with applicable respective Canadian standards. References to UL listings of products to include requirements that products are to be also Underwriters Laboratories of Canada (ULC) listed for use in Canada. Products are to meet or exceed latest ANSI/ASHRAE/IES 90.1 standards, as applicable. Do not supply any products containing asbestos materials or PCB materials.

.3 Systems and equipment of this Project are to be "State of the Art" and be most recent and up to date series/version of product that is available at time of shop drawing review process. Products that have been stored or "on shelf" for an extended period of time will not be accepted. Software is to be of latest version available and be provided with updates available at time of shop drawing review process. Systems are to be designed such that its software is backwards compatible. Future upgrades are not to require any hardware replacements or additions to utilize latest software.

.4 Products scheduled and/or specified have been selected to establish a performance and quality standard, and, in some instances, a dimensional standard. In most cases, base specified manufacturers are stated for any product specified by manufacturer’s name and model number. Where acceptable manufacturers are listed, first name listed is base specified company. Bid Price may be based on products supplied by any of manufacturers’ base specified or named as acceptable for particular product. If acceptable manufacturers are not stated for a particular product, base Bid Price on product supplied by base specified manufacturer.

.5 Documents have been prepared based on product available at time of Bidding. If, after award of Contract, and if successful manufacturer can no longer supply a product that meets base specifications, notify Consultant immediately. Be responsible for obtaining other manufacturers product that complies with base specified performance and criteria and meets project timelines. Proposed products are subject to review and consideration by Consultant and are considered as substitutions subject to a credit to Contract. In addition, if such products require modifications to room spaces, mechanical systems, electrical systems, etc., include required changes. Such changes are to be submitted in detail to Consultant for review and consideration for acceptance. There will be no increase in Contract Price for revisions. Above conditions supplement and are not to supersede any specification conditions with regards to substitutions or failure to supply product as per issued documents.

.6 Listing of a product as "acceptable" does not imply automatic acceptance by Consultant and/or Owner. It is responsibility of Contractor to ensure that any price quotations received and submittals made are for products that meet or exceed specifications included herein.

.7 If products supplied by a manufacturer named as acceptable are used in lieu of base specified manufacturer, be responsible for ensuring that they are equivalent in performance and operating characteristics (including energy consumption if applicable) to base specified products. It is understood that any additional costs (i.e. for larger starters, larger feeders, additional spaces, etc.), and changes to associated or adjacent work resulting from provision of product supplied by a manufacturer other than base specified manufacturer, is included in Bid Price. In addition, in equipment spaces where equipment named as acceptable is used in lieu of base specified equipment and dimensions of such equipment differs from base specified equipment, prepare and submit for review accurately dimensioned layouts of rooms affected, identifying architectural and structural elements, systems and equipment to prove that equipment in room will fit properly meeting design intent. There will be no increase in Contract Price for revisions.

.8 In addition to manufacturer’s products base specified or named as acceptable, other manufacturers of products may be proposed as substitutions to Consultant for review and consideration for acceptance, listing in each case a corresponding credit for each substitution proposed. However, base Bid Price on products base specified or named as acceptable. Certify in writing to Consultant that proposed substitution meets space, power, design, energy consumption, and other requirements of base specified or acceptable product. It is understood that there will be no increase in Contract Price by reason of any changes to associated equipment, mechanically, electrically, structurally or architecturally, required by acceptance of proposed substitution. Consultant has sole discretion in accepting any such proposed substitution of product. Indicate any proposed substitutions in areas provided on Bid Form. Do not order such products until they are accepted in writing by Consultant.

.9 Indicate in Supplementary Mechanical Bid Form, names of manufacturers for proposed products to be supplied, and which were based specified or scheduled with a manufacturer’s name. Names of proposed manufacturers on list must be one of names stated as acceptable for particular products, unless prior approval from Owner has been given for use of products by other manufacturers. Submit to Consultant for review as directed.

.10 Where products are listed as "or approved equal", certify in writing that product to be used in lieu of base specified product, at least meets space, power, design, energy consumption, and other requirements of base specified product and is equivalent or better than base specified product. When requested by Consultant, provide full design detail drawings and specifications of proposed products. Acceptance of these "or approved equal" products is at sole discretion of Consultant. It is understood that there will be no increase in Contract Price by reason of any changes to associated equipment, mechanically, electrically, structurally or architecturally, required by acceptance of approved equal product. There must be no increase in Contract price due to Consultant’s rejection of proposed equivalent product.

.11 Whenever use of product other than base specified product is being supplied, ensure corresponding certifications and product information (detailed catalogue and engineering data, fabrication information and performance characteristics) are submitted to Consultant for review. Failure of submission of these documents to Consultant in a timely manner to allow for review will result in base specified product to be supplied at Consultant’s discretion, at no additional cost to Contract.

.12 Products supplied by a manufacturer/supplier other than a manufacturer listed as acceptable may be considered for acceptance by Consultant if requested in writing with full product documentation submitted, a minimum of 10 working days prior to Bid closing date.

.13 Any proposed changes initiated by Contractor after award of Contract may be considered by Consultant at Consultant's discretion, with any additional costs for such changes if accepted by Owner and reviewed with Consultant, and costs for review, to be borne by Contractor.

.14 Whenever use of product other than based specified products or named as acceptable is being supplied, time for process of submission of other products and Consultant's review of products will not alter contract time or delay work schedule.

1.14 SHOP DRAWINGS

.1 At start-up meeting, review with Consultant products to be included in shop drawing submission. Prepare and submit list of products to Consultant for review.

.2 Submit electronic copies of shop drawings unless otherwise directed by Consultant. Coordinate exact requirements with Consultant.

.3 Submit for review, drawings showing detail design, construction, and performance of equipment and materials as requested in Specification. Submit shop drawings to Consultant for review prior to ordering and delivery of product to site. Include minimally for preparation and submission of following, as applicable:

.1 product literature cuts;

.2 equipment data sheets;

.3 equipment dimension drawings;

.4 system block diagrams;

.5 sequence of operation;

.6 connection wiring schematic diagrams;

.7 functionality with integrated systems.

.4 Each shop drawing or product data sheet is to be properly identified with project name and product drawing or specification reference. Shop drawing or product data sheet dimensions are to match dimension type on drawings.

.5 Where any item of equipment is required by Code or Standard or By-Law to meet a specific energy efficiency level, or any other specific requirement, ensure this requirement is clearly indicated on submission.

.6 Ensure proposed products meet each requirement of Project. Endorse each shop drawing copy "CERTIFIED TO BE IN ACCORDANCE WITH ALL REQUIREMENTS". Include company name, submittal date, and sign each copy. Shop drawings that are received and are not endorsed, dated and signed will be returned to be resubmitted.

.7 Consultant to review shop drawings and indicate review status by stamping shop drawing copies as follows:

.1 "REVIEWED" or "REVIEWED AS NOTED" (appropriately marked) – If Consultant's review of shop drawing is final, Consultant to stamp shop drawing;

.2 "RETURNED FOR CORRECTION" – If Consultant's review of shop drawing is not final, Consultant to stamp shop drawing as stated above, mark submission with comments, and return submission. Revise shop drawing in accordance with Consultant's notations and resubmit.

.8 Following is to be read in conjunction with wording on Consultant's shop drawing review stamp applied to each and every shop drawing or product data sheet submitted:

"THIS REVIEW BY CONSULTANT IS FOR SOLE PURPOSE OF ASCERTAINING CONFORMANCE WITH GENERAL DESIGN CONCEPT. THIS REVIEW DOES NOT MEAN THAT CONSULTANT APPROVES DETAILED DESIGN INHERENT IN SHOP DRAWINGS, RESPONSIBILITY FOR WHICH REMAINS WITH CONTRACTOR. CONSULTANT'S REVIEW DOES NOT RELIEVE CONTRACTOR OF RESPONSIBILITY FOR ERRORS OR OMISSIONS IN SHOP DRAWINGS OR OF CONTRACTOR'S RESPONSIBILITY FOR MEETING REQUIREMENTS OF CONTRACT DOCUMENTS. BE RESPONSIBLE FOR DIMENSIONS TO BE CONFIRMED AND CORRELATED AT JOB SITE, FOR INFORMATION THAT PERTAINS SOLELY TO FABRICATION PROCESSES OR TO TECHNIQUES OF CONSTRUCTION AND INSTALLATION, AND FOR COORDINATION OF WORK OF SUB-TRADES."

.9 Submit each system and each major component as separate shop drawing submissions. Submit together, shop drawings for common devices such as devices of each system are to be submitted together.

.10 Obtain shop drawings for submission from product manufacturer's authorized representatives and supplemented with additional items specified herein.

.11 Do not order product until respective shop drawing review process has been properly reviewed with Consultant.

.12 Where extended warranties are specified for equipment items, submit specified extended warranty with shop drawing submittal.

1.15 ENGINEERED SUBMITTALS

.1 Submittals for items required to be sealed by a professional engineer (engineered) are to be duly prepared, sealed, and signed under direct control and supervision of a qualified professional engineer licensed in jurisdiction of the work. Professional engineer is to conform to requirements specified in this Section in article entitled Requirements for Contractor Retained Engineers.

.2 Engineered submittals are to include, but not be limited to, following:

.1 complete CAD layout drawings indicating equipment, piping schematic, pipe routing and sizing, zones, devices, wiring schematics, and any other pertinent data;

.2 listing of design data used to determine system layout and sizing;

.3 complete copies of design calculations and listing of design data used in preparing calculations;

.4 list detailing standards, codes, regulations, etc. adhered to when designing system;

.5 items as noted in other Sections of the Specification.

.3 Professional engineer responsible for engineered submittals is to perform periodic field reviews, including review of associated mock-ups where applicable, at locations wherever work as described by engineered submittal is in progress, during fabrication and installation of such work, and submit a field review report after each visit. Submit field review reports to Consultant and authorities having jurisdiction as required.

.4 Field reviews are to be at intervals as necessary and appropriate to progress of work described by engineered submittal to allow engineer to be familiar with progress and quality of such work and to determine if work is proceeding in general conformity with Contract Documents including reviewed shop drawings and design calculations.

.5 Upon completion of work as described by engineered submittal, professional engineer responsible for preparation of engineered submittal and for performing periodic field reviews is to prepare and submit to Consultant and, if applicable, authorities having jurisdiction, a letter certifying that work has been supplied and installed in accordance with requirements of Contract Documents, authorities having jurisdiction and engineered submittal.

1.16 EQUIPMENT LOADS

.1 Supply equipment loads (self-weight, operating weight, housekeeping pad, inertia pads, etc.) to Consultant, via shop drawing submissions, prior to construction.

.2 Where given choice of specific equipment, actual weight, location and method of support of equipment may differ from those assumed by Consultant for base design. Back-check equipment loads, location, and supports, and include necessary accommodations.

.3 Where supporting structure consists of structural steel framing, it is imperative that equipment loads, location, and method of support be confirmed prior to fabrication of structural steel. Review locations of equipment with Consultant prior to construction.

1.17 OPENINGS

.1 Supply opening sizes and locations to Consultant to allow verification of their effect on design, and for inclusion on structural drawings where appropriate.

.2 No openings are permitted through completed structure without written approval from Owner and reviewed with Consultant. Show required openings on a copy of structural drawings. Identify exact locations, elevations, and size of proposed openings and submit to Consultant for review, well in advance of doing work.

.3 Prior to leaving site at end of each day, walk through areas of work and check for any openings, penetrations, holes, and/or voids created under scope of work of project, and ensure that any openings created under scope of work have been closed off, fire-stopped and smoke-sealed. Unless otherwise directed by Owner and reviewed with Consultant, do not leave any openings unprotected and unfinished overnight.

1.18 SCAFFOLDING, HOISTING AND RIGGING

.1 Unless otherwise specified or directed, supply, erect and operate scaffolding, rigging, hoisting equipment and associated hardware required for work, and subject to approval from Owner and reviewed with Consultant.

.2 Use scaffolds in such a manner as to interfere as little as possible with work of other trades.

.3 Do not place major scaffolding/hoisting equipment loads on any portion of structure without approval from Owner and reviewed with Consultant. No supports, clips, brackets or similar devices are to be welded, bolted or otherwise affixed to any finished member or surface without approval from Owner and review with Consultant.

.4 Immediately remove from site scaffolding, rigging and hoisting equipment when no longer required.

1.19 CHANGES IN THE WORK

.1 Whenever Consultant proposes in writing to make a change or revision to design, arrangement, quantity or type of work from that required by Contract Documents, prepare and submit to Consultant for review, a quotation detailing proposed cost for executing change or revision.

.2 Quotation is to be a detailed and itemized estimate of product, labour, and equipment costs associated with change or revision, plus overhead and profit percentages and applicable taxes and duties.

.3 If overhead and profit percentages are not specified in Division 00 or 01, but allowable under Contract as reviewed with Consultant prior to contract signing, then allowable maximum percentages for overhead and profit are as per DDSB's standards in front end documents (Article 8.1).

.4 Unless otherwise specified in Divisions 00 or 01, following additional requirements apply to all quotations submitted:

.1 when change or revision involves deleted work as well as additional work, cost of deleted work (less overhead and profit percentages but including taxes and duties) is to be subtracted from cost of additional work before overhead and profit percentages are applied to additional work;

.2 material costs are not to exceed those published in local estimating price guides;

.3 mechanical material labour unit costs are to be in accordance with Mechanical Contractors Association of America Labour Estimating Manual, less 25%;

.4 electrical material labour unit costs are to be in accordance with National Electrical Contractors Association Manual of Labour Units at difficult level, less 25%;

.5 costs for journeyperson and apprentice labour must not exceed prevailing rates at time of execution of Contract and must reflect actual personnel performing work;

.6 cost for site superintendent must not exceed 10% of total hours of labour estimated for change or revision, and change or revision must be such that site superintendent's involvement is necessary;

.7 costs for rental tools and/or equipment are not to exceed local rental costs;

.8 overhead percentage will be deemed to cover quotation costs other than actual site labour and materials, and rentals;

.9 quotations, including those for deleted work, to include a figure for any required change to Contract time.

.5 Quotations submitted that are not in accordance with requirements specified above will be rejected and returned for re-submittal. Failure to submit a proper quotation to enable Consultant to expeditiously process quotation and issue a Change Order will not be grounds for any additional change to Contract time.

.6 Make requests for changes or revisions to work in writing to Consultant and, if accepted by Owner, Notice of Change to be issued.

.7 Do not execute any change or revision until written authorization for the change or revision has been obtained from Consultant.

1.20 PROGRESS PAYMENT BREAKDOWN

.1 Prior to submittal of first progress payment draw, submit a detailed breakdown of work cost to assist Consultant in reviewing and approving progress payment claims.

.2 Payment breakdown is subject to Owner’s approval and Consultant’s review. Progress payments will not be processed until an approved breakdown is in place. Breakdown is to include one-time claim items such as mobilization and demobilization, insurance, bonds (if applicable), shop drawings and product data sheets, commissioning including testing, adjusting and balancing, system testing and verification, and project closeout submittals.

.3 Indicate equipment, material and labour costs for site services (if applicable) and indicate work of each trade in same manner as indicated on progress draw.

1.21 NOTICE FOR REQUIRED FIELD REVIEWS

.1 Whenever there is a requirement for Consultant to perform a field review prior to concealment of any work, to inspect/re-inspect work for deficiencies prior to Substantial Performance of the Work, for commissioning demonstrations, and any other such field review, give minimum 5 working days' notice in writing to Consultant.

.2 If Consultant is unable to attend a field review when requested, arrange an alternative date and time.

.3 Do not conceal work until Consultant advises that it may be concealed.

.4 When Consultant is requested to perform a field review and work is not ready to be reviewed, reimburse Consultant for time and travel expenses.

1.22 PRELIMINARY TESTING

.1 When directed by Consultant, promptly arrange, pay for, and perform site tests on any piece of equipment or any system for such reasonable lengths of time and at such times as may be required to prove compliance with Specification and governing Codes and Regulations, prior to Substantial Performance of the Work.

.2 When, in Consultant's opinion, tests are required to be performed by a certified testing laboratory, arrange and pay for such tests.

.3 These tests are not to be construed as evidence of acceptance of work, and it is agreed and understood that no claim for delays or damage will be made for injury or breakage to any part or parts of equipment or system due to test where such injuries or breakage were caused by faulty parts and/or workmanship of any kind.

.4 When, in Consultant's opinion, tests indicate that equipment, products, etc., are defective or deficient, immediately remove such equipment and/or products from site and replace them with acceptable equipment and/or products, at no additional cost.

1.23 PROVISIONS FOR SYSTEMS/EQUIPMENT USED DURING CONSTRUCTION

.1 Permanent building mechanical systems are not to be used for temporary heating or cooling purposes during construction.

.2 Confirm with Consultant what equipment can be used during construction.

.3 Any system or piece of equipment that is specified to be provided under requirements of Documents and is required to be used during construction stages of work prior to issuing of Certificate of Substantial Performance of the Work, are to be provided with special interim maintenance and service to cover systems/equipment during time of use during construction period of project until project has been certified as substantially performed and such systems/equipment are turned over to Owner.

.4 During this period of construction, such systems/equipment to not become property of Owner or be Owner's responsibility for maintenance or service. Systems/equipment are to remain property of respective manufacturers/suppliers or Contractor, who are responsible for full maintenance and servicing of systems/equipment in order to maintain validity of warranties after turn over to Owner.

.5 Prior to application for a Certificate of Substantial Performance of the Work and turn over to Owner, such systems/equipment to be cleaned, restored to "new" condition, paint finishes "touched-up", filters cleaned or replaced, etc.

1.24 TEMPORARY SERVICES

.1 Coordinate with Prime Contractor, requirements for temporary services including but not limited to temporary heating, cooling and water. Unless otherwise noted, provide required services in compliance with requirements of local governing building code and local governing inspection authorities.

.2 Maintain fire protection of areas which may include fire watch during temporary shutdowns of existing systems, in accordance with requirements of local governing code and local governing authorities.

1.25 MAINTAINING EQUIPMENT PRIOR TO ACCEPTANCE

.1 Maintain equipment in accordance with manufacturer's instructions prior to start-up, testing and commissioning.

.2 Employ a qualified millwright to check and align shafts, drives, and couplings on all base mounted split coupled motor driven equipment.

.3 Where equipment lubrication fittings are not easily accessible, extend the fittings to accessible locations using copper or aluminium tubing.

.4 All filters are to be new upon Substantial Performance of the Work. This is in addition to any spare filters specified.

1.26 CLEANING

.1 During construction, keep site reasonably clear of rubbish and waste material resulting from work on a daily basis to the satisfaction of Owner and Consultant. Before applying for a Certificate of Substantial Performance of the Work, remove rubbish and debris, and be responsible for repair of any damage caused as a result of work.

.2 Clean equipment and devices installed as part of this project.

1.27 RECORD AS-BUILT DRAWINGS

.1 Drawings for this project have been prepared on a CAD system using AutoCAD software of release version reviewed with Consultant. For purpose of producing record "as built" drawings, copies of Contract Drawings can be obtained from Consultant, at expense of $500.00 CDN plus HST, per drawing, up to first 5 drawings, and $100.00 CDN plus HST, per any additional drawings thereafter. Drawings may also to be used for preparation of layouts and interference drawings.

.2 As work progresses at site, clearly mark in red in a neat and legible manner on a set of bound white prints of Contract Drawings, changes and deviations from routing of services and locations of equipment shown on Contract Drawings, on a daily basis. Changes and deviations include those made by addenda, change orders, and site instructions. Use notes marked in red as required. Maintain white print red line as-built set at site for exclusive use of recording as-built conditions, keep set up-to-date at all times, and ensure set is always available for periodic review. As-built set is also to include the following:

.1 dimensioned location of inaccessible concealed work;

.2 locations of control devices with identification for each;

.3 for underground piping and ducts, record dimensions, invert elevations, offsets, fittings, cathodic protection and accessories if applicable, and locate dimensions from benchmarks to be preserved after construction is complete;

.4 for fire protection systems, record actual locations of equipment, sprinkler heads, and valves, drains, and test locations, and deviations of pipe routing and sizing from that shown on the drawings;

.5 location of piping system air vents;

.6 location of concealed services terminated for future extension and work concealed within building in inaccessible locations.

.3 Before applying for a Certificate of Substantial Performance of the Work, update a clean copy of Contract Drawing set in accordance with marked up set of "as-built" white prints including deviations from original Contract Drawings, thus forming an "as-built" drawing set. Submit "as-built" site drawing prints to Consultant for review. Make necessary revisions to drawings as per Consultant’s comments, to satisfaction of Consultant.

.4 Use final reviewed "as-built" drawing set to provide CAD files of drawings thus forming true "as-built" set of Contract Drawings. Identify set as "Project Record Copy". Load digital copies of final reviewed by Consultant as-built drawings onto USB type flash drive. Provide 2 complete sets of "as-built" drawings on separate USBs. Submit "as-built" sets of white prints and USBs to Consultant.

.5 Submitted drawings are to be of same quality as original Contract Drawings. CAD drawing files are to be compatible with AutoCAD software release version confirmed with Consultant.

.6 Unless otherwise noted in Divisions 00 or 01, failure to maintain accurate record drawings will incur additional 5% holdback on progress claims until drawings are brought up to date to satisfaction of Owner and reviewed with Consultant.

1.28 OPERATING AND MAINTENANCE MANUALS

.1 For each item of equipment for which a shop drawing is required (except for simple equipment), supply minimum 3, project specific, indexed copies of equipment manufacturers' operating and maintenance (O&M) instruction data manuals. Review exact quantity of manuals with Consultant. Consolidate each copy of data in an identified hard cover three "D" ring binder. Each binder to include:

.1 front cover: project name; wording – "Mechanical Systems Operating and Maintenance Manual"; and date;

.2 introduction sheet listing Consultant, Contractor, and Subcontractor names, street addresses, telephone and fax numbers, and e-mail addresses;

.3 equipment manufacturer's authorized contact person name, telephone number and company website;

.4 Table of Contents sheet, and corresponding index tab sheets;

.5 copy of each "REVIEWED" or clean, updated "REVIEWED AS NOTED" shop drawing or product data sheet, with manufacturer’s/supplier’s name, telephone and fax numbers, email address, company website address, and email address for local source of parts and service; when shop drawings are returned marked "Reviewed As Noted" with revisions marked on shop drawing copies, they are to be revised by equipment supplier to incorporate comments marked on "Reviewed" shop drawings and a clean updated copy is to be included in operating and maintenance manuals;

.6 operating data as follows:

.1 pressure test reports, and certificates issued by governing authorities;

.2 description of each system and its controls;

.3 control schematics for equipment/systems including building environmental controls;

.4 wiring and connection diagrams;

.5 if applicable, BAS architecture and all required operating data;

.6 description of operation of each system at various loads together with reset schedules and seasonal variances;

.7 operation instruction for each system and each component;

.8 description of actions to be taken in event of emergencies and/or equipment failure;

.9 valve tag schedule, and flow diagrams to indicate valve locations.

.7 maintenance data as follows:

.1 operation and trouble-shooting instructions for each item of equipment and each system;

.2 schedules of tasks, frequency, tools required, and estimated task time;

.3 recommended maintenance practices and precautions including warnings of any maintenance practice that will damage or disfigure equipment/systems;

.4 complete parts lists with numbers.

.8 performance data as follows:

.1 equipment and system start-up data sheets;

.2 equipment performance verification test results, and final commissioning report;

.3 final testing, adjusting and balancing reports.

.9 copies of warranties;

.10 items requested specifically in Section Articles.

.2 Generally, binders are not to exceed 75 mm (3") thick and not to be more than 2/3 full.

.3 Operating and maintenance instructions are to relate to job specific equipment supplied under this project and related to Owner’s building. Language used in manuals is to contain simple practical operating terms and language easy for in-house maintenance staff to understand how to operate and maintain each system.

.4 Before applying for a Certificate of Substantial Performance of the Work, assemble one copy of O & M Manual and submit to Consultant for review prior to assembling remaining copies. Incorporate Consultant's comments into final submission.

.5 Provide 2 digital copies of contents of operating and maintenance manuals and load onto separate USB type flash drives and submit to Consultant. Prepare digital copies using version of Adobe Acrobat Portable Document Format or equal as reviewed with Consultant and enhanced with bookmarks and internal document links.

1.29 COMMISSIONING

.1 After successful start-up and prior to Substantial Performance of the Work, commission the mechanical work. Commissioning work is the process of Contractor demonstrating to Owner and Consultant, for purpose of final acceptance, by means of successful and documented functional performance testing, that systems and/or subsystems are capable of being operated and maintained to perform in accordance with requirements of Contract Documents, as further described below.

.1 Retain services of a testing, adjusting, and balancing agency to perform testing and balancing of mechanical system air/fluid flows and capacities, prior to operational performance testing. Refer to Section entitled Testing, Adjusting and Balancing.

.2 Test, adjust and operate equipment and systems after start-up but before functional performance testing, to confirm operations are in accordance with requirements of Contract Documents. Verify modes and sequences of control and monitoring, interlocks, and responses to emergency conditions. Complete commissioning data sheets to document successful operational performance testing.

.3 Repeat successful operational performance testing with completed commissioning data sheet documentation in the presence of Consultant and Owner to validate and verify equipment and systems are complete in all respects, function correctly, and are ready for acceptance.

.4 Submit final commissioning data sheets, TAB reports as specified in Section entitled Testing, Adjusting and Balancing, project closeout documents, and other required submittals.

1.30 WARRANTY

.1 Unless otherwise specified in Divisions 00 and 01, warrant mechanical work to be in accordance with Contract Documents and free from defects for a period of 1 year from date of issue of a Certificate of Substantial Performance of the Work.

.2 Where equipment includes extended warranty period, e.g., 5 years, first year of warranty period is to be governed by terms and conditions of warranty in Contract Documents, and remaining years of warranty are to be direct from equipment manufacturer and/or supplier to Owner. Submit signed and dated copies of extended warranties to Consultant.

.3 Warranty to include parts, labour, travel costs and living expenses incurred by manufacturer’s authorized technician to provide factory authorized on-site service.

.4 Repair and/or replace any defects that appear in Work within warranty period without additional expense to Owner. Be responsible for costs incurred in making defective work good, including repair or replacement of building finishes, other materials, and damage to other equipment. Ordinary wear and tear and damage caused wilfully or due to carelessness of Owner’s staff or agents is exempted.

.5 Do not include Owner deductible amounts in warranties.

.6 Visit building during warranty period with Owner representatives. Owner to organize these visits. At these meetings, Owner representatives are to review performance of systems. If performance is satisfactory, then no further action needs to be taken. If unsatisfactory, then correct deficiencies, as directed by Owner representatives, to satisfaction of Owner's representatives. These site visits to occur:

.1 once during 1st month of building operation;

.2 once during 3rd month of building operation;

.3 once between 4th and 10th month in a season opposite to 1st and 3rd month visits.

1.31 PROJECT CLOSEOUT SUBMITTALS

.1 Prior to application for Substantial Performance of the Work, submit required items and documentation specified, including following:

.1 Operating and Maintenance Manuals;

.2 as-built record drawings and associated data;

.3 extended warranties for equipment as specified;

.4 operating test certificates, i.e. Sprinkler Test Certificate;

.5 final commissioning report and TAB report;

.6 identified keys for equipment and/or panels for which keys are required, and other items required to be submitted;

.7 other data or products specified.

1.32 INSTRUCTIONS TO OWNER

.1 Refer to equipment and system operational and maintenance training requirements specified in Division 01.

.2 Train Owner's designated personnel in aspects of operation and maintenance of equipment and systems as specified. Demonstrations and training are to be performed by qualified technicians employed by equipment/system manufacturer/supplier. Supply hard copies of training materials to each attendee.

.3 Unless where specified otherwise in trade Sections, minimum requirements are for manufacturer/suppliers of each system and major equipment, to provide minimum two separate sessions each consisting of minimum 4 hours on site or in factory training (at Owner's choice), of Owner's designated personnel (for up to 6 people each session), on operation and maintenance procedures of system.

.4 For each item of equipment and for each system for which training is specified, prepare training modules as specified below. Use Operating and Maintenance Manuals during training sessions. Training modules include but are not limited to:

.1 Operational Requirements and Criteria – equipment function, stopping and starting, safeties, operating standards, operating characteristics, performance curves, and limitations;

.2 Troubleshooting – diagnostic instructions, test and inspection procedures;

.3 Documentation – equipment/system warranties, and manufacturer's/supplier's parts and service facilities, telephone numbers, email addresses, and the like;

.4 Maintenance – inspection instructions, types of cleaning agents to be used as well as cleaning methods, preventive maintenance procedures, and use of any special tools;

.5 Repairs – diagnostic instructions, disassembly, component removal and repair instructions, instructions for identifying parts and components, and review of any spare parts inventory.

.5 Before instructing Owner's designated personnel, submit to Consultant for review preliminary copy of training manual and proposed schedule of demonstration and training dates and times. Incorporate Consultant's comments in final copy.

.6 Obtain in writing from Consultant list of Owner's representatives to receive instructions. Submit to Consultant prior to application for Certificate of Substantial Performance of the Work, complete list of systems for which instructions were given, stating for each system:

.1 date instructions were given to Owner's staff;

.2 duration of instruction;

.3 names of persons instructed;

.4 other parties present (manufacturer's representative, consultants, etc.).

.7 Obtain signatures of Owner's staff to verify they properly understood system installation, operation and maintenance requirements, and have received operating and maintenance instruction manuals and "as-built" record drawings.

.8 Submit to Consultant, copy of electronic version of training materials loaded on USB flash drive. Include in operating and maintenance manuals submission.

1.33 FINAL INSPECTION

.1 Submit to Consultant, written request for final inspection of systems. Include written certification that:

.1 deficiencies noted during job inspections have been completed;

.2 field quality control procedures have been completed;

.3 systems have been tested and verified, balanced and adjusted, and are ready for operation;

.4 maintenance and operating data have been completed and submitted to, reviewed with Consultant and accepted by Owner;

.5 tags and nameplates are in place and equipment identifications have been completed;

.6 clean-up is complete;

.7 spare parts and replacement parts specified have been provided and acknowledged by Consultant;

.8 as-built and record drawings have been completed and submitted to and reviewed with Consultant and accepted by Owner;

.9 Owner's staff has been instructed in operation and maintenance of systems;

.10 commissioning procedures have been completed.

2 PRODUCTS

NOT USED

3 EXECUTION

NOT USED

END OF SECTION

1 GENERAL

1.01 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Mechanical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

1.02 SUBMITTALS

.1 Submit shop drawings/product data sheets for:

.1 pressure gauges and thermometers;

.2 electric motors (submit with equipment they are associated with).

.2 Submit weight loads for selected equipment (upon request).

.3 Submit copy of reflected ceiling plan drawings and elevation drawings to indicate proposed access door locations.

.4 As specified in Part 2 of this Section, submit a spare belt set, tagged and identified, for each belt driven piece of equipment.

.5 Submit any other submittals specified in this Section or other Sections of Mechanical Divisions.

2 PRODUCTS

2.01 PIPE SLEEVES

.1 Galvanized Sheet Steel – Minimum #16 gauge galvanized steel with an integral flange at one end to secure sleeve to formwork construction.

.2 Polyethylene – Factory fabricated, flanged, high density polyethylene sleeves with reinforced nail bosses.

.3 Galvanized Steel or Cast Iron Pipe – Schedule 40 mild galvanized steel, or Class 4000 cast iron.

2.02 FIRESTOPPING AND SMOKE SEAL MATERIALS

.1 Firestopping and smoke seal system materials for mechanical penetrations through fire rated construction are specified in Section entitled Firestopping and Smoke Seal Systems and work is to be included as part of mechanical work.

2.03 WATERPROOFING SEAL MATERIALS

.1 Modular, mechanical seal assemblies consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and pipe sleeve or wall opening, assembled with stainless steel bolts and pressure plates and designed so when bolts are tightened the links expand to seal the opening watertight. Select seal assemblies to suit pipe size and sleeve size or wall opening size.

.2 Acceptable products are:

.1 Thunderline Corp. (Power Plant Supply Co.) "LINK SEAL" Model S-316;

.2 The Metraflex Co. "MetraSeal" type ES.

2.04 PIPING HANGERS AND SUPPORTS

.1 Pipe hanger and support materials, including accessories, are to be, unless otherwise specified, in accordance with Manufacturers Standardization Society (MSS) Standard Practice Manual SP-58, Pipe hangers and Supports-Materials, Design and Manufacture, and where possible, MSS designations are indicated with each product specified below. Conform to following requirements:

.1 unless otherwise specified, ferrous hanger and support products are to be electro-galvanized;

.2 hangers and supports for insulated piping are to be sized to fit around insulation and insulation jacket.

.2 Hangers and supports for horizontal suspended piping as follows:

.1 adjustable steel clevis hanger – MSS Type 1;

.2 adjustable swivel ring band hanger – MSS Type 10;

.3 Supports for horizontal pipe on vertical surfaces as follows:

.1 steel offset pipe clamp – Anvil Fig. 103 or Myatt Fig. 170;

.2 heavy-duty steel pipe clip – MSS Type 26;

.3 single steel pipe hook – Myatt Fig. 156;

.4 epoxy coated steel pipe stays are not permitted.

.4 Floor supports for vertical risers as follows:

.1 copper tubing riser clamp – MSS Type 8;

.2 heavy-duty steel riser clamp – MSS Type 8.

.5 Supports for vertical piping on vertical surfaces as follows:

.1 steel offset pipe clamp – Anvil Fig. 103 or Myatt Fig. 170;

.2 heavy-duty steel pipe bracket or soil pipe bracket – MSS Type 26;

.3 extension split pipe clamp – MSS Type 12;

.4 epoxy coated steel pipe stays are not permitted.

.6 For horizontal pipe on racks, Unistrut or equal galvanized steel pipe racks with pipe securing hardware as follows:

.1 standard galvanized steel U-bolts/clamps supplied by rack manufacturer;

.7 Special hangers and supports for various applications as follows:

.1 for groups of pipes having same slope – MSS Type 32 welded steel brackets, Anvil Fig. 46 universal trapeze assemblies, or Unistrut or equal support assemblies, all with U-bolts, clamps, etc., to secure pipes in place;

.2 for fire protection piping – generally as above but ULC listed and/or FM approved, and in accordance with Chapter requirements of NFPA Standard applicable to piping system;

.3 for bare horizontal copper piping – generally as above but factory vinyl coated to prevent direct copper/steel contact;

.4 for bare copper vertical piping – corrosion resistant ferrous clamps with flexible rubber gasket type material (not tape) to isolate pipe from clamp;

.5 insulation protection shields to and including 40 mm (1-½") dia. – MSS Type 40 galvanized steel shields with ribs to keep shield centred on hanger.

.8 Hanger rods are to be electro-galvanized carbon steel (unless otherwise specified), round, threaded, to ASTM A36, complete with captive machine nuts with washers at hangers, sized to suit loading in accordance with Table 3 in MSS SP-58, but in any case minimum 9.5 mm (3/8") diameter.

.9 Acceptable manufacturers are:

.1 E. Myatt & Co. Inc.;

.2 Anvil International Inc.;

.3 Empire Industries Inc.;

.4 Hunt Manufacturing Ltd.;

.5 Unistrut Canada Ltd.;

.6 Nibco Inc. "Tolco";

.7 Taylor Pipe Supports.

2.05 ACCESS DOORS

.1 Access doors to be provided under work of Division 08 by General Trades Contractor.

.2 Coordinate with Mechanical Contractor and General Trades Contractor to ensure access doors on project are provided by a single manufacturer, installed as part of work of General Trades Contractor and work involving both mechanical and electrical services, where possible, be accessible from common access door. Coordinate work to ensure same common location access doors are not supplied by more than one Division.

.3 Size access doors to suit the concealed work for which they are supplied, and wherever possible they are to be of standard size for all applications, but in any case they are to be minimum 300 mm x 300 mm (12" x 12") for hand entry and 600 mm x 600 mm (24" x 24") for body entry.

.4 Access doors in fire rated construction are to be ULC listed and labelled and of a rating to maintain fire separation integrity.

.5 Identify on reflected ceiling plans and wall elevation drawings, coordinated locations of proposed access door locations and submit to Consultant for review.

2.06 PRESSURE GAUGES AND THERMOMETERS

.1 Pressure gauges as follows:

.1 adjustable, glycerine filled, 100 mm or 115 mm (4" or 4-½") diameter and each accurate to within 1% of scale range;

.2 type 304 stainless steel case with relief valve and polished stainless steel bayonet;

.3 stainless steel rotary movement with stainless steel bushings and socket;

.4 clear acrylic window;

.5 dual scale white dial with a scale range such that working pressure of system is at approximate mid-point of scale;

.6 black pointer.

.2 Pressure gauge accessories and additional requirements as follows:

.1 a bronze ball type shut-off valve is to be provided in the piping to each pressure gauge;

.2 each pressure gauge for piping and equipment with normal everyday flow is to be equipped with a brass pressure snubber;

.3 Thermometers as follows:

.1 round, 125 mm (5") diameter, adjustable (90°) angle bimetal dial type thermometers, each accurate to within 1% of full scale;

.2 hermetically sealed stainless steel case with stainless steel ring;

.3 dampened bimetal coil;

.4 calibration adjustment screw;

.5 white aluminum dual scale dial with black and blue markings and a range such that working temperature of system is approximate mid-point of the scale;

.6 black aluminum pointer;

.7 double strength glass window;

.8 12 mm (½") NPT connection with 6.4 mm (¼") diameter stainless steel stem;

.9 suitable thermowell.

.4 Acceptable manufacturers are:

.1 H.O. Trerice Co.;

.2 Weiss Instruments;

.3 Ashcroft.

2.07 EQUIPMENT BELT DRIVES

.1 ANSI/RMA Standard V-belt type rated at minimum 1.5 times motor nameplate rating, and in accordance with following requirements:

.1 belts are to be reinforced cord and rubber, and multiple belts are to be matched sets;

.2 sheaves are to be cast iron or steel, secured to shafts with removable keys unless otherwise specified, standard adjustable pitch (± 10% range) for motors under 10 HP, fixed pitch type with split tapered bushing and keyway for motors 10 HP and larger, and, if required, replaced as part of mechanical work to suit system air/water quantity testing and balancing work;

.3 motor slide rail adjustment plates are to allow for centre line adjustment.

.2 Supply a spare belt set (tagged and identified) for each belt drive and hand to Owner upon Substantial Performance of the Work.

2.08 EQUIPMENT DRIVE GUARDS AND ACCESSORIES

.1 For V-belt drives – removable, 4-sided, fully enclosed, galvanized sheet steel guards to OHSA standards, cleaned, factory primed and painted with yellow equipment enamel, complete with a 2-piece full length hinged front panel to permit belt maintenance or replacement without removing guard, and 40 mm (1-½") diameter tachometer openings at each shaft location.

.2 For flexible couplings – removable "U" shaped galvanized steel guards to OHSA Standards with a 2.3 mm (3/32") thick frame and expanded mesh face.

.3 For unprotected fan inlets and outlets – unless otherwise specified, removable 20 mm (¾") galvanized steel wire mesh with galvanized steel frames, all to OHSA Standards.

2.09 ELECTRIC MOTORS

.1 Unless otherwise specified, motors are to conform to NEMA Standard MG1, applicable IEEE Standards, and applicable CSA C22.2 Standards, and are to meet NEMA standards for maximum sound level ratings under full load. Confirm motor voltages prior to ordering.

.2 Vertically mounted and submersible motors are to be purposely designed for mounting in this attitude.

.3 Efficiency of 1-phase motors to 1 HP is to be in accordance with CAN/CSA C747. Efficiency of 3-phase motors 1 HP and larger is to be in accordance with CAN/CSA C390 or IEEE 112B.

.4 Unless otherwise specified, 1-phase motors smaller than ½ HP are to be 115 volt, continuous duty capacitor start type with an NEMA 48 or 56 frame size, solid base, heavy-gauge steel shell with solid die-cast end shields, dynamically balanced die-cast rotor, integral automatic reset thermal overload protection, Class "B" insulation, and a 1.15 service factor at 40°C (105°F) ambient temperature.

.5 Explosion-proof 1-phase motors are to be totally enclosed, fan cooled, 115 volt continuous duty capacitor start type in accordance with CSA C22.2 No. 145, as specified for standard 1-phase motors but suitable for use in Class 1 Group D hazardous locations and complete with a rolled steel shell and a 1.0 service factor at 40°C (105°F) ambient temperature.

.6 Unless otherwise specified, motors ½ HP and larger are to be totally enclosed, fan cooled, 3-phase, T-frame, squirrel cage continuous duty induction motors suitable for voltages indicated on Drawings, NEMA Design "B" for normal starting torque or Design "C" for high starting torque as required by the application, each complete with Class "B" insulation, a 1.15 service factor at 40°C ambient temperature, grease lubricated open ball bearings with grease fittings to permit re-lubrication without dismantling motor, a cast iron frame with cast iron feet where required, cast iron end bracket and precision machined bearing fit, and balanced carbon steel shaft assembly with die-cast aluminum rotor windings.

.7 Explosion-proof 3-phase motors are to be totally enclosed fan cooled motors in accordance with CSA C22.2 No. 145, generally as specified above for standard 3-phase motors but suitable for use in Class 1 Group D hazardous locations and with a 1.0 service factor at 40°C (105°F) ambient temperature.

.8 Motors for equipment which is scheduled or specified with a corrosion resistant coating or constructed from corrosion resistant materials are to be factory coated with a primer and epoxy paint finish.

.9 Acceptable manufacturers are:

.1 TECO-Westinghouse Motors (Canada) Inc.;

.2 Canadian General Electric;

.3 Baldor Electric Co.;

.4 U.S. Electrical Motors;

.5 Weg Electric Corp.;

.6 Marathon Electric;

.7 Toshiba Corp.;

.8 Leeson Canada.

2.10 MOTOR STARTERS AND ACCESSORIES

.1 Motor starters must be capable of starting associated motors under the imposed loads. Confirm starter voltage matches motor prior to ordering.

.2 Unless otherwise specified, starters for 1-phase motors are to be 115 volt, thermal overload protected manual starting switches with a neon pilot light, a surface or recessed enclosure to suit the application, and, where automatic operation is required, a separate H-O-A switch in an enclosure to match starter enclosure.

.3 Unless otherwise specified, starters for 3-phase motors less than 50 HP are to be combination "quick-make" and "quick-break" fused disconnects and full voltage non-reversing across-the-line starters, each complete with and overload relay per phase, an enclosure to suit the application, and, a H-O-A switch, pilot lights, control transformer, auxiliary contacts, and other accessories as per motor starter schedule.

.4 Starters for 2-speed double winding motors are to be generally as specified above but suitable for motor and equipped with a 45 second time delay to permit equipment to coast down to low speed before it is operated at low speed.

.5 Starters for 2-speed single winding motors are to be generally as specified above but suitable for motor and equipped with a 45 second time delay to permit equipment to coast down to low speed before it is operated at low speed.

.6 Starters for reversible motors for cooling towers are to be generally as specified above but suitable for motor and equipped with a 45 second time delay to allow fan(s) to coast down to a stop before being operated in reverse rotation.

.7 Unless otherwise specified, motor starter enclosures are to be in accordance with following NEMA ratings:

.1 enclosures located in sprinklered areas – Type 2;

.2 enclosures exposed to the elements – Type 3R, constructed of stainless steel;

.3 enclosures inside the building in wet areas – Type 3R, constructed of stainless steel;

.4 enclosures in explosion rated area – Type 7 with exact requirements to suit the area and application;

.5 enclosures except as noted above – Type 1;

.6 enclosures located in finished areas – as above but recess type with brushed stainless steel faceplate.

.8 Acceptable manufacturers are:

.1 Rockwell Automation Inc. - Allen-Bradley;

.2 Eaton Corp. – Cutler-Hammer;

.3 Eaton Corp. – Moeller Electric;

.4 Siemens Canada;

.5 Schneider Electric.

2.11 MECHANICAL WORK IDENTIFICATION MATERIALS

.1 Equipment nameplates are to be minimum 1.6 mm (1/16") thick 2-ply laminated coloured plastic plates, minimum 12 mm x 50 mm (½" x 2") for smaller items such as damper motors and control valves, minimum 25 mm x 65 mm (1" x 2-½") for equipment, and minimum 50 mm x 100 mm (2" x 4") for control panels and similar items. Additional requirements are as follows:

.1 unless otherwise specified or required, each nameplate is to be white, complete with bevelled edges and black engraved wording to completely identify equipment and its use with no abbreviations;

.2 wording is generally to be as per drawings, i.e. Fan EF-1, and is to include equipment service and building area/zone served, but must be reviewed prior to engraving;

.3 supply stainless steel screws for securing nameplates in place;

.4 nameplates for equipment suspended above floor level or generally not within easy viewing from floor level are to be increased in size so as to be easily readable from floor level.

.2 Valve tags are to be coloured, 40 mm (1-½") square, 2-ply laminated plastic with bevelled edges, red-white, green-white, yellow-black, etc., to match piping identification colour, each complete with a 3.2 mm (1/8") diameter by 100 mm (4") long brass plated steel bead chain, and four lines of engraved maximum size identification wording, i.e.:

VALVE V12
200 mm (8")
CHILL. WATER
NORMALLY OPEN

.3 Standard pipe identification is to be equal to Smillie McAdams Summerlin Ltd., Brady or Primark Manufacturing Inc. vinyl plastic with indoor/outdoor type vinyl ink lettering and directional arrows, as follows:

.1 for pipe less than or equal to 150 mm (6") diameter, coiled type snap-on markers of a length to wrap completely around pipe or pipe insulation;

.2 for pipe larger than 150 mm (6") diameter, saddle type strap-on markers with 2 opposite identification locations and complete with nylon cable ties.

.4 Identification wording and colours for pipe identification materials are to be as follows:

PIPE SERVICE	IDENTIFICATION COLOUR	LEGEND
domestic cold water	green	DOM. COLD WATER
domestic hot water supply	green	DOM. HW SUPPLY
domestic hot water recirculation	green	DOM. HW RECIRC.
sanitary drainage	green	SAN.
plumbing vent	green	SAN. VENT
heating water supply	yellow	HTG. WTR. SUPPLY
heating water return	yellow	HTG. WTR. RETURN

.5 Colours for pipe identification legends and directional arrows are to be as follows:

IDENTIFICATION COLOUR	LEGEND & ARROW COLOUR
yellow	black
green	white
red	white

.6 Duct identification is to be custom made Mylar stencils with 50 mm (2") high lettering to accurately describe duct service, i.e. "AHU-1 SUPPLY", complete with a directional arrow, and coloured ink with ink pads and roller applicators. Ink colour is generally to be black but must contrast with lettering background.

3 EXECUTION

3.01 GENERAL PIPING AND DUCTWORK INSTALLATION REQUIREMENTS

.1 Unless otherwise specified, locate and arrange horizontal pipes and ducts above or at ceiling on floors, arranged so that under consideration of all other work in area, maximum ceiling height and/or usable space is maintained. If required to maintain ceiling heights, reroute and/or resize ductwork, with Consultant’s approval.

.2 Unless otherwise specified, install work concealed in finished spaces, and concealed to degree possible in partially finished and unfinished spaces. Refer to and examine Architectural drawings and room finish schedules to determine finished, partially finished, and unfinished areas. Walls which are painted are considered finished.

.3 Install pipes and ducts parallel to building lines and to each other.

.4 Neatly group and arrange exposed work.

.5 Locate work to permit easy access for service or maintenance as required and/or applicable. Locate valves, dampers and any other equipment which will or may need maintenance or repairs and which are to be installed in accessible construction so as to be easily accessible from access doors. Where valves, dampers and similar piping or ductwork accessories occur in vertical services in shafts, pipe spaces or partitions, locate accessories at floor level.

.6 Make connections between pipes of different materials using adapters suitable for application. Provide cast brass dielectric type adapters/unions at connections between ferrous and copper pipe.

.7 Comply with equipment and material manufacturer's installation instructions unless otherwise specified herein or on drawings, and unless such instructions contradict governing codes and regulations.

.8 Carefully clean ducts, pipe and fittings prior to installation. Temporarily cap or plug ends of pipe, ducts and equipment which are open and exposed during construction.

.9 Install piping and ductwork which are to be insulated so that they have sufficient clearance to permit insulation and finish to be applied continuously and unbroken around pipe or duct, except for ductwork at fire barriers, in which case insulation will be terminated at each side of the duct fire damper.

.10 Inspect surfaces and structure prepared by other trades before performing work. Verify surfaces or structure to receive work has no defects or discrepancies which could result in poor application or cause latent defects in installation and workmanship. Report defects in writing. Installation of work will constitute acceptance of such surfaces as being satisfactory.

.11 Any ferrous piping that exhibits in excess of 5% surface rust, either inside or outside or both, is to be wire brush cleaned to bare metal and coated with suitable primer. Steel pipe, fittings and accessories are to be free of corrosion and dirt when work is complete or prior to being concealed from view. Where dirt is evident, clean piping prior to being concealed.

.12 For factory applied finishes, repaint or refinish surfaces damaged during shipment and installation. Quality of repair work is to match original finish. This requirement also applies to galvanized finishes.

.13 Where mechanical work is located in high humidity areas where ferrous metal products will be subject to corrosion and protection for such products is not specified, provide finishes on products to protect against corrosion or provide products which will not corrode in the environment, i.e. aluminium ductwork, copper or stainless steel pipe, etc.

.14 Provide screwed unions or flanges in piping connections to equipment and in regular intervals in long (in excess of 12 m [40']) piping runs to permit removal of sections of piping.

.15 Unless otherwise specified and except where space limitations do not permit, piping elbows are to be long radius. Eccentric reducers are to be installed with straight side at top of piping.

3.02 PIPE JOINT REQUIREMENTS

.1 Do not make pipe joints in walls or slabs.

.2 Ream piping ends prior to making joints.

.3 Properly cut threads in screwed steel piping and coat male threads only with Teflon tape or paste, or an equivalent thread lubricant. After pipe has been screwed into fitting, valve, union, or piping accessory, not more than 2 pipe threads are to remain exposed.

.4 Site bevel steel pipe to be welded or supply mill bevelled pipe. Remove scale and oxide from bevels and leave smooth and clean. Use factory made welding tees or welding outlet fittings for piping branches off mains. Do not use shop or site fabricated fittings unless written approval has been obtained.

.5 Welded joints are to be made by CWB certified licensed journeyman welders qualified in accordance with CSA B51, Boiler Pressure Vessel and Pressure Piping Code, and who are in possession of a proper certificate of qualification for each procedure to be performed. Each weld is to be identified with the welder's identification symbol, and welds are not to be concealed until they have been inspected and approved. Electrodes are to be in accordance with CSA W48 Series, Electrodes, and requirements of CAN/CSA W117.2, Safety in Welding, Cutting and Allied Processes are to be followed.

.6 Unless otherwise specified, make flanged joints with Garlock 5500 or equivalent gasket materials to suit the application, and bolts and nuts. Bolts are not to be longer than length necessary to screw nut up flush to the end of bolt. Bolts used for flanged connections in piping with a working pressure of 690 kPa (100 psi) and greater are to be ASTM A-193 Grade B-7, with heavy hexagon nuts to ASTM A-194 CL-2H. Provide suitable washers between each bolt head and flange and between each nut and flange.

.7 A random check of bolted flanged connections will be made to verify flanged connections are properly mated with no shear force acting on bolts. Supply labour to disconnect and reconnect selected flanged joints. If improperly mated joints are found, remove and reinstall affected piping so flanges mate properly. If improperly mated joints are found, additional joints will be checked, and you will be responsible for the repair of any other improper joints discovered.

.8 Unless otherwise specified make soldered joints in copper piping using flux suitable for and compatible with type of solder being used. Clean the outside of pipe end and inside of fitting, valve, or similar accessory prior to soldering.

.9 Install mechanical joint fittings and couplings in accordance with manufacturer's instructions.

.10 Grooves are to be rolled. Make arrangements with coupling and fitting manufacturer for shop and/or site instructions and demonstrations as required, and adhere to manufacturer's instructions with respect to pipe grooving, support, type of gasket required, anchoring and guiding the grooved piping system.

.11 If pressure crimped couplings and fittings are used, ensure gaskets are fully compatible with piping fluid, and valves and piping accessories are suitable. Use only fitting manufacturer supplied crimping equipment. Comply with manufacturer's latest published specification, instructions, and recommendations with respect to pipe, coupling, and fitting preparation and installation, and support, anchoring and guiding of the piping system.

.12 Solvent weld PVC piping in 2 parts, primer stage and cementing stage, in accordance with manufacturer's recommendations, ASTM D2855, and CSA requirements.

.13 Install PVC piping with gasketed joints in accordance with manufacturer's current published specifications, instructions and recommendations, and CSA requirements.

3.03 INSTALLATION OF PIPE SLEEVES

.1 Where pipes pass through concrete and/or masonry surfaces provide pipe sleeves as follows:

.1 in poured concrete slabs – unless otherwise specified, minimum 16 gauge flanged galvanized steel or, where permitted by governing authorities, factory fabricated plastic sleeves;

.2 in concrete or masonry walls – Schedule 40 galvanized steel pipe or Class 4000 cast iron pipe.

.2 Sleeves in waterproofed slabs or walls are to be lengths of Schedule 40 mild galvanized steel pipe with a waterstop plate in accordance with drawing detail. Provide waterproof sleeves in following locations:

.1 in mechanical room floor slabs, except where on grade;

.2 in slabs over mechanical, fan, electrical and telephone equipment rooms or closets;

.3 in floors equipped with waterproof membranes;

.4 in roof slab;

.5 in waterproof walls.

.3 Size sleeves, unless otherwise specified, to leave 12 mm (½") clearance around pipes, or where pipe is insulated, a 12 mm (½") clearance around pipe insulation.

.4 Pack and seal void between pipe sleeves and pipe or pipe insulation in non-fire rated construction for the length of sleeves as follows:

.1 pack sleeves in interior construction with mineral wool and seal both ends of sleeves with non-hardening silicone base caulking compound;

.2 pack sleeves in exterior walls above grade with mineral wool and seal both ends of sleeves water-tight with approved non-hardening silicone base caulking compound unless mechanical type seals have been specified;

.3 seal sleeves in exterior walls below grade (and any other wall where water leakage may be a problem) with link type mechanical seals as specified.

.5 Where sleeves are required in masonry work, accurately locate and mark sleeve location, and hand sleeves to mason for installation.

.6 Terminate piping for sleeves that will be exposed so sleeve is flush at both ends with building surface concerned so sleeve may be completely covered by an escutcheon plate, except for sleeves in waterproof floors which are to terminate 100 mm (4") above finished floor.

.7 "Gang" type sleeving will not be permitted.

.8 Where sleeves are provided in non-fire rated construction for future piping, or where piping has been removed from existing sleeves, cap and seal both ends of sleeved opening.

3.04 INSTALLATION OF WATERPROOF MECHANICAL SEALS

.1 Provide watertight link type mechanical seals in exterior wall openings.

.2 Assemble and install each mechanical seal in accordance with manufacturer's instructions.

.3 After installation, periodically check each mechanical seal installation for leakage and, if necessary, tighten link seal bolts until seal is completely watertight.

3.05 SLEEVE AND FORMED OPENING LOCATION DRAWINGS

.1 Prepare and submit for review, drawings indicating size and location of required sleeves, recesses and formed openings in poured or precast concrete work.

.2 Such drawings are to be completely and accurately dimensioned and relate sleeve, recesses, and formed openings to suitable grid lines and elevation datum, and are to take into account structural items such as grade beams, column caps, and column drop slabs.

.3 Begin to prepare such drawings immediately upon notification of acceptance of bid and award of Contract.

3.06 INSTALLATION OF FASTENING AND SECURING HARDWARE

.1 Provide fastening and securing hardware required for mechanical work to maintain installations attached to structure or to finished floors, walls and ceilings in a secure and rigid manner capable of withstanding dead loads, live loads, superimposed dead loads, and any vibration of installed products.

.2 Use fasteners compatible with structural requirements, finishes and types of products to be connected. Do not use materials subject to electrolytic action or corrosion where conditions are liable to cause such action.

.3 Where floor, wall or ceiling construction is not suitable to support loads, provide additional framing or special fasteners to ensure proper securement to structure that is to support the products. Provide reinforcing or connecting supports where required to distribute loading to structural components.

.4 Obtain written consent before using explosive actuated fastening devices. If consent is obtained, comply with requirements of CAN/CSA Z166.1 and CAN/CSA Z166.2.

.5 Do not attach fasteners to steel deck without written consent from Consultant.

3.07 INSTALLATION OF PIPE HANGERS AND SUPPORTS

.1 Provide required pipe hangers and supports.

.2 Provide any additional structural steel channels, angles, inserts, beam champs and similar accessories required for hanging or supporting pipe. Unless otherwise shown or specified, hang or support pipes from structure only.

.3 For insulated pipe, size hanger or support to suit diameter of insulated pipe and install hanger or support on outside of insulation and insulation finish.

.4 Unless otherwise shown or specified, hang and/or support horizontal pipe above ground by means of hangers and/or supports specified in Part 2 of this Section. Unless otherwise shown or specified, hangers for suspended pipe less than or equal to 25 mm (1") dia. are to be clevis type or adjustable ring type, and hangers for suspended pipe greater than or equal to 40 mm (1-½") dia. are to be adjustable clevis type.

.5 Space hangers and supports in accordance with following:

.1 cast iron pipe – hang or support at every joint with maximum 2.4 m (8') spacing;

.2 copper and steel pipe – hang or support at spacing in accordance with following schedule:

PIPE DIA.	MAX. SPACING STEEL (meters)	MAX. SPACING COPPER (meters)
to 25 mm (1")	2.4 m (8')	1.8 m (6')
40 mm (1-½")	2.7 m (9')	2.4 m (8')
50 mm (2")	3.0 m (10')	2.7 m (9')
65 mm (2-½")	3.6 m (12')	3.0 m (10')
75 mm (3")	3.6 m (12')	3.0 m (10')
90 mm (3-½")	3.6 m (12')	3.6 m (12')
100 mm (4")	4.2 m (14')	3.6 m (12')
250 mm (10")	6.0 m (20')	
300 mm (12")	6.7 m (22')	

.3 flexible grooved pipe/coupling joint piping – as above but with not less than one hanger or support between joints.

.6 Where pipes change direction, either horizontally or vertically, provide a hanger or support on horizontal pipe not more than 300 mm (12") from elbow, and where pipes drop from tee branches, support tees in both directions not more than 50 mm (2") on each side of tee.

.7 When pipes with same slope are grouped and a common hanger or support is used, space hanger or support to suit spacing requirement of smallest pipe in group and secure pipes in place on common hanger or support.

.8 Provide roller hangers or supports for heat transfer piping greater than or equal to 150 mm (6") diameter and conveying a material 75°C (170°F) or greater to facilitate pipe movement due to expansion and contraction, and at each hanger or support tack weld a steel protection saddle to pipe to protect piping insulation.

.9 Unless otherwise shown or specified, support vertical piping by means of supports specified in Part 2 of this Section, spaced in accordance with following:

.1 support vertical pipes at maximum 3 m (10') intervals or at every floor, whichever is lesser;

.2 for sections of vertical piping with a length less than 3 m (10'), support pipe at least once;

.3 for vertical cast iron plain end pipe (mechanical joint type), secure riser or pipe clamp around pipe under a flange integral with pipe for vertical support purposes, or provide a length of hub and spigot pipe to facilitate proper support;

.4 for vertical steel pipe risers in excess of 3 m (10'), weld shear lugs to pipe to carry load;

.5 for vibration isolated piping risers, provide rubber-steel-rubber vibration isolation pads between riser clamps and floor.

.10 Each hanger, support or securement for horizontal bare copper tubing is to be plastic coated to prevent direct contact between pipe and ferrous hanger. Each wall or floor clamp for vertical bare copper piping is to be isolated from pipe by means of strips of flexible rubber inserts. Use of painted ferrous hangers and supports, including those painted with copper coloured paint, is not acceptable. Site application of tape or other types of isolation is not acceptable.

.11 For insulated horizontal piping less than or equal to 40 mm (1-½") diameter, provide galvanized steel insulation protection shields between insulation and hanger or support. Install shields immediately after pipe is insulated.

.12 Do not support piping from steel deck without written consent from Consultant.

3.08 SUPPLY OF ACCESS DOORS

.1 Supply access doors to give access to mechanical work which may need maintenance or repair but which is concealed in inaccessible construction, except as otherwise specified herein or on drawings.

.2 Before commencing installation of mechanical work, coordinate with other trades and prepare on a set of reflected ceiling plans and wall elevations, complete layouts of access doors. Submit these layouts for Consultant’s review and show exact sizes and locations of such access doors. Locate and arrange mechanical work to suit.

.3 Access doors will be installed by trade responsible for particular type of construction in which doors are required. Supply access doors to trade installing same at proper time.

.4 Wherever possible, access doors to be of a standard size for each application. Confirm exact dimensions and minimum size restrictions with Consultant prior to ordering.

.5 Group piping and ductwork to ensure minimum number of access doors is required.

.6 Submit a sample of each proposed access door for review prior to ordering.

.7 Coordinate with Electrical Contractor and General Trades Contractor to ensure access doors on project are provided by a single manufacturer, installed as part of work of General Trades Contractor and work involving both mechanical and electrical services should, where possible, be accessible from common access door. Coordinate work to ensure common location access doors are not supplied by both Mechanical Divisions and Electrical Divisions.

3.09 INSTALLATION OF VALVES

.1 Generally, valve locations are indicated or specified on drawings or specified in Sections of the Specification where valves are specified, however, regardless of locations shown or specified, following requirements apply:

.1 provide shut-off valves to isolate systems, at base of vertical risers, in branch take-offs at mains and risers on floors, to isolate equipment, to permit work phasing as required, and wherever else required for proper system operation and maintenance;

.2 install shut-off valves with handles upright or horizontal, not inverted, and located for easy access;

.3 unless otherwise specified, provide a check valve in discharge piping of each pump;

.4 valve sizes are to be same as connecting pipe size;

.5 valves are to be permanently identified with size, manufacturer's name, valve model or figure number and pressure rating, and wherever possible, valves are to be product of same manufacturer;

.6 for valves in insulated piping, design of valve stem, handle and operating mechanism is to be such that insulation does not have to be cut or altered in any manner to permit valve operation.

3.10 INSTALLATION OF PRESSURE GAUGES AND THERMOMETERS

.1 Provide pressure gauges in following locations:

.1 in piping at each side of a pressure reducing valve;

.2 in potable water service piping downstream of meter;

.3 wherever else shown and/or specified.

.2 Provide thermometers in following locations:

.1 in supply and return piping connections to main mechanical plant equipment such as boilers, chillers, cooling towers, heat exchangers, main coils, etc., unless temperature indication is supplied with equipment;

.2 wherever else shown and/or specified.

.3 Conform to following installation requirements:

.1 for installation of thermometers in piping wells, provide a coat of metallic base heat transfer paste or grease in piping well;

.2 for pressure gauges in piping at equipment locations, install pressure gauge between equipment and first pipe fitting;

.3 locate, mount and adjust instruments so they are easily readable;

.4 where pressure gauges and/or thermometers are located at high level or in an area where they cannot be easily seen, provide remote reading instruments.

3.11 INSTALLATION OF EQUIPMENT DRIVE GUARDS AND ACCESSORIES

.1 Provide OHSA guards for exposed accessible rotating parts such as belt drives, couplings, fan wheels, and shaft ends on mechanical equipment.

.2 Install belt guards to allow movement of motors for adjusting belt tension.

.3 Provide a means to permit lubrication and use of test instruments with guards in place.

.4 Secure guards to equipment or equipment base but do not bridge sound or vibration isolation.

.5 Where equipment oil level gauges, oil reservoirs, grease cups, or grease gun fittings are integral with equipment but are not easily accessible for service, extend to an accessible location using aluminium or copper tubing.

3.12 MECHANICAL WORK IDENTIFICATION

.1 Identify new exposed piping and ductwork as per Part 2 of this Section in locations as follows:

.1 at every end of every piping or duct run;

.2 adjacent to each valve, strainer, damper and similar accessory;

.3 at each piece of connecting equipment;

.4 on both sides of every pipe and duct passing through a floor, wall or partition, unless otherwise specified;

.5 at 6 m (20') intervals on pipe and duct runs exceeding 6 m (20') in length;

.6 at least once in each room, and at least once on pipe and duct runs less than 6 m (20') in length.

.2 Unless otherwise specified identify new concealed piping and ductwork as per Part 2 of this Section in locations as follows:

.1 at points where pipes or ducts enter and leave rooms, shafts, pipe chases, furred spaces, and similar areas;

.2 at maximum 6 m (20') intervals on piping and ductwork above suspended accessible ceilings, and at least once in each room;

.3 at each access door location;

.4 at each piece of connected equipment, automatic valve, etc..

.3 Provide an identification nameplate for equipment provided as part of this project, including items such as control valves, motorized dampers, instruments, and similar products. Secure nameplates in place, approximately at eye level if possible, with stainless steel screws unless such a practice is prohibitive, in which case use epoxy cement applied to cleaned surfaces. Locate nameplates in the most conspicuous and readable location.

.4 Paint new natural and/or propane gas piping with primer and 2 coats of yellow paint in accordance with Code requirements and requirements of Painting Section in Division 09. Identify piping at intervals as specified above.

.5 Provide an identification nameplate for each motor starter or disconnect switch located in a motor control centre or on a motor starter panel, and on each individually mounted starter provided as part of mechanical work, and on each disconnect switch provided as part of the electrical work for motorized equipment provided as part of mechanical work.

.6 Tag valves and prepare a valve tag chart in accordance with following requirements:

.1 attach a valve tag to each new valve, except for valves located immediately at equipment they control;

.2 prepare a computer printed valve tag chart to list tagged valves, with, for each valve, the tag number, location, valve size, piping service, and valve attitude (normally open or normally closed);

.3 if an existing valve tag chart is available at site, valve tag numbering is to be an extension of existing numbering and new valve tag chart is to incorporate existing chart;

.4 frame and glaze one copy of chart and, unless otherwise directed, affix to a wall in each main Mechanical and/or Equipment Room;

.5 include a copy of valve tag chart in each copy of operating and maintenance instruction manuals;

.6 hand an identified CD of valve tag chart to Owner at same time O & M Manuals are submitted.

.7 Where shut-off valves, control dampers, sensors, and similar items which will or may need maintenance and/or repair are located above accessible suspended ceilings, provide round coloured ceiling tacks in ceiling panel material, or stickers equal to Brady "Quick Dot" on ceiling grid material to indicate locations of items. Unless otherwise specified, ceiling tack or sticker colours are to be as follows:

.1	HVAC piping valves and equipment:	yellow
.2	fire protection valves and equipment:	red
.3	plumbing valves and equipment:	green
.4	HVAC ductwork dampers and equipment:	blue
.5	control system hardware and equipment:	orange

3.13 PIPE LEAKAGE TESTING

.1 Before piping has been insulated or concealed, and before equipment, fixtures and fittings have been connected, test piping for leakage.

.2 Tests are to be witnessed by Consultant and/or Owner's representative, and, where required, representatives of governing authorities. Give ample notice of tests in writing and verify attendance. Have completed test report sheets dated and signed by those present to confirm proper test results.

.3 When circumstances prevent scheduled tests from taking place, give immediate and adequate notice of cancellation to all who were scheduled to attend.

.4 Gravity Drainage and Vent Piping

.1 Test piping in accordance with local governing building code.

.2 After fixtures and fittings are set and pipes are connected to building drain or drains, turn on water into pipe, fixtures, fittings and traps in order to detect any imperfect material or workmanship. Perform a smoke test if required by local governing authorities.

.5 Domestic Water Piping

.1 Test piping with cold water at a pressure of 1-½ times normal working pressure and maintain pressure for a minimum of 2 hours.

.6 Heat Transfer (HVAC) System Piping

.1 Test piping with cold water at a pressure of 1035 kPa (150 psi) for a minimum of 2 hours.

.7 Following requirements apply to all testing:

.1 ensure piping has been properly flushed, cleaned and is clear of foreign matter prior to pressure testing;

.2 temporarily remove or valve off piping system specialties or equipment which may be damaged by test pressures prior to pressure testing systems, and flush piping to remove foreign matter;

.3 when testing is carried out below highest level of the particular system, increase test pressure by the hygrostatic head of 7 kPa (1 psi) for every 600 mm (24") below the high point;

.4 include for temporary piping connections required to properly complete tests;

.5 piping under test pressure is to have zero pressure drop for length of test period;

.6 make tight leaks found during tests while piping is under pressure, and if this is impossible, remove and refit piping and reapply test until satisfactory results are obtained;

.7 where leaks occur in threaded joints in steel piping, no caulking of these joints will be allowed under any conditions;

.8 tests are be done in reasonably sized sections so as to minimize number of tests required;

.9 in addition to leakage tests specified above, demonstrate proper flow throughout systems including mains, connections and equipment, as well as proper venting and drainage, and include for any necessary system adjustments to achieve proper conditions.

3.14 SUPPLY OF MOTOR STARTERS AND ACCESSORIES

.1 Unless otherwise shown or specified, supply a starter for each item of motorized equipment. Refer to Motor Starter Schedule. Hand starters to electrical trade at site at the proper time.

.2 Unless otherwise specified or shown on drawings, 1-phase motor starters will be mounted adjacent to equipment they serve and connected complete as part of electrical work. Hand starters to electrical trade at site at the proper time.

3.15 ELECTRICAL WIRING WORK FOR MECHANICAL WORK

.1 Unless otherwise specified or indicated, following electrical wiring work for mechanical equipment will be done as part of the electrical work:

.1 "line" side power wiring to motor starters or disconnect switches in motor control centres and starters or disconnects on motor starter panels, and "load" side wiring from starters or disconnects to equipment;

.2 "line" side power wiring to individual wall mounted starters, and "load" side wiring from starters to equipment;

.3 provision of receptacles for plug-in equipment;

.4 provision of disconnect switches for motors in excess of 10 m (30') from starter location, or cannot be seen from starter location, and associated power wiring;

.5 motor starter interlocking in excess of 24 volts;

.6 120 volt power connections to electrical receptacles integral with small ceiling exhaust fans, including wiring through light switches or speed controllers;

.7 120 volt wiring connections to lighting fixture/switch combinations integral with air handling units;

.8 120 volt wiring connections to duplex receptacles integral with air handling unit control panels.

.2 Mechanical wiring work not listed above or specified herein or on drawings to be done as part of electrical work is to be installed in conduit and is to be done as part of mechanical work in accordance with wiring requirements specified for electrical work.

3.16 INTERRUPTION TO AND SHUT-DOWN OF MECHANICAL SERVICES AND SYSTEMS

.1 Coordinate shut-down and interruption to existing mechanical systems with Owner. Generally, shut-downs may be performed only between the hours of 12:00 midnight Friday until 6:00 a.m. Monday morning. Include for costs of premium time to perform work during nights, weekends or other times outside of normal working hours, which may be necessary to comply with stipulations specified herein this Article. Services for operation of existing non-renovated areas of building are to be maintained.

.2 Upon award of a Contract, submit a list of anticipated shut-down times and their maximum duration.

.3 Prior to each shut-down or interruption, inform Owner and Consultant in writing 5 working days in advance of proposed shut-down or interruption and obtain written consent to proceed. Do not shut-down or interrupt any system or service without such written consent. Shutdowns of some essential services may require additional advance notification time.

.4 Perform work associated with shut-downs and interruptions as continuous operations to minimize shut-down time and to reinstate systems as soon as possible, and, prior to any shut-down, ensure materials and labour required to complete the work for which shut-down is required are available at site.

.5 Pipe freezing may be used to connect new piping to existing piping without draining existing piping. Pipe freeze equipment is to be equal to "NORDIC FREEZE" equipment supplied by Mag Tool Inc. (1-800-661-9983) or Rigid Tool Co. RIGID "SuperFreeze".

3.17 CUTTING, PATCHING AND CORE DRILLING

.1 Unless otherwise provided by General Trades, perform cutting, patching, and core drilling of existing building required for installation of mechanical work. Perform cutting in a neat and true fashion, with proper tools and equipment to Consultant’s approval. Patching is to exactly match existing finishes and be performed by tradesmen skilled in particular trade or application. Work is subject to review and acceptance by Consultant.

.2 Criteria for cutting holes for additional services:

.1 cut holes through slabs only; no holes to be cut through beams;

.2 cut holes 150 mm (6") diameter or smaller only; obtain approval from Structural Consultant for larger holes;

.3 keep at least 100 mm (4") clear from beam faces;

.4 space at least 3 hole diameters on centre;

.5 for holes that are required closer than 25% of slab span from supporting beam face, use cover meter above slab to clear slab top bars;

.6 for holes that are required within 50% of slab span, use cover meter underside of slab to clear slab bottom bars;

.7 submit sleeving drawings indicating holes and their locations for Structural Consultant's review.

.3 Do not cut or drill any existing work without approval from Owner and Consultant. Be responsible for damage done to building and services caused by cutting or drilling.

.4 Where pipes pass through existing construction, core drill an opening. Size openings to leave 12 mm (½") clearance around pipes or pipe insulation.

.5 Prior to drilling or cutting an opening, determine, in consultation with Consultant and Owner, and by use of non-destructive radar scan (magnetic scan) of slab or wall, presence of any existing services and reinforcement bars concealed behind building surface to be cut and locate openings to suit. Coring is not permitted through concrete beams or girders.

.6 Where drilling is required in waterproof slabs, size opening to permit snug and tight installation of a pipe sleeve sized to leave 12 mm (½") clearance around pipe or pipe insulation. Provide a pipe sleeve, constructed of Schedule 40 galvanized steel pipe with a flange at one end and of a length to extend 100 mm (4") above slab, in opening. Secure flange to the underside of slab and caulk void between sleeve and slab opening with proper non-hardening silicone base caulking compound to produce a water-tight installation.

.7 Firestop and seal openings in fire rated construction in accordance with requirements of article entitled Firestopping and Smoke Seal Materials in this Section. Do not leave openings open overnight unless approved by Owner and Consultant.

3.18 FLASHING FOR MECHANICAL WORK PENETRATING ROOF

.1 Perform required flashing work, including counter-flashing, for mechanical work penetrating and/or set in roof.

.2 Perform flashing work in accordance with requirements of drawing details, and requirements specified in Division 07.

3.19 CLEANING MECHANICAL WORK

.1 Clean mechanical work prior to application for Substantial Performance of the Work.

.2 Include for vacuum cleaning interior of air handling units and ductwork systems.

3.20 CONNECTIONS TO OTHER EQUIPMENT

.1 Carefully examine Contract Documents during bidding period and include for mechanical work piping and/or ductwork connections to equipment requiring such connections.

3.21 FAN NOISE LEVELS

.1 Submit sound power levels with fan shop drawings/product data, with levels measured to AMCA 300 and calculated to AMCA 301.

3.22 EQUIPMENT AND SYSTEM MANUFACTURER'S CERTIFICATION

.1 When equipment/system installation is complete, but prior to start-up procedures, arrange and pay for equipment/system manufacturer's authorized representative to visit site to examine installation, and after any required corrective measures have been made, to certify in writing to Consultant that equipment/system installation is complete and in accordance with equipment/system manufacturer's instructions.

3.23 EQUIPMENT AND SYSTEM START-UP

.1 When installation of equipment/systems is complete but prior to commissioning, perform start-up for equipment/systems as specified in mechanical work Sections in accordance with following requirements:

.1 submit a copy of each equipment/system manufacturer's start-up report sheet to Consultant for review, and incorporate any comments made by Consultant;

.2 under direct on-site supervision and involvement of equipment/system manufacturer's representative, start-up equipment/systems, make any required adjustments, document procedures, leave equipment/systems in proper operating condition, and submit to Consultant complete set of start-up documentation sheets signed by manufacturer/supplier and Contractor.

END OF SECTION

1 GENERAL

1.01 APPLICATION

.1 This Section specifies insulation requirements common to Mechanical Divisions work Sections and it is a supplement to each Section and is to be read accordingly.

1.02 DEFINITIONS

.1 "concealed" – means mechanical services and equipment above suspended ceilings, in non-accessible chases, in accessible pipe spaces, and furred-in spaces.

.2 "exposed" – means exposed to normal view during normal conditions and operations.

.3 "mineral fibre" – includes glass fibre, rock wool, and slag wool.

.4 "domestic water" or "potable water" – means piping extended from building Municipal supply main.

1.03 SUBMITTALS

.1 Submit a product data sheet for each insulation system product.

.2 In accordance with Part 3 of this Section, submit a letter from fire rated duct wrap supplier to certifying duct wrap has been properly installed.

1.04 QUALITY ASSURANCE

.1 Mechanical insulation is to be applied by a licensed journeyman insulation mechanic, or by an apprentice under direct, daily, on-site supervision of a journeyman mechanic.

.2 Do not apply insulation unless leakage tests have been satisfactorily completed.

.3 Ensure surfaces to be insulated are clean and dry.

.4 Ensure ambient temperature is minimum 13°C (55°F) for at least 1 day prior to application of insulation, and for duration of insulation work, and relative humidity is and will be at a level such that mildew will not form on insulation materials.

.5 Insulation materials must be stored on site in a proper and dry storage area. Any wet insulation material is to be removed from site.

2 PRODUCTS

2.01 FIRE HAZARD RATINGS

.1 Unless otherwise specified, insulation system materials inside building must have a fire hazard rating of not more than 25 for flame spread and 50 for smoke developed when tested in accordance with ULC S102, Surface Burning Characteristics of Building Materials and Assemblies.

2.02 THERMAL PERFORMANCE

.1 Unless otherwise specified, thermal performance of insulation is to meet or exceed values given in Tables entitled Minimum Piping Insulation Thickness Heating and Hot Water Systems and Minimum Piping Insulation Thickness Cooling Systems, as stated in ANSI/ASHRAE/IES Standard 90.1 version referenced in Ontario Building Code.

2.03 PIPE INSULATION MATERIALS

.1 Horizontal pipe insulation at hangers and supports are to be equal to Belform Insulation Ltd. "Koolphen K-Block" insulated pipe support inserts consisting of minimum 150 mm (6") long, pre-moulded, rigid, sectional phenolic foam insulation (of same thickness as adjoining insulation) with a reinforced foil and kraft paper vapour barrier jacket and a captive galvanized steel saddle.

.2 Pre-moulded mineral fibre is to be rigid, sectional, sleeve type insulation to ASTM C547, with a factory applied vapour barrier jacket. Acceptable products are:

.1 Johns Manville Inc. "Micro-Lok AP-T Plus";

.2 Knauf Fiber Glass "Pipe Insulation" with "ASJ-SSL" jacket;

.3 Manson Insulation Inc. "ALLEY K APT";

.4 Owens Corning “Fiberglas” Pipe Insulation.

.3 Blanket mineral fibre is to be blanket type roll insulation to CGSB 51-GP-11M, 24 kg/m^3 (1-½ lb/ft^3) density, with a factory applied vapour barrier facing. Acceptable products are:

.1 Johns Manville Inc. Microlite FSK Duct Wrap Type 150;

.2 Knauf Fiber Glass Blanket Insulation FSK Duct Wrap Type III;

.3 Manson Insulation Inc. ALLEY WRAP FSK Duct Wrap Type III;

.4 Certainteed Corporation Softtouch FSK Duct Wrap Type 150.

2.04 BARRIER-FREE LAVATORY PIPING INSULATION KITS

.1 Removable, flexible, reusable, white moulded plastic insulation kits for barrier-free lavatory drain piping and potable water supplies exposed under lavatory.

.2 Acceptable products are:

.1 Truebo "Lav-Guard 2" E-Z Series;

.2 Zeston "SNAP-TRAP";

.3 McGuire Manufacturing Co. Inc. "ProWrap".

2.05 REMOVABLE/REUSABLE INSULATION COVERS

.1 Valve, etc. covers are to be NO SWEAT reusable insulation wraps with vapour barrier jacket and self-sealing ends and longitudinal seam, with a length to suit the application and an insulation thickness equal to adjoining insulation.

2.06 DUCTWORK SYSTEM INSULATION MATERIALS

.1 Rigid mineral fibre board is to be pre-formed board type insulation to ASTM C612, 48 kg/m^3 (3 lb/ft^3) density, with a factory applied reinforced aluminum foil and kraft paper facing. Acceptable products are:

.1 Knauf Fiber Glass Insulation Board with FSK facing;

.2 Manson Insulation Inc. "AK BOARD FSK";

.3 Johns Manville Inc. Type 814 "Spin-Glas";

.4 Owens Corning 703.

.2 Blanket mineral fibre is to be blanket type roll form insulation to ASTM C553, 24 kg/m^3 (1½ lb/ft^3) density, 40 mm (1-½") thick, with a factory applied vapour barrier facing. Acceptable products are:

.1 Johns Manville Inc. Microlite FSK Duct Wrap Type 150;

.2 Knauf Fiber Glass Blanket Insulation FSK Duct Wrap Type III;

.3 Manson Insulation Inc. ALLEY WRAP FSK Duct Wrap Type III;

.4 Certainteed Corporation Softtouch FSK Duct Wrap Type 150.

2.07 INSULATING COATINGS

.1 Equal to Robson Thermal Manufacturing Ltd. insulating coatings as follows:

.1 anti-condensation coating, "No Sweat-FX";

.2 thermal insulating coating, "ThermaLite".

2.08 INSULATION FASTENINGS

.1 Wire – minimum #15 gauge galvanized annealed wire.

.2 Wire with Mesh – minimum #15 gauge galvanized annealed wire factory woven into 25 mm (1") hexagonal mesh.

.3 Aluminium Banding – equal to ITW Insulation Systems Canada "FABSTRAPS" minimum 12 mm (½") wide, 0.6 mm (1/16") thick aluminium strapping.

.4 Duct Insulation Fasteners – weld-on 2 mm (3/32") diameter zinc coated steel spindles of suitable length, complete with minimum 40 mm (1-½") square plastic or zinc plated steel self-locking washers.

.5 Tape Sealant – equal to MACtac Canada Ltd. self-adhesive insulation tapes, types PAF, FSK, ASJ, or SWV as required to match surface being sealed.

.6 Mineral Fibre Insulation Adhesive – clear, pressure sensitive, brush consistency adhesive, suitable for a temperature range of -20°C to 82°C (-4°F to 180°F), compatible with type of material to be secured, and WHMIS classified as non-hazardous.

.7 Lagging Adhesive – white, brush consistency, ULC listed and labelled, 25/50 fire/smoke rated lagging adhesive for canvas jacket fabric, suitable for colour tinting, complete with fungicide and washable when dry.

.8 Screws – No. 10 stainless steel sheet metal screws.

2.09 INSULATION JACKETS AND FINISHES

.1 Canvas Jacket Material – ULC listed and labelled, 25/50 fire/smoke rated, roll form, minimum 170 g (6 oz.).

.2 Roll Form Sheet and Fitting Covers – minimum 15 mm (1/2") thick white PVC, 25/50 fire/smoke rated tested in accordance with ULC S102, complete with installation and sealing accessories. Acceptable products are:

.1 Proto Corp. "LoSMOKE";

.2 The Sure-Fit System "SMOKE-LESS 25/50";

.3 Johns Manville Inc. "Zeston" 300.

3 EXECUTION

3.01 GENERAL INSULATION APPLICATION REQUIREMENTS

.1 Unless otherwise specified, do not insulate following:

.1 factory insulated equipment and piping;

.2 heating piping within radiation unit enclosures, including blank filler sections of enclosures;

.3 branch potable water piping located under counters to serve counter mounted plumbing fixtures and fittings, except barrier-free lavatories;

.4 exposed chrome plated potable water angle supplies from concealed piping to plumbing fixtures and fittings, except barrier-free lavatories;

.5 acoustically lined ductwork and/or equipment;

.6 piping unions, except for unions in "cold" category piping.

.2 Install insulation directly over pipes and ducts, not over hangers and supports.

.3 Install piping insulation and jacket continuous through pipe openings and sleeves.

.4 Install duct insulation continuous through walls, partitions, and similar surfaces except at fire dampers.

.5 When insulating "cold" piping and equipment, extend insulation up valve bodies and other such projections as far as possible, and protect insulation jacketing from the action of condensation at its junction with metal.

.6 Where existing insulation work is damaged as a result of mechanical work, repair damaged insulation work to Project work standards.

.7 Where mineral fibre rigid sleeve type insulation is terminated at valves, equipment, unions, etc., neatly cover exposed end of insulation with a purpose made PVC cover on "cold" piping, and with canvas jacket material on "hot" piping.

.8 Carefully and neatly gouge out insulation for proper fit where there is interference between weld bead, mechanical joints, etc., and insulation. Bevel away from studs and nuts to permit their removal without damage to insulation, and closely and neatly trim around extending parts of pipe saddles.

.9 Where thermometers, gauges, and similar instruments occur in insulated piping, and where access to heat transfer piping balancing valve ports and similar items are required, create a neat, properly sized hole in insulation and provide a suitable grommet in the opening.

3.02 INSULATION FOR HORIZONTAL PIPE AT HANGERS AND SUPPORTS

.1 At each hanger and support location for piping 50 mm (2") diameter and larger and scheduled to be insulated, except where roller hangers and/or supports are required, and unless otherwise specified, supply a factory fabricated section of phenolic foam pipe insulation with integral vapour barrier jacket and captive galvanized steel shield. Supply insulation sections to piping installers for installation as pipe is erected.

3.03 PIPE INSULATION REQUIREMENTS – MINERAL FIBRE

.1 Insulate following pipe inside building and above ground with mineral fibre insulation of thickness indicated:

.1 domestic cold water piping, less than 100 mm (4") dia. – 25 mm (1") thick;

.2 domestic cold water piping, greater than or equal to 100 mm (4") dia. – 40 mm (1-½") thick;

.3 domestic hot water piping, less than 40 mm (1-½") dia. – 25 mm (1") thick;

.4 domestic hot water piping, greater than or equal to 40 mm (1½") dia. – 40 mm (1-½") thick;

.5 storm drainage piping from roof drains to the point where main vertical risers extend straight down, without offsets, and connect to horizontal underground mains – 25 mm (1") thick;

.6 condensate drainage piping from fan coil unit or any other air conditioning system/unit drain pans to main vertical drain risers or to indirect drainage point – 25 mm (1") thick;

.2 Secure overlap flap of the sectional insulation jacket tightly in place. Cover section to section butt joints with tape sealant.

.3 Insulate fittings with sectional pipe insulation mitred to fit tightly, and cover butt joints with tape sealant, or, alternatively, wrap fittings with blanket mineral fibre insulation to a thickness and insulating value equal to the sectional insulation, secure in place with adhesive and/or wire, and cover with PVC fitting covers.

.4 Unless otherwise specified, insulate unions, valves, strainers, and similar piping system accessories in "cold" piping with cut and tightly fitted segments of sectional pipe insulation with joints covered with tape sealant, or, alternatively, wrap piping union, valve, strainer, etc., with blanket mineral fibre and cover with PVC covers as for paragraph above.

.5 Terminate sectional insulation approximately 50 mm (2") from flange or coupling on each side of flange or coupling. Cover flange or coupling with a minimum 50 mm (2") thickness of blanket mineral fibre insulation wide enough to butt tightly to ends of adjacent sectional insulation. Secure blanket insulation in place and cover with a purpose made PVC coupling cover.

.6 Take special care at concealed water rough-in piping at plumbing fixtures to ensure piping is properly insulated. If necessary due to space limitations, use 12 mm (½") thick sectional pipe insulation in lieu of 25 mm (1") thick insulation.

3.04 INSTALLATION OF BARRIER FREE LAVATORY INSULATION KITS

.1 Provide manufactured insulation kits to cover exposed drainage and water piping under barrier free lavatories.

3.05 DUCTWORK INSULATION REQUIREMENTS – MINERAL FIBRE

.1 Insulate following ductwork systems inside building and above ground with mineral fibre insulation of thickness indicated:

.1 supply air ductwork outward from fans, except for supply ductwork exposed in area it serves – minimum 25 mm (1") thick rigid board or minimum 40 mm (1-½") thick flexible blanket as required;

.2 exhaust discharge ductwork for a distance of 3 m (10') downstream (back) from exhaust openings to atmosphere, including any exhaust plenums within the 3 m (10') distance – minimum 25 mm (1") thick rigid board or minimum 40 mm (1-½") thick flexible blanket as required;

.3 any other ductwork, casings, plenums or sections specified or detailed on drawings to be insulated – thickness as specified.

.2 Provide rigid board type insulation for casings, plenums, and exposed rectangular ductwork. Provide blanket type insulation for round ductwork and concealed rectangular ductwork.

.3 Liberally apply adhesive to surfaces of exposed rectangular ducts and/or casings. Accurately and neatly press insulation into adhesive with tightly fitted butt joints. Provide pin and washer insulation fasteners at 300 mm (12") centres on bottom and side surfaces. Secure and seal joints with 75 mm (3") wide tape sealant. Additional installation requirements as follows:

.1 at trapeze hanger locations, install insulation between duct and hanger;

.2 provide drywall type metal corner beads on edges of ductwork, casings and plenums in equipment rooms, service corridors, and any other area where insulation is subject to accidental damage, and secure in place with tape sealant.

.4 Liberally apply adhesive to surfaces of concealed rectangular or oval ductwork, and wrap insulation around duct with a top butt joint and tight section to section butt joints. Provide pin and washer insulation fasteners at 300 mm (12") centres on bottom surfaces. Secure and seal joints with 75 mm (3") tape sealant. At each trapeze type duct hanger, provide a 100 mm (4") wide full length piece of rigid mineral fibre board insulation between duct and hanger.

.5 Accurately cut sections of insulation to fit tightly and completely around exposed and concealed round or oval ductwork. Liberally apply adhesive to surfaces of duct, and wrap insulation around duct with a top butt joint and tight section to section butt joints. Seal joints with tape sealant. At duct hanger locations install insulation between duct and hanger. At each hanger location for concealed ductwork where flexible blanket insulation is used, provide a 100 mm (4") wide full circumference strip of semi-rigid board type duct insulation between duct and hanger.

.6 Insulation application requirements common to all types of rigid ductwork are as follows:

.1 at duct connection flanges, insulate flanges with neatly cut strips of rigid insulation material secured with adhesive to side surfaces of flange with a top strip to cover exposed edges of the side strips, then butt the flat surface duct insulation up tight to flange insulation, or, alternatively, increase insulation thickness to depth of flange and cover top of flanges with tape sealant;

.2 installation of fastener pins and washers is to be concurrent with duct insulation application;

.3 cut insulation fastener pins almost flush to washer and cover with neatly cut pieces of tape sealant;

.4 accurately and neatly cut and fit insulation at duct accessories such as damper operators (with standoff mounting) and pitot tube access covers;

.5 prior to concealment of insulation by either construction finishes or canvas jacket material, patch vapour barrier damage by means of tape sealant.

3.06 APPLICATION OF INSULATING COATINGS

.1 Apply, in accordance with manufacturer’s instruction, insulating coatings to following bare metal surfaces:

.1 paint bare metal surfaces clear of "cold" piping and/or equipment insulation for a distance of from 300 mm (12") to 600 mm (24") clear of pipe or equipment insulation, with "No Sweat-FX" anti-condensation coating;

.2 paint bare metal surfaces associated with mechanical systems with an operating temperature 60°C (140°F) with "ThermaLite" insulating coating.

.2 Apply coatings with a brush. Remove any splatter or excess coating from adjacent surfaces.

3.07 INSULATION FINISH REQUIREMENTS

.1 Unless otherwise shown and/or specified, jacket exposed mineral fibre insulation, and calcium silicate duct insulation work inside building with canvas secured in place with a full covering coat of lagging adhesive. Accurately cut canvas with scissors or a knife. Do not rip or tear canvas to size. Remove lagging adhesive splatter from adjacent uninsulated surfaces.

END OF SECTION

1 GENERAL

1.01 APPLICATION

.1 This Section specifies requirements, criteria, methods and execution for mechanical demolition work that are common to one or more mechanical work Sections, and it is intended as a supplement to each Section and is to be read accordingly.

2 PRODUCTS

Not Used

3 EXECUTION

3.01 DISCONNECTION AND REMOVAL OF EXISTING MECHANICAL WORK

.1 Where indicated on drawings, disconnect and remove existing mechanical work, including hangers, supports, insulation, etc. Disconnect at point of supply, remove obsolete connecting services and make system safe. Cut back obsolete piping behind finishes and cap water-tight unless otherwise specified.

.2 Scope and extent of demolition or revision work is only generally indicated on drawings. Estimate scope, extent and cost of work at site during bidding period site visit(s). Claims for extra costs for demolition work not shown or specified but clearly visible or ascertainable at site during bidding period site visits will not be allowed.

.3 If any re-design is required due to discrepancies between mechanical drawings and site conditions, notify Consultant who will issue a Site Instruction. If, in the opinion of Consultant, discrepancies between mechanical drawings and actual site conditions are of a minor nature, required modifications are to be done at no additional cost.

.4 Where existing mechanical services extend through, or are in an area to serve items which are to remain, maintain services in operation. Include for rerouting existing services concealed behind existing finishes and which become exposed during renovation work, so as to be concealed behind new or existing finishes.

.5 Unless otherwise specified, remove from site and dispose of existing materials which have been removed and are not to be relocated or reused.

3.02 INTERRUPTION TO AND SHUT-DOWN OF MECHANICAL SERVICES AND SYSTEMS

.1 Co-ordinate shut-down and interruption to existing mechanical systems with school. Generally, shut-downs may be performed only between the hours of 12:00 midnight Friday until 6:00 a.m. Monday morning.

.2 Upon award of contract, submit a list of anticipated shut-down times and their maximum duration.

.3 Prior to each shut-down or interruption, inform Owner in writing 5 business days in advance of proposed shut-down or interruption and obtain written consent to proceed. Do not shut-down or interrupt any system or service without such written consent.

.4 Perform work associated with shut-downs and interruptions as continuous operations to minimize shut-down time and to reinstate systems as soon as possible, and, prior to any shut-down, ensure materials and labour required to complete the work for which shut-down is required are available at site.

.5 Pipe freezing may be used to connect new piping to existing piping without draining existing piping. Pipe freeze equipment is to be equal to "NORDIC FREEZE" equipment supplied by Mag Tool Inc. or Rigid Tool Co. RIGID "SuperFreeze".

END OF SECTION

1 GENERAL

1.01 APPLICATION

.1 This Section specifies commissioning requirements that are common to Mechanical Divisions work Sections and it is a supplement to each Section and is to be read accordingly. When requirements of this Section contradict requirements of Divisions 00 or 01, conditions of Divisions 00 or 01 to take precedence.

1.02 COMMISSIONING AGENT INVOLVEMENT VERSUS WARRANTY OBLIGATIONS

.1 Involvement of Commissioning Agent performing duties as described in this Section is not in any way to void or alter any Contractual warranty obligations.

1.03 SUBMITTALS

.1 Submit to Commissioning Agent, at same time as submittal to Consultant, one copy of each shop drawing or product data sheet associated with equipment or systems to be commissioned.

.2 Submit for review, a Commissioning Plan with schedule, commissioning procedures for commissioning events, and a copy of Commissioning Agent's commissioning data sheets for equipment/systems to be commissioned.

.3 Submit a list of commissioning instruments and for each instrument, indicate purpose of instrument and include a recent calibration certificate.

.4 Submit equipment and system manufacturer's start-up and test report sheets for review a minimum of 1 month prior to equipment and system start-up procedures.

.5 After start-up and successful pre-functional performance testing and submittal of completed forms, submit, for each system or subsystem, a letter confirming pre-functional performance testing has been successfully completed and system or subsystem is ready for functional performance testing and commissioning process to commence.

1.04 DEFINITIONS

.1 Commissioning: process of demonstrating to Owner and Consultant, for purpose of final acceptance, by means of successful and documented functional performance testing, that systems and/or subsystems are capable of being operated and maintained to perform in accordance with requirements of Contract Documents, all as further described below.

.2 Commissioning Agent: commissioning authority who will supervise commissioning process, and who will recommend final acceptance of commissioned mechanical work.

.3 Start-Up and Adjusting: process of equipment manufacturer's/supplier's technical personnel, with Contractor, starting and operating equipment and systems, making any required adjustments, documenting process, and submitting manufacturer's/supplier's start-up reports to confirm equipment has been properly installed and is operational as intended.

.4 Pre-Functional Performance Testing: testing, adjusting and operating of components, equipment, systems and/or subsystems, by Contractor, after start-up but before functional performance testing, to confirm components, equipment, systems and/or subsystems operate in accordance with requirements of Contract Documents, including modes and sequences of control and monitoring, interlocks, and responses to emergency conditions, and including submittal of pre-functional performance testing documentation sheets.

.5 Functional Performance Testing: a repeat of successful pre-functional performance testing by Contractor, in presence of Commissioning Agent and Consultant with completed Commissioning Agent's commissioning documentation sheets to document, validate and verify equipment, systems and subsystems are complete in all respects, function correctly, and are ready for acceptance.

.6 Commissioning Documentation Sheets: prepared sheets for pre-functional performance testing and for functional performance testing supplied by Commissioning Agent for each piece of equipment/system to be commissioned, each sheet or set of sheets complete with Project name and number, date of commissioning, equipment/system involved, equipment/system name and model number, equipment tag in accordance with drawings, and, for each commissioning procedure listed, a column giving expected data in accordance with Contract Documents, a column to fill in observed data during commissioning, and space for signatures of Contractor and Commissioning Agent.

.7 Systems Operating Manual: a manual prepared by Commissioning Agent to present an overview of building mechanical systems and equipment to be used by building maintenance personnel to assist them in daily operation of systems.

.8 Validate: to confirm by examination and witnessing tests correctness of equipment and system operation.

1.05 COMMISSIONING AGENT

.1 Retain services of a qualified Commissioning Agent.

1.06 QUALITY ASSURANCE

.1 Commissioning work is to be in accordance with requirements of following:

.1 CSA Z320, Building Commissioning Standard and Check Sheets;

.2 ASHRAE Guideline 0, The Commissioning Process;

.3 ASHRAE Guideline 1.1, The HVAC Commissioning Process;

.4 ASHRAE Guideline 1.2, The Commissioning Process for Existing HVAC&R Systems;

.2 Commissioning Agent is to meet following qualifications:

.1 be a member of Professional Engineers Association in Province of the work;

.2 be a member of Building Commissioning Association, and a Certified Commissioning Professional (CCP) as designated by Building Commissioning Association;

.3 have a minimum of 5 years of successful documented commissioning experience on projects of similar size and complexity as this Project;

.4 supply a qualified P. Eng. and a Building Commissioning Association Certified Commissioning Professional (CCP) or an ASHRAE Commissioning Project Management Professional (CPMP) on site to supervise commissioning process.

1.07 COMMISSIONING OBJECTIVES

.1 Objectives of commissioning process:

.1 to support quality management by means of monitoring and checking installation;

.2 to verify equipment/system performance by means of commissioning of completed installation;

.3 to move completed equipment/systems from "static completion" state to "dynamic" operating state so as to transfer a complete and properly operating installation from Contractor to Owner.

1.08 TESTING EQUIPMENT

.1 Supply instruments and test equipment required to conduct start-up, testing and commissioning procedures.

2 PRODUCTS

Not Used

3 EXECUTION

3.01 COMMISSIONING

.1 Commission work in accordance with requirements of this Section and as required by Commissioning Agent.

.2 Prerequisites to successful completion of commissioning:

.1 submittal of signed start-up and test reports;

.2 completion of system testing, adjusting and balancing (TAB), and acceptance of TAB reports;

.3 permanent electrical and control connections of equipment;

.4 successful completion and documentation of pre-functional performance testing;

.5 submittal of letters to Consultant certifying systems and subsystems have been started, tested, adjusted, successfully pre-functional performance tested, are ready for functional performance testing, and are in accordance with requirements of Contract Documents.

3.02 DEFICIENCIES LISTED DURING COMMISSIONING

.1 Correct deficiencies listed by Consultant and Commissioning Agent during commissioning process within 15 calendar days of notification unless agreed otherwise with Consultant, and when deficiencies have been corrected, notify Consultant and Commissioning Agent immediately.

3.03 SYSTEMS TO BE COMMISSIONED

.1 Mechanical systems to be commissioned include, but are not to be limited to, systems described below. Specific commissioning procedures are to be as directed by Commissioning Agent.

.2 Commissioning of water systems (all piping extended from Municipal main) includes:

.1 commissioning of trap seal primer units, including adjustment of water flows and confirmation of water flow at each connected trap;

.2 commissioning of plumbing fixtures.

.3 Commissioning of heating systems includes piping, piping specialties, equipment, and control, as well as checking and validating temperature and flow documentation contained in TAB reports. If TAB is not done during heating season, a follow-up site visit during heating season will be required to confirm proper flows and temperatures, and any required system "fine tuning".

.4 Commissioning of air handling systems includes equipment, ductwork, ductwork specialties, controls, interlocks, and checking and validating air capacities and flows in accordance with TAB reports.

.5 Control work commissioning includes confirmation of proper operation of individual control components, and overall operation of controls in conjunction with operation of connected building systems, including heating season/cooling season testing requirements specified above.

.6 Perform commissioning of following existing systems, revised as part of the Work, as for new systems:

.1 Supply Fan AHU.9 in Mech. Room 4411;

.2 Supply Fan AHU.11 in Mech. Room 5521;

.3 Exhaust Fan EXH.12 in Mech. Room 5521

3.04 COMMISSIONING PROCESS

.1 Perform commissioning process in stages and include, but not be limited to, following:

.1 Stage 1: Commissioning of equipment/systems as listed in this Section, which is a prerequisite to an application for Substantial Performance of the Work and includes supervising and validating results of functional performance testing, and submittal of reviewed Systems Operating Manual.

.2 Stage 2: Commissioning work performed 12 months after issue of a Certificate of Substantial Performance and which includes supervision of Contractor’s "fine tuning" of equipment/systems through seasonal occupancy, and any other such work to achieve optimal comfort and performance conditions.

.3 Stage 3: Successful completion of satisfactory equipment/system operation during 1st month after issue of a Certificate of Total Performance of the Work.

.4 Stage 4: Successful completion of satisfactory equipment/system operation during 3rd month after issue of a Certificate of Total Performance of the Work.

.5 Stage 5: Successful seasonal commissioning of building.

3.05 RESPONSIBILITIES OF COMMISSIONING AGENT

.1 During construction phase, Commissioning Agent is to:

.1 review Contractor's shop drawings for commissioning related issues, and report any such issues to Consultant;

.2 as soon as possible after project start-up, prepare and issue a Commissioning Plan based on Contractor's construction schedule;

.3 prior to tests, supply pre-functional performance test commissioning data sheets for equipment and systems to be commissioned to Contractor;

.4 monitor and inspect installation on a regular basis throughout construction stages, issue reports identifying any issues which may have an impact on commissioning process, and work with project team to expeditiously resolve any problems that may arise due to site conditions;

.5 arrange with Contractor for on-site commissioning meetings on an as-required basis, to be attended by Contractor and applicable subcontractors, Owner, and Consultant, chair meetings, and prepare and distribute meeting minutes to attendees;

.6 witness and validate tests, identify deficiencies, and issue progress reports;

.7 coordinate commissioning scheduling with Contractor;

.8 review final TAB report on site with Contractor, and check 100% of TAB results for fan equipment, 30% of TAB results for duct systems outward from fan equipment, and issue a report to Consultant;

.9 for smaller multiple items of equipment such as air terminal boxes, fan coil units, backflow preventers, and similar equipment, review completed commissioning data sheets submitted by Contractor and review data sheet information on-site with Contractor for 30% of quantity of each item of equipment;

.10 review pre-functional performance test commissioning data sheets submitted by Contractor, then witness and supervise functional performance testing and supervise and direct commissioning process, validate commissioning procedures, witness completion of commissioning data sheets by Contractor, and sign completed data sheets;

.11 perform a preliminary review of Contractor's O & M Manuals, before they are issued to Consultant, and issue any comments to Consultant;

.12 coordinate, with Contractor and Owner, training and instructions by Contractor and his equipment and system manufacturers/suppliers to Owner's operating and maintenance personnel, and comment on quality of training and instructions to Consultant;

.13 prepare and issue Systems Operation Manual to Owner prior to equipment and system training by Contractor.

.2 During post construction phase, Commissioning Agent is to:

.1 prepare and issue final report on commissioning, identifying any deficiencies that remain outstanding;

.2 recommend any training and/or instructions to be given to Owner's operating and maintenance personnel in addition to training and instructions already given;

.3 after Substantial Performance of the Work, witness system checks and validate documentation by Contractor as follows:

.1 once during 1st month of building operation;

.2 once during 3rd month of building operation;

.3 once between 4th and 10th month of building operation but during a season opposite to 1st or 3rd month visits.

.4 ensure any deficient work resulting from system checks described above are corrected;

.5 3 months after Substantial Performance of the Work, attend a question and answer session(s) with Contractor to answer any questions and concerns related to commissioning work from Owner's operating personnel.

3.06 RESPONSIBILITIES OF CONTRACTOR

.1 During construction phase, Contractor is to:

.1 prepare and submit an installation schedule which includes a time schedule for each activity with lead and lag time allowed and indicated, shop drawing and working detail drawing submissions, and major equipment factory testing and delivery dates;

.2 prepare and submit a commissioning schedule which is to include a time schedule coordinated with installation schedule referred to above and Commissioning Agent, and allowances for additional time for re-tests as may be required, and update schedule on a monthly basis as required;

.3 when requested by Commissioning Agent, arrange site commissioning meetings with Owner, Consultant, and applicable subcontractors present, to be chaired by Commissioning Agent who will also prepare and distribute meeting minutes;

.4 promptly correct reported deficient work, and report when corrective work is complete;

.5 where required by Codes and/or Specification, retain equipment manufacturers/suppliers or independent 3rd parties to certify correct installation of equipment/systems;

.6 under supervision of equipment manufacturers/suppliers, start-up and adjust equipment to design requirements, and submit start-up sheets which include equipment data such as manufacturer and model number, serial number where applicable, and performance parameters, all signed by equipment manufacturer/supplier and Contractor;

.7 complete Commissioning Agent's commissioning data sheets for multiple items of smaller equipment such as air terminal boxes, fan coil units, backflow preventers, etc., submit sheets to Commissioning Agent, accompany Commissioning Agent for an on-site check of 30% of data sheet information for each type of equipment, and perform any corrective action required as a result of site checks;

.8 perform system testing, adjusting and balancing and, when complete, issue a copy of final report to Commissioning Agent for review and a site check of results, and perform any corrective work required as a result of site checks by Commissioning Agent;

.9 in accordance with updated commissioning schedule and actual progress at site, certify in writing to Consultant and Commissioning Agent that equipment and/or systems are complete, have been checked, started and adjusted, successfully pre-functional performance tested and documented, and are ready for functional performance testing and commissioning procedures, giving Consultant and Commissioning Agent a minimum of 5 working days' notice;

.10 perform system and subsystem functional performance testing under supervision of Commissioning Agent, and submit to Consultant and Commissioning Agent, completed and signed functional performance testing and commissioning data sheets (issued by Commissioning Agent) and also signed by Commissioning Agent.

.2 During post construction phase, Contractor is to:

.1 optimize system operation in accordance with building occupant's needs and comments using System Operation Manual prepared by Commissioning Agent as reference;

.2 complete commissioning procedures, activities, and performance verification procedures that were delayed or not concluded during construction phase;

.3 accompanied by Commissioning Agent, complete system checks and "fine tuning" with signed documentation as follows:

.1 once during 1st month of building operation;

.2 once during 3rd month of building operation;

.3 once between 4th and 10th months in a season opposite to 1st and 3rd month visits.

.4 correct deficiencies revealed by system checks described above, and, where required, involve equipment manufacturers/suppliers during corrective actions, and report completion of corrective work;

.5 3 months after Substantial Completion conduct a question and answer session(s) at building with Owner's operating and maintenance personnel, with duration of session(s) dictated by number of questions and concerns that have to be addressed.

END OF SECTION

1 GENERAL

1.01 APPLICATION

.1 This Section specifies mechanical system testing, adjusting, and balancing requirements that are common to mechanical work Sections of the Specification and it is a supplement to each Section and is to be read accordingly.

1.02 DEFINITIONS

.1 “Agency” – means agency to perform testing, adjusting and balancing work.

.2 “TAB” – means testing, adjusting and balancing to determine and confirm quantitative performance of equipment and systems and to regulate specified fluid flow rate and air patterns at terminal equipment, e.g., reduce fan speed, throttling, etc.

.3 “hydronic systems” – includes heating water, chilled water, glycol-water solution, condenser water, and any similar system.

.4 “air systems” – includes outside air, supply air, return air, exhaust air, and relief air systems.

.5 “flow rate tolerance” – means allowable percentage variation, minus to plus, of actual flow rate values in Contract Documents.

.6 “report forms” – means test data sheets arranged for collecting test data in logical order for submission and review, and these forms, when reviewed and accepted, should also form permanent record to be used as basis for required future testing, adjusting and balancing.

.7 “terminal” – means point where controlled fluid enters or leaves the distribution system, and these are supply inlets on water terminals, supply outlets on air terminals, return outlets on water terminals, and exhaust or return inlets on air terminals such as registers, grilles, diffusers, louvers, and hoods.

.8 “main” – means duct or pipe containing system’s major or entire fluid flow.

.9 “submain” – means duct or pipe containing part of the systems’ capacity and serving 2 or more branch mains.

.10 “branch main” – means duct or pipe servicing 2 or more terminals.

.11 **“**branch” – means duct or pipe serving a single terminal.

1.03 SUBMITTALS

.1 Within 30 days of work commencing at site, submit name and qualifications of proposed testing and balancing agency in accordance with requirements of article entitled Quality Assurance below.

.2 Submit sample test forms, if other than those standard forms prepared by Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB), are proposed for use.

.3 Submit a report by Agency to indicate Agency's evaluation of mechanical drawings with respect to service routing and location or lack of balancing devices. Include set of drawings used and marked-up by Agency to prepare report.

.4 Submit a report by Agency after each site visit made by Agency during construction phase of this Project.

.5 Submit a draft report, as specified in Part 3 of this Section.

.6 Submit a final report, as specified in Part 3 of this Section.

.7 Submit a testing and balancing warranty as specified in Part 3 of this Section.

.8 Submit reports listing observations and results of post construction site visits as specified in Part 3 of this Section.

1.04 QUALITY ASSURANCE

.1 Employ services of an independent testing, adjusting, and balancing agency meeting qualifications specified below, to be single source of responsibility to test, adjust, and balance building mechanical systems to produce design objectives. Agency is to have successfully completed testing, adjusting and balancing of mechanical systems for a minimum of 5 projects similar to this Project within past 3 years, and is to be certified as an independent agency in required categories by one of following:

.1 AABC - Associated Air Balance Council;

.2 NEBB - National Environmental Balancing Bureau.

.2 Testing, adjusting and balancing of complete mechanical systems is to be performed over entire operating range of each system in accordance with 1 of following publications:

.1 National Standards for a Total System Balance published by Associated Air Balance Council;

.2 Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems published by National Environmental Balancing Bureau;

.3 Chapter 37, Testing, Adjusting, and Balancing of ASHRAE Handbook HVAC Applications.

2 PRODUCTS

Not Used

3 EXECUTION

3.01 SCOPE OF WORK

.1 Perform total mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of fluid quantities of mechanical systems as required to meet design specifications and comfort conditions, and recording and reporting results.

.2 Mechanical systems to be tested, adjusted and balanced include:

.1 TAB of domestic water systems is to include:

.1 domestic hot water recirculation piping.

.2 TAB of heating systems is to include piping and equipment fluid temperatures, flows and control, and if TAB is not done during heating season, a follow-up site visit during heating season will be required to confirm proper flows and temperatures, and any required system "fine tuning".

.3 TAB of air handling and exhaust systems is to include equipment and ductwork air temperatures, capacities and flows.

.4 Following existing systems, revised as part of mechanical work, are to be tested, adjusted and balanced as for new systems:

.1 Exhaust Fan #3 in Mech. Room 1118.

3.02 TESTING, ADJUSTING AND BALANCING

.1 Conform to following requirements:

.1 as soon as possible after award of Contract, Agency is to carefully examine a white print set of mechanical drawings with respect to routing of services and location of balancing devices, and is to issue a report listing results of the evaluation;

.2 set of drawings examined by Agency is to be returned with evaluation report, with red line mark-ups to indicate locations for duct system test plugs, and required revision work such as relocation of balancing devices and locations for additional devices;

.3 after review of mechanical work drawings and specification, Agency is to visit site at frequent, regular intervals during construction of mechanical systems, to observe routing of services, locations of testing and balancing devices, workmanship, and anything else that will affect testing, adjusting and balancing;

.4 after each site visit, Agency is to report results of site visit indicating date and time of visit, and detailed recommendations for any corrective work required to ensure proper adjusting and balancing;

.5 testing, adjusting and balancing is not to begin until:

.1 building construction work is substantially complete and doors have been installed;

.2 mechanical systems are complete in all respects, and have been checked, started, adjusted, and then successfully performance tested.

.6 mechanical systems to be tested, adjusted and balanced are to be maintained in full, normal operation during each day of testing, adjusting and balancing;

.7 obtain copies of reviewed shop drawings of applicable mechanical plant equipment and terminals, and temperature control diagrams and sequences;

.8 Agency is to walk each system from system "head end" equipment to terminal units to determine variations of installation from design, and system installation trades will accompany Agency;

.9 Agency is to check valves and dampers for correct and locked position, and temperature control systems for completeness of installation before starting equipment;

.10 wherever possible, Agency is to lock balancing devices in place at proper setting, and permanently mark settings on devices;

.11 for belt-driven equipment, Agency is to report to Contractor and Consultant of any situation where sheaves have to be replaced to suit testing and balancing, and replacements are to be done by Contractor at no cost;

.12 Agency is to leak test ductwork as specified in Section entitled HVAC Air Distribution in accordance with requirements of SMACNA "HVAC Air Duct Leak Test Manual", coordinate work with work of aforementioned Sections, provide detailed sketch(es) to Sheet Metal Contractor and Consultant identifying ductwork not in accordance with acceptable leakage values specified in aforementioned Sections, and retest corrected ductwork;

.13 Agency is to balance systems with due regard to objectionable noise which is to be a factor when adjusting fan speeds and performing terminal work such as adjusting air quantities, and should objectionable noise occur at design conditions, Agency is to immediately report problem and submit data, including sound readings, to permit an accurate assessment of noise problem to be made;

.14 Agency is to check supply air handling system mixing plenums for stratification, and where variation of mixed air temperature across coils is found to be in excess of ±5% of design requirements, Agency is to report problem and issue a detail sketch of plenum baffle(s) required to eliminate stratification;

.15 Agency is to perform testing, adjusting and balancing to within ±5% of design values, and make and record measurements which are within ±2% of actual values;

.16 for air handling systems equipped with air filters, test and balance systems with simulated 50% loaded (dirty) filters by providing a false pressure drop;

.17 test, adjust and balance air conditioning systems during summer season and heating systems during winter season, including at least a period of operation at outside conditions within 2.8°C (5°F) wet bulb temperature of maximum summer design condition, and within 5.5°C (10°C) dry bulb temperature of minimum winter design condition, and take final temperature readings during seasonal operation.

.2 Prepare reports as indicated below.

.1 Upon completion of testing, adjusting, and balancing procedures, prepare draft reports on AABC or NEBB forms. Draft reports may be hand written, but must be complete, factual, accurate, and legible. Organize and format draft reports in same manner specified for final reports. Submit 2 complete sets of draft reports. Only 1 complete set of draft reports will be returned.

.2 Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit 2 complete sets of final reports. Use units of measurement (SI or Imperial) as used on Project Documents.

.3 Report forms are to be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, 3-ring binders. Provide binding edge labels with project identification and a title descriptive of contents. Divide contents of binder into divisions listed below, separated by divider tabs:

.1 General Information and Summary;

.2 Air Systems;

.3 Hydronic Systems;

.4 Temperature Control Systems;

.5 Special Systems.

.4 Agency is to provide following minimum information, forms and data in report:

.1 inside cover sheet to identify Agency, Contractor, and Project, including addresses, and contact names and telephone numbers and a listing of instrumentation used for procedures along with proof of calibration;

.2 remainder of report is to contain appropriate forms containing as a minimum, information indicated on standard AABC or NEBB report forms prepared for each respective item and system;

.3 Agency is to include for each system to be tested, adjusted and balanced, a neatly drawn, identified (system designation, plant equipment location, and area served) schematic "as-built" diagram indicating and identifying equipment, terminals, and accessories;

.4 Agency is to include report sheets indicating building comfort test readings for all rooms.

.3 After final testing and balancing report has been submitted, Agency is to visit site with Contractor and Consultant to spot check results indicated on balancing report. Agency is to supply labour, ladders, and instruments to complete spot checks. If results of spot checks do not, on a consistent basis, agree with final report, spot check procedures will stop and Agency is to then rebalance systems involved, resubmit final report, and again perform spot checks with Contractor and Consultant.

.4 When final report has been accepted, Contractor is to submit to Owner, in name of Owner, a certificate equal to AABC National Guaranty Certification or a NEBB Quality Assurance Program Bond, and in addition, Contractor is to submit a written extended warranty from Agency covering one full heating season and one full cooling season, during which time any balancing problems which occur, with exception of minor revision work done during scheduled site visits, will, at no cost, be investigated by Agency and reported on to Owner, and if it is determined that problems are a result of improper testing, adjusting and balancing, they are to be immediately corrected without additional cost to Owner.

.5 After acceptance of final report, Agency is to perform post testing and balancing site visits in accordance with following requirements:

.1 post testing and balancing site visits are to be made:

.1 once during first month of building operation;

.2 once during third month of building operation;

.3 once between fourth and tenth months in a season opposite to first and third month visit.

.2 during each return visit and accompanied by Owner's representative, Agency is to spot rebalance terminal units as required to suit building occupants and eliminate complaints;

.3 Agency is to schedule each visit with Contractor and Owner, and inform Consultant;

.4 after each follow-up site visit, Agency is to issue to Contractor and Consultant a report indicating any corrective work performed during visit, abnormal conditions and complaints encountered, and recommended corrective action.

END OF SECTION

1 GENERAL

1.01 APPLICATION

.1 This Section specifies material requirements for firestopping and smoke seal systems that are common to mechanical work Sections and it is a supplement to each Section and is to be read accordingly.

1.02 SUBMITTALS

.1 Submit a product data sheet and WHIMIS sheet for each firestopping and smoke seal product.

.2 Submit for review, full company name and experience of proposed firestopping and smoke seal system applicator.

.3 Submit letter of proper firestopping and smoke seal certification as specified in Part 3 of this Section.

1.03 QUALITY ASSURANCE

.1 Applicator is to have a minimum of 3 years of successful experience on projects of similar size and complexity, and applicator's qualifications are to be submitted to Consultant for review.

.2 Comply with firestopping and smoke seal product manufacturer’s recommendations regarding suitable environment conditions for product installation.

2 PRODUCTS

2.01 FIRESTOPPING AND SMOKE SEAL SYSTEM MATERIALS

.1 Asbestos-free, elastomeric materials and intumescent materials, tested, listed and labelled by ULC in accordance with CAN/ULC S115, and CAN/ULC S101 for installation in ULC designated firestopping, and smoke seal systems to provide a positive fire, water and smoke seal and a fire resistance rating (flame, hose stream and temperature) no less than fire rating for surrounding construction.

.2 Firestopping and smoke seal material system to be specifically ULC certified with designated reference number for its specific installation. As part of shop drawing submission, submit copies of firestopping drawings with ULC certificate and system number for each specific installation.

.3 Materials are to be compatible with abutting dissimilar materials and finishes and complete with primers, damming and back-up materials, supports, and anchoring devices in accordance with firestopping manufacturer’s recommendations and ULC tested assembly. Coordinate material requirements with trades supplying abutting areas of materials.

.4 Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance ratings.

.5 Typically, for openings of up to 250 mm (10") in diameter, provide putty pad type firestop materials equivalent to Specified Technologies Inc. "SpecSeal" intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibres or silicone compounds.

.6 Typically, for openings of greater than 250 mm (10") in diameter, and for rectangular openings, provide pillow type firestop materials equivalent to Specified Technologies Inc. "SpecSeal" re-enterable, non-curing, mineral fibre core encapsulated on six sides with intumescent coating contained in a flame retardant poly bag.

.7 Pipe insulation forming part of a fire and smoke seal assembly is specified in Section entitled Mechanical Insulation.

.8 Supply products of a single manufacturer for use on work of this Division.

.9 Installer to be manufacturer trained and certified on specific product. Submit copy of certificate with shop drawings.

.10 Include for manufacturer’s authorized representative to inspect and verify each installation and application. Submit test report signed and verified by system installer’s authorized representative and manufacturer’s representative.

.11 Acceptable certification to also include certification by Underwriters Laboratories of Northbrook IL, using tests conforming to ULC-S115 and given cUL listing published by UL in their "Products Certified for Canada (cUL) Directory".

.12 Acceptable manufacturers are:

.1 Specified Technologies Inc.;

.2 3M Canada Inc.;

.3 Tremco;

.4 A/D Fire Protection Systems;

.5 Nelson;

.6 Hilti Canada.

3 EXECUTION

3.01 INSTALLATION OF FIRESTOPPING AND SMOKE SEAL MATERIALS

.1 Where work penetrates or punctures fire rated construction, provide ULC certified, listed and labelled firestopping and smoke sealing packing material systems to seal openings and voids around and within raceway and to ensure that continuity and integrity of fire separation is maintained. Openings not in immediate vicinity of working areas are to be firestopped and sealed same day as being opened.

.2 Install firestopping and smoke seal materials for each installation in strict accordance with specific ULC certification number and manufacturer's instructions. Comply with local governing building code requirements and obtain approvals from local building inspection department. Ensure that openings through fire separations do not exceed maximum size wall opening, and maximum and minimum dimensions indicated in ULC Guide No. 40 U19 for Service Penetration Assemblies and firestopping materials.

.3 Ensure that continuity and integrity of fire separation is maintained and conform to requirements of latest edition of ULC publication "List of Equipment and Materials, Volume II, Building Construction".

.4 Comply with following requirements:

.1 Examine substrates, openings, voids, adjoining construction and conditions under which firestop and smoke seal system is to be installed. Confirm compatibility of surfaces.

.2 Verify penetrating items are securely fixed and properly located with proper space allowance between penetrations and surfaces of openings.

.3 Report any unsuitable or unsatisfactory conditions to Consultant in writing, prior to commencement of work. Commencement of work will mean acceptance of conditions and surfaces.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces. Remove stains on adjacent surfaces.

.5 Prime substrates in accordance with product manufacturer’s written instructions.

.6 Provide temporary forming as required and remove only after materials have gained sufficient strength and after initial curing.

.7 Tool or trowel exposed surfaces to a neat, smooth, and consistent finish.

.8 Remove excess compound promptly as work progresses and upon completion.

.9 At fusible link damper locations, seal perimeter of angle iron framing on both sides of wall or slab with ULC listed and labelled sealant materials to provide a positive smoke seal.

.5 Notify Consultant when work is complete and ready for inspection, and prior to concealing or enclosing firestopping and smoke seal materials and service penetration assemblies. Arrange for final inspection of work by local governing authority inspector prior to concealing or enclosing work. Make any corrections required.

.6 On completion of firestopping and smoke sealing installation, submit a Letter of Assurance to Consultant certifying the firestopping and smoke sealing installation has been carried out throughout the building to service penetrations and that installation has been performed in strict accordance with requirements of local governing building code, any applicable local municipal codes, ULC requirements, and manufacturer’s instructions.

.7 Manufacturer's authorized representative to inspect and verify each installation and provide a test report signed by installing trade and manufacturer's representative. Test report to list each installation and respective ULC certification and number.

.8 Where work requires removal of existing firestopping materials and replacement of firestopping materials after cabling changes have been made, ensure that replacement material is same material and manufacturer of existing if any remains in place, or ensure that all existing material is removed before installation of replacement material.

END OF SECTION

1 GENERAL

1.01 SUBMITTALS

.1 Submit shop drawings/product data sheets to regulatory authority for review and approval prior to submitting to Consultant. Conform to following requirements:

.1 submit shop drawings/product data sheets for all products specified in this Section except pipe and fittings;

.2 submit complete CAD layout drawings indicating source of water supply with test flow and pressure, "head-end" equipment piping schematic, pipe routing and sizing, and zones, all signed and sealed by a qualified professional mechanical engineer registered in jurisdiction of the work as specified below;

.3 submit copies of all calculations, including hydraulic calculations, stamped and signed by same engineer who signs layout drawings, and a listing of all design data used in preparing the calculations, system layout and sizing, including occupancy-hazard design requirements;

.4 in addition to submitting shop drawings to regulatory authority as specified above, shop drawings must be approved by Owner’s insurer prior to being submitted to Consultant for review.

.2 Submit a complete sprinkler system test certificate as specified in Part 3 of this Section.

.3 Sprinklers are to be identified on drawings and product submittals, and be specifically identified by manufacturer's listed model or series designation. Trade names and other abbreviated listings are unacceptable.

1.02 QUALITY ASSURANCE

.1 Fire protection sprinkler system work is to be in accordance with following Codes and Standards:

.1 NFPA 13, Standard for the Installation of Sprinkler Systems;

.2 CSA B137.2, Polyvinylchloride (PVC) Injection-Moulded Gasketed Fittings for Pressure Applications;

.3 CSA B137.3, Rigid Polyvinylchloride (PVC) Pipe for Pressure Applications;

.4 ASTM A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless;

.5 ASTM A135, Standard Specification for Electric-Resistance-Welded Steel Pipe;

.6 ASTM A234, Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service;

.7 ASTM A536, Standard Specification for Ductile Castings;

.8 ASTM A795, Standard Specification for Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use;

.9 ANSI/ASME B16.4, Grey Iron Threaded Fittings (Classes 125 and 250);

.10 CAN/CSA B64.10, Backflow Preventers and Vacuum Breakers.

.2 Fire protection sprinkler work is to be performed by a sprinkler company who is a member in good standing of the Canadian Automatic Sprinkler Association. Site personnel are to be licensed in jurisdiction of the work and under the continuous supervision of a foreman who is an experienced fire protection system installer and a journeyman pipe fitter licensed in jurisdiction of the work.

.3 Check and verify dimensions and conditions at site and ensure work can be performed as indicated. Coordinate work with trades at site and accept responsibility for and cost of making adjustments to piping and/or spacing to avoid interference with other building components.

.4 Verify working condition of existing sprinkler system equipment which has direct interface with project work and is to remain. Replace with new equipment where necessary.

.5 System components must be ULC listed and labelled.

.6 Grooved couplings, and fittings, valves and specialties are to be products of a single manufacturer. Grooving tools are to be of same manufacturer as grooved components.

.7 Castings used for coupling housings, fittings, valve bodies, etc., are to be date stamped for quality assurance and traceability.

1.03 DESIGN REQUIREMENTS

.1 Fire protection sprinkler work is to be designed in accordance with NFPA 13 and Provincial Standards, and, where required, local building and fire department requirements and standards of Owner's Insurer. If water supply flow and pressure test data is not available, conduct Municipal main water flow and pressure tests at nearest fire hydrant to obtain criteria to be used in system design. Include hydrant location and flow and pressure test data with system design calculations.

.2 Include for a qualified mechanical professional engineer registered and licensed in the jurisdiction of the work to design the fire protection standpipe work. Refer to Section entitled Mechanical Work General Instructions for requirements regarding Contractor retained engineers.

.3 Sprinkler /System Occupancy – Hazard Design requirements: In accordance with NFPA 13 occupancy-hazard density requirements, unless otherwise specified.

1.04 PROJECT CLOSEOUT

.1 Provide all required closeout documents to engineer for review and record, including but not limited to, sprinkler test certificate, NFPA conformance letter stamped by a professional engineer, etc.

2 PRODUCTS

2.01 PIPE, FITTINGS AND JOINTS

.1 Pipe, fittings and joints are to be as follows, with exceptions as specified in Part 3 of this Section:

.1 PVC

.1 Class 200, DR14, rigid, hub and spigot pattern PVC pipe and CSA certified fittings to CAN/CSA B137.2 and B137.3 and complete with gasketed joints.

.2 Schedule 40 Steel – Grooved Coupling Joints

.1 Schedule 40 mild black carbon steel, ASTM A53, Grade B, complete with grooved ends and mechanical fittings and couplings equal to Victaulic "FireLock" fittings and Victaulic Style 009N, 107H, and 107N QuickVic and 005 rigid coupling joints. Strap type outlet fittings such as Victaulic "Snap-Let" are not acceptable.

.3 Schedule 40 Steel – Screwed and Welded Joints

.1 Schedule 40 mild black carbon steel, ASTM A53, Grade B. Screwed piping complete with Class 125 cast iron screwed fittings to ANSI/ASME B16.4. Welded piping complete with factory made seamless carbon steel butt welding fittings to ASTM A234, Grade WPB, long sweep pattern wherever possible.

.4 Schedule 10 Steel – Grooved Coupling Joints

.1 Schedule 10 mild black carbon steel, ASTM A53, Grade B, complete with grooved ends and fitings and couplings equal to Victaulic "FireLock" fittings and Victaulic Style 009N, 107H, and 107N QuickVic and 005 rigid coupling joints.

.5 Schedule 10 Steel – Screwed Joints

.1 Schedule 10 mild black carbon steel, ASTM A53, Grade B, complete with mill or site threaded ends, Class 125 cast iron screwed fittings to ANSI/ASME B16.4, and screwed joints.

.6 "Lightwall" Steel – Grooved Coupling Joints

.1 Commercial quality. "Lightwall" rolled mild carbon steel pipe to ASTM A135, Grade A, complete with a galvanized exterior, grooved ends, and fittings and couplings equal to Victaulic "Fire Lock" grooved fittings and Victaulic Style 009N QuickVic or 005 rigid coupling joints.

.7 "Lightwall" Steel – Screwed Joints

.1 Commercial quality, "Lightwall" rolled mild carbon steel pipe to ASTM A135, Grade A, ULC listed, mill or site threaded, complete with galvanized exterior, Class 125 cast iron screwed fittings to ANSI/ASME B16.4, and screwed joints.

.8 Flexible Pipe – Equal to Victaulic "VicFlex"

.1 Drop system is to consist of a braided type 304 stainless steel flexible tube, zinc plated steel 25 mm (1") NPT male threaded nipple for connection to branch-line piping, and a zinc plated steel reducer with a 12 mm (1/2") or 20 mm (3/4") NPT female thread for connection to sprinkler head.

.2 Drop is to include a cULus/FM approved Series AH2 braided hose with a bend radius to 50 mm (2") to allow for proper installation in confined spaces.

.3 Hose is to be listed for following number of 50 mm (2") radius 90° bends:

.1 4 bends at 0.79 m (31") length;

.2 5 bends at 0.91 m (36") length;

.3 8 bends at 1.2 m (48") length;

.4 10 bends at 1.5 m (60") length;

.5 12 bends at 1.8 m (72") length.

.4 Union joints are to be provided for ease of installation, prevention of hose torque stresses and on site changing of factory 146 mm (5.75") straight reducing nipple in reduced spaces under obstructions.

.5 On T-bar ceiling grid with drop in tile application, flexible drop is to attach to ceiling grid using a one-piece open gate Series AB1 bracket. Bracket is to allow installation before ceiling tile is in place.

.6 On T-bar ceiling grid designed for hard lid drywall application, flexible drop is to attach to ceiling grid using a one-piece open gate Series AB2 bracket. Bracket is to allow for vertical adjustment of reducer/head from below drywall, post-drywall installation.

.7 On hat furring channel grid with hard lid drywall application, flexible drop is to attach to ceiling grid using a one-piece open gate Series AB4 bracket. Bracket is to allow for vertical adjustment of reducer/head from below drywall, post-drywall installation.

.8 Braided drop system is to be cULus listed for sprinkler services to 1206 kPa (175 psi).

.9 Standard Mechanical Couplings: Equal to Victaulic

.1 Manufactured in two segments of cast ductile iron, conforming to ASTM A-536, Grade 65-45-12. Gaskets are to be pressure-responsive synthetic rubber, grade to suit intended service, conforming to ASTM D-2000. Mechanical coupling bolts are to be zinc plated (ASTM B-633) heat treated carbon steel track head conforming to ASTM A-449 and ASTM A-183. Couplings are to comply with ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.

.2 Rigid Type: Coupling housings with offsetting, angle-pattern bolt pads are to be used to provide system rigidity and support and hanging in accordance NFPA-13. Couplings are to be fully installed at visual pad-to-pad offset contact. Couplings that require exact gapping of bolt pads at specific torque ratings are not permitted.

.3 Flexible Type: Use in locations where vibration attenuation and stress relief are required; Victaulic Style 177 (Quick-Vic™) flexible coupling.

2.02 SERVICE MAIN DOUBLE CHECK VALVE ASSEMBLY

.1 Minimum 1205 kPa (175 psi) rated dual check valve backflow preventer assembly to CAN/CSA B64, complete with tight-closing resilient seated shut-off valves, test cocks, and strainer.

.2 Assembly is to incorporate a metered by-pass to detect leaks and unauthorized water use. Where the municipality requires, coordinate water meter supply with the City water service otherwise include water meter as part of the assembly.

.3 Acceptable manufacturers are:

.1 Watts Industries Canada;

.2 Zurn/Wilkins;

.3 Apollo Valves (Conbraco Industries).

2.03 SHUT-OFF VALVES

.1 Minimum 2070 kPa (300 psi) rated full port brass or bronze body screwed ball valves and lug body or grooved end type butterfly valves.

.1 Butterfly valves are to include a pressure responsive seat, and stem is to be offset from disc centerline to provide complete 360° circumferential seating.

.2 Standard of Acceptance: Victaulic Style 705.

.3 Supervised closed applications standard of acceptance Victaulic Series 707C supervised closed butterfly valve.

.2 OS&Y Gate Valves: 1725 kPa (250 psi), grooved ends with ductile iron body, yoke, and handwheel conforming to ASTM A-536, EPDM coated ASTM A-126-B cast iron disc, ASTM B16 brass rising stem, flanged and epoxy coated ductile iron bonnet, EPDM O-ring stem seals and body gasket. Equal to Victaulic Series 771H (Grooved ends) and Series 771F (Grooved x Flanged).

2.04 CHECK VALVES

.1 Minimum 1725 kPa (250 psi) resilient seat check valves, suitable for vertical or horizontal installations. Standard of Acceptance: Victaulic Series 717.

.2 Check valves associated with Fire Department connections and fire pump test connection are to be tapped for site installation of a 20 mm (¾") diameter ball drip.

2.05 BALL DRIPS

.1 Equal to National Fire Equipment Ltd. Model #A58, 20 mm (¾") diameter automatic ball drip.

2.06 SHUT-OFF VALVE SUPERVISORY SWITCHES

.1 Tamper-proof supervisory switches, each arranged to activate a fire alarm system trouble alarm condition if the valve is closed or tampered with, each suitable in all respects for the application, and each complete with all required mounting and connection hardware.

.2 Actuator housings are to be weatherproof.

2.07 FIRE DEPARTMENT CONNECTION

.1 Wall mounting polished brass clapper type dual inlet Fire Department connection with 2, 65 mm (2-½") diameter inlets threaded to Fire Department hose requirements and equipped with caps and chains, an outlet sized as shown, and a faceplate.

.2 Faceplate is to be polished brass and complete with "AUTO-SPKR" cast-in raised lettering.

.3 Exposed metal parts of Fire Department connection are to be chrome plated.

.4 For low point near each fire department connection, a 90° elbow with drain connection to allow for system drainage to prevent freezing. Standard of Acceptance: Victaulic #10-DR.

2.08 SPRINKLER MAIN "LOSS OF PRESSURE" ALARM SENSOR

.1 Piping mounted adjustable pressure sensor designed to actuate an alarm upon sensing a loss of pressure in the fire protection main. Switch is to be low voltage or line voltage as required.

2.09 WATER FLOW ALARM SWITCH

.1 Pipe mounting water flow alarm switch, minimum 1725 kPa (250 psi) rated, designed to actuate 2, 7 ampere rated (at 125/250 VAC) SPDT snap action switches when water flow exceeds 0.758 L/sec. (10 Imperial gpm), complete with a tamper-proof cover with conduit connection opening, a piping saddle and U-bolt, and an automatic rest pneumatic retard device with field adjustable (0 to 70 second) switch actuation delay to reduce false alarms caused by a single or series of transient water flow surges.

2.10 ALARM CHECK VALVE

.1 Enamelled cast iron check valve assembly designed for either vertical or horizontal mounting and to actuate alarms when wet type sprinkler system is activated. Assembly is to be minimum 1205 kPa (175 psi) cold water rated with all moving parts constructed of brass, bronze, stainless steel or EPDM, and is to be complete with:

.1 pipe, fittings and accessories for site connection of an excess pressure pump;

.2 basic trim including piping materials and check valve for an external by-pass, potable water supply and system water supply pressure gauges with gauge test ports and shut-off valves, an angle type main drain valve, and fittings for mounting an alarm test by-pass;

.3 alarm test by-pass piping with ball valve to permit alarm testing without operation of alarm valve;

.4 alarm trim with pipe and fittings for connection to a water motor alarm, and an adjustable pressure switch for electrical connection to an alarm system upon flow through valve.

2.11 EXCESS PRESSURE PUMP

.1 Close coupled, 1750 RPM, all bronze gear pump sized to maintain sufficient pressure in fire protection main to prevent alarm check valve(s) from initiating flow alarms during fluctuations in pressure of Municipal water supply. Pump is to be complete with:

.1 stainless steel shaft with maintenance free seal;

.2 lifetime lubricated carbon bearings;

.3 TEFC motor conforming to requirements specified in Section entitled Basic Mechanical Materials and Methods, and secured to a mounting base;

.4 accessory package consisting of flexible suction and discharge connection hoses, a Monel inlet strainer, relief valve factory set at 862 kPa (120 psi), and a steel mounting plate designed to mount pump to alarm check valve flange;

.5 power and control panel.

.2 Factory pre-wired power and control panel, CSA certified, designed to automatically start and stop pump in response to water pressure variations in the main and consisting of a surface wall mounting NEMA 2 enamelled steel panel with hinged front door equipped with Corbin catch, and following:

.1 door interlock fused disconnect with HRC fuses;

.2 protected type pump starter;

.3 door mounted H-O-A rotary selector switch;

.4 fused control transformer;

.5 115 volt adjustable pressure switch to suit the application;

.6 set of NO/NC dry contacts for connection of lack of power availability alarm;

.7 door mounted "POWER ON" LED.

2.12 WATER MOTOR ALARM

.1 Surface wall mounting water motor driven alarm device consisting of a water motor assembly with 20 mm (¾") diameter inlet and 25 mm (1") or 32 mm (1-¼") diameter drain connections, inlet strainer, a red enamelled steel exterior wall mounting strike and gong assembly, a drive shaft sleeve with drive shaft to connect water motor and gong assembly and, at the exterior gong, identification to read "SPRINKLER FIRE ALARM - WHEN BELL RINGS CALL FIRE DEPARTMENT OR POLICE".

2.13 ZONE CONTROL RISER MODULES

.1 Equal to Victaulic Co. "FireLock" Series 747M factory assembled zone control riser modules, each complete with a painted cast ductile iron grooved end body, a ball type shut-off valve, a test and drain combination with properly sized orifice, a flow alarm switch, a pressure gauge with cock, and a pressure relief valve kit.

2.14 SPRINKLER HEADS

.1 Sprinkler heads, unless otherwise specified, are to be as scheduled in Part 3 of this Section.

.2 Sprinkler body is to be die-cast, with a hex-shaped wrench boss integrally cast into sprinkler body to reduce risk of damage during installation. Wrenches are to be provided by sprinkler manufacturer that directly engages wrench boss.

.3 For locations where corrosive resistant coatings are required, body is to be coated with ULC listed and FM approved anti-corrosion VC-250 coating (silver colouring).

.4 Recessed sprinkler heads in finished areas are to be chrome plated unless otherwise specified. Concealed sprinkler head ceiling plates are to match ceiling colour.

.5 Where exposed pendent heads occurs in areas with suspended ceilings, they are to be complete with chrome plated escutcheon plates. Similarly, sidewall heads with concealed piping are to be complete with chrome plated escutcheon plates.

.6 Sprinkler heads which are exposed in areas where they may be subject to damage are to be complete with wire guards, chrome plated where in finished areas.

.7 Escutcheons and guards are to be listed, supplied, and approved for use with sprinkler by sprinkler manufacturer.

.8 Sprinkler heads located in areas or over equipment where high ambient temperature is present are to be, unless otherwise specified, 74°C (165°F) heads. All other heads, unless otherwise specified or required, are to be 57°C (135°F) rated.

.9 Acceptable manufacturers are:

.1 Victaulic Co.;

.2 Tyco Fire Suppression & Building Products;

.3 The Viking Corporation;

.4 The Reliable Automatic Sprinkler Co.

2.15 SPARE SPRINKLER HEAD CABINET

.1 Surface wall mounting, red enamelled steel, identified cabinet with hinged door, shelves with holes for mounting sprinkler heads, a wrench or wrenches suitable for each type of sprinkler head, and a full complement of spare sprinkler heads.

.2 Cabinet is to be sized to accommodate a minimum of 4 spare heads for each type of head used on the project, however, each cabinet is to be full of spare heads.

3 EXECUTION

3.01 DEMOLITION

.1 Refer to demolition requirements specified in Section entitled Demolition and Revision Work.

3.02 PIPING INSTALLATION REQUIREMENTS

.1 Provide required sprinkler system piping.

.2 Perform piping work in accordance with requirements of NFPA 13, governing regulations, and "Reviewed" shop drawings.

.3 Piping, unless otherwise specified, is as follows:

.1 for underground piping inside or outside building – Class 200, DR14 rigid PVC, braced and secured at bends and tees with concrete blocks in accordance with Municipal standards and details;

.2 for piping inside building and above ground except as noted below – Schedule 40 grooved end black steel with Victaulic or equal fittings and coupling joints, or, for piping to and including 50 mm (2") diameter, screwed fittings and joints, or, for piping 65 mm (2-½") diameter and larger, welding fittings and welded joints;

.3 for piping downstream of "head end" alarm valve(s) and equipment – Schedule 10 or "Lightwall" black steel pipe with Victaulic or equal fittings and coupling joints or screwed fittings and joints;

.4 for branch piping to heads in suspended ceilings, etc. – at your option, flexible piping installed in accordance with manufacturer’s instructions;

.4 Exceptions to piping requirements specified above are as follows:

.1 wet zone steel piping, fittings, unions, couplings and flanges for sprinkler work exposed to weather either inside or outside building (including parking garages), are to be galvanized;

.2 ferrous pipe hangers, supports, and similar hardware used for galvanized steel piping are to be electro-galvanized.

.5 Pipe sizes, pipe routing, sprinkler head quantities and locations, and layout of work shown on drawings are to assist during tendering period. Ensure adequate head coverage, head quantities and pipe sizing as specified in Part 1 of this Section. Do not reduce size of sprinkler main or re-route main unless reviewed with and approved by Consultant.

.6 Install grooved joints in accordance with manufacturer's latest installation instructions. Grooved ends are to be clean and free from indentations, projections and roll marks. Gaskets are to be moulded and produced by coupling manufacturer, and verified as suitable for intended service. Have factory-trained representative from mechanical joint manufacturer provide on-site training in proper use of grooving tools and installation of grooved piping products. Have factory-trained representative periodically review product installation and ensure best practices are being followed. Remove and replace any improperly installed products.

.7 Clean pipe, fittings, couplings, flanges and similar components after erection is complete. Wire brush clean any ferrous pipe, fitting, coupling, flange, hanger, support and similar component which exhibit rust and carefully coat with suitably coloured primer.

.8 When sprinkler work is complete, test system components and overall system(s) and submit completed test certificate and other documentation in accordance with Chapter 8 of NFPA 13.

3.03 INSTALLATION OF DOUBLE CHECK VALVE ASSEMBLY

.1 Provide a double check valve assembly in sprinkler main inside the building.

.2 Equip assembly with inlet and outlet shut-off valves with supervisory switches as specified below.

.3 Support each end of assembly from floor by means of flanged pipe supports with saddles.

3.04 INSTALLATION OF SHUT-OFF VALVES AND CHECK VALVES

.1 Provide shut-off valves and check valves in piping where shown and wherever else required.

.2 Locate valves for easy operation and maintenance.

.3 Confirm exact locations prior to roughing-in.

3.05 INSTALLATION OF SHUT-OFF VALVE SUPERVISORY SWITCHES

.1 Equip each shut-off valve with a supervisory switch.

.2 Identify each supervised valve with a 150 mm (6") square, engraved, laminated red-white plastic tag to correspond with supervised valve numbering specified and/or shown as part of the electrical work fire alarm system.

.3 At low point near each fire department connection, install a 90° elbow with drain connection to allow for system drainage to prevent freezing.

3.06 INSTALLATION OF FIRE DEPARTMENT CONNECTION

.1 Provide an exterior Fire Department connection. Confirm exact location prior to roughing-in. Confirm finish prior to ordering.

.2 Equip connection with a check valve. Equip check valve with a ball drip to drain piping between Fire Department connection and check valve, and extend drainage piping from outlet of ball drip to nearest suitable floor drain.

3.07 INSTALLATION OF LOSS OF PRESSURE SENSOR

.1 Supply and mount a pressure sensor in the fire protection piping main to activate a "LOSS OF PRESSURE" trouble alarm should Municipal water service pressure fall below the acceptable level.

.2 Locate sensor for easy access and maintenance, and set alarm pressure to suit site conditions. Confirm setting on site.

.3 Identify pressure sensor and its normal setting with a 150 mm (6") square red-white laminated plastic tag engraved to read "LOSS OF WATER PRESSURE SENSOR - NORMAL SETTING 210 kPa". Confirm wording prior to engraving.

3.08 INSTALLATION OF FLOW ALARM SWITCHES

.1 Provide water flow alarm switches in accessible locations in zone piping.

.2 Adjust to suit site water pressure conditions. Check and test operation.

.3 Identify each switch with a 150 mm (6") square red-white laminated engraved plastic tag. Confirm wording prior to engraving.

3.09 INSTALLATION OF ALARM CHECK VALVES

.1 Provide alarm check valves, complete with trim, for wet zone fire protection sprinkler piping.

.2 Check and test operation of each valve and adjust as required to suit site water pressure conditions.

.3 Identify each valve with a 150 mm (6") square red-white laminated engraved plastic tag. Confirm wording prior to engraving.

3.10 INSTALLATION OF EXCESS PRESSURE PUMP AND CONTROL

.1 Provide an excess pressure pump in wet fire protection sprinkler system piping, arranged to prevent activation of alarm check valve water flow alarms during normal water pressure fluctuations in the main. Locate pump on a steel mounting plate assembly at alarm check valve(s) and install accessories supplied with pump. Provide a pressure gauge in valved tubing across pump suction and discharge connections.

.2 Supply a starter and control panel for pump and surface wall mount adjacent to pump. Connect panel pressure switch with copper tubing in accordance with pump manufacturer’s instructions. Adjust pressure switch to suit site conditions.

.3 Start-up the pump, test operation and adjust as required.

3.11 INSTALLATION OF WATER MOTOR ALARM

.1 Provide a water motor alarm. Secure gong on the exterior wall, impeller and motor assembly on the interior wall, and connect with drive assembly in accordance with manufacturer’s instructions. Install inlet strainer supplied loose with assembly.

.2 Provide a galvanized steel drain pipe from impeller-motor assembly down the interior wall and terminate piping back out through the wall with a 45° piping elbow and wall plate located 600 mm (24") above finished grade.

.3 Confirm exact location of alarm gong prior to roughing-in.

.4 When installation is complete, check and test alarm operation and adjust as required.

3.12 INSTALLATION OF ZONE CONTROL RISER MODULES

.1 Provide zone control riser modules with drain piping where required. Terminate drainage piping over a funnel floor drain unless otherwise shown or specified. Identify each assembly.

3.13 INSTALLATION OF ZONE CONTROL RISER MODULE CABINETS

.1 Provide flush wall mounting cabinets for zone control and inspector’s test connection assemblies where required in finished areas. Confirm exact locations prior to roughing-in.

.2 Identify each cabinet with a nameplate in accordance with requirements of Section entitled Basic Mechanical Materials and Methods.

3.14 INSTALLATION OF SPRINKLER HEADS

SPECNOTE: EDIT FOLLOWING PARAGRAPH IF SPRINKLER HEADS ARE SCHEDULED ON DRAWING.

.1 Provide required sprinkler heads in accordance with following schedule:

SPECNOTE: EDIT SCHEDULE TO SUIT PROJECT.

APPLICATION	SPRINKLER HEAD TYPE
Rooms/areas with a suspended ceiling	Victaulic V38/V39 or Tyco Series RFII "Royal Flush II" concealed pendent Victaulic V27 or Tyco Series TY-FRB recessed pendent Victaulic V27 or Tyco Series TY-FRB pendent with escutcheon plates
Rooms/areas without a suspended ceiling	Victaulic V27 or Tyco Series TY-FRB pendent
Elevator shafts	Victaulic V27 or Tyco Series TY-FRB horizontal sidewall
Unheated exterior stairwells	Victaulic V36 or Tyco Series DS-1 dry pipe horizontal sidewall Victaulic V36 or Tyco Series DS-3 wet pipe horizontal sidewall
Air handling system outdoor air and relief air plenums (unheated)	Tyco Series DS-3 ECOH dry horizontal sidewalls in wet piping Victaulic V27 or Tyco Series TY-FRB upright or horizontal sidewall in dry pipe or anti-freeze piping
Unheated and unfinished areas	Victaulic V36 or Tyco Series DS-3 ECOH dry horizontal sidewall in wet piping Victaulic V27 or Tyco Series TY-FRB upright or horizontal sidewall in dry pipe or anti-freeze piping
Heated areas with overhead doors	Victaulic V27 or Tyco Series TY-FRB horizontal sidewall
At non-rated windows in rated walls	Tyco Model WS horizontal and pendent vertical sidewall

.2 Sprinkler head manufacturers indicated on schedule are for type indication purposes. Acceptable manufacturers are listed in Part 2 of this Section.

.3 Coordinate sprinkler head locations with all drawings, including architectural reflected ceiling plan drawings, and, where applicable, electrical drawings. Coordinate sprinkler head locations in areas with suspended ceilings with the location of lighting, grilles, diffusers, and similar items recessed in or surface mounted on the ceiling as per the reflected ceiling plans. In areas with lay-in tile, centre the sprinkler head both ways in the lay-in tile wherever possible. Confirm locations prior to roughing-in.

.4 Maintain maximum headroom in areas with no ceilings.

.5 Provide guards for heads where they are subject to damage.

.6 Provide high temperature heads in equipment rooms and similar areas over heat producing or generating equipment.

3.15 INSTALLATION OF SPARE SPRINKLER HEAD CABINET

.1 Supply a full complement (to fill cabinet) of spare sprinkler heads of types used (minimum 4 of each type) and place in a wall mounting storage cabinet located adjacent to sprinkler system "head end" equipment where later directed.

3.16 INSTALLATION OF INDICATOR POST VALVE

.1 Provide a shut-off valve in underground sprinkler main piping outside building. Equip valve with a valve box and an indicator post assembly.

.2 Confirm valve box length and steel shaft length prior to ordering and confirm exact location prior to roughing-in.

.3 When installation is complete, check and test operation of assembly and adjusts as required.

END OF SECTION

1 GENERAL

1.01 SUBMITTALS

.1 Submit shop drawings/product data sheets for all products specified in Part 2 of this Section except for pipe, fittings, and chlorine.

.2 Submit laboratory water purity test results indicating chlorine residual prior to application for Substantial Performance of the Work.

1.02 QUALITY ASSURANCE

.1 Domestic water piping and valves are to comply with following codes, regulations and standards (as applicable):

.1 applicable local codes and regulations;

.2 ASTM F1960, Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing;

.3 CAN/CSA B125.1, Plumbing Supply Fittings;

.4 CAN/CSA B125.3, Plumbing Fittings;

.5 CAN/CSA B137 Series, Thermoplastic Pressure Piping Compendium;

.6 CAN/ULC S102.2, Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies;

.7 CAN/ULC S101, Fire Endurance Tests of Building Construction and Materials;

.8 NSF/ANSI 14, Plastics Piping System Components and Related Materials;

.9 NSF/ANSI 61, Drinking Water System Components – Health Effects;

.10 NSF/ANSI 372, Drinking Water System Components – Lead Content.

2 PRODUCTS

2.01 PIPE, FITTINGS AND JOINTS

.1 Soft Copper

.1 Type "K" soft copper to ASTM B88, supplied in a continuous coil with no joints if possible, and complete with, if joints are required, compression type flared joint couplings.

.2 Hard Copper - Solder Joint

.1 Type "L" hard drawn seamless copper to ASTM B88, complete with copper solder type fittings to ASME/ANSI B16.18 and soldered joints using The Canada Metal Co. Ltd. "SILVABRITE 100" or equal lead-free solder for cold water pipe, and 95% tin/ 5% Antimony or "SILVABRITE 100" solder for other services.

.3 Semi-Rigid Polyethylene Tubing

.1 Versa Fittings and Mfg. Inc. 12 mm (½") dia., high density, semi-rigid polyethylene tubing, 1380 kPa (200 psi) rated.

2.02 SHUT-OFF VALVES

.1 Ball Valves

.1 Class 600, 4140 kPa (600 psi) WOG rated, lead-free, full port ball type valves, each complete with a forged brass body with solder ends, forged brass cap, blowout-proof stem, solid forged brass chrome plated ball, "Teflon" or "PTFE" seat, and a removable lever handle. Valves in insulated piping are to be complete with stem extensions.

.2 Acceptable products are:

.1 Toyo Valve Co. Fig. 5049A-LF;

.2 Milwaukee Valve Co. #UPBA485B;

.3 Kitz Corporation Code 859;

.4 Apollo Valves #77LF-200;

.5 Watts Industries (Canada) Inc. #LFFBVS-3C.

2.03 CHECK VALVES

.1 Horizontal

.1 Lead-free, Class 125, bronze, 1380 kPa (200 psi) WOG rated horizontal swing type check valves with solder ends.

.2 Acceptable products are:

.1 Toyo Valve Co. Fig. 237A-LF;

.2 Milwaukee Valve Co. #UP1509;

.3 Kitz Corporation Code 823;

.4 Apollo Valves #61LF Series.

.2 Vertical

.1 Equal to Kitz Corp. Code 826, lead-free, 1725 kPa (250 psi) WOG rated vertical lift check valve with soldering ends.

2.04 DRAIN VALVES

.1 Minimum 2070 kPa (300 psi) water rated, 20 mm (¾") dia., straight pattern full port bronze ball valves, each complete with a threaded outlet suitable for coupling connection of 20 mm (¾") dia. garden hose, and a cap and chain.

.2 Acceptable products are:

.1 Toyo Valve Co. Fig. 5046;

.2 Dahl Brothers Canada Ltd. Fig. No. 50. 430;

.3 Kitz Corporation Code 58CC;

.4 Apollo Valves #78-104-01;

.5 Watts Industries (Canada) Inc. #B6000.

2.05 DOMESTIC HOT WATER PIPING BALANCING VALVES

.1 Solder or flanged end type as required, globe style, non-ferrous circuit balancing valves designed to facilitate precise flow measurement, precision flow balancing, and positive shut-off, complete with capped and valved drain connection, and valved ports for connection to a differential pressure meter.

.2 Acceptable products are:

.1 S.A. Armstrong Model CBV Series;

.2 Tour and Andersson Model TBV Series;

.3 Watts Industries (Canada) Inc. Model CSM Series.

2.06 DOMESTIC HOT WATER THERMOSTATIC MIXING VALVES

.1 Lawler Manufacturing Co. Inc. 310-75 Thermostatic Mixer" factory each CSA B125 certified, forged brass, tamper-proof thermostatic mixing valves, adjustable for water supply between 29°C and 49°C (85°F and 120°F), sized to suit number of lavatories in grouping, and complete with a stop and check valve and a lockable handle

.2 Acceptable manufacturers are:

.1 Lawler Manufacturing Co. Inc.;

.2 Symmons Industries Inc.

2.07 CHLORINE

.1 Sodium hypochlorite to AWWA B300.

2.08 FLOOR DRAIN TRAP SEAL PRIMERS

.1 Primer Valve Type

.1 Precision Plumbing Products Inc. Model P2-500 trap primer valve, constructed of brass, adjustable to high or low water pressures and complete with "O" ring seals, 12 mm (½") threaded inlet and outlet connections, and, for priming two traps from the same primer, a DU-2 dual outlet distribution unit.

.2 Primer Valve Type with Manifold

.1 Precision Plumbing Products Inc. Model P1-500 trap primer valve constructed as specified above for the Model P2-500 primer valve, complete with a Model DU-3 or DU-4, 3 or 4 outlet distribution unit for priming 3 or 4 traps, and at Model "YS-8" supply tube with combinations of Model DU-3 and DU-4 distribution units for priming from 5 to 6 traps.

.3 Electronic Type

.1 Precision Plumbing Products #PT Series surface wall mounting, CSA certified, 115 volt, 1-phase, 60 Hz., electronic, automatic trap priming manifolds, each sized to suit the number of drain traps or interceptors serviced, and each complete with:

.1 galvanized steel cabinet with door;

.2 20 mm (¾") dia. NPT copper pipe inlet with shut-off valve and water hammer arrestor;

.3 solenoid valve, an atmospheric vacuum breaker, and a discharge manifold with 12 mm (½") dia. compression type copper tube connections on 40 mm (1-½") centres with quantity to suit the number of items to be primed;

.4 control panel with circuit breaker, 5 ampere fuse, 24 hour timer, and manual override toggle switch.

2.09 WATER HAMMER ARRESTORS

.1 Piston type, sealed, pressurized water hammer arrestors suitable for either horizontal or vertical installation, each complete with a hard drawn copper body, "O"-ring piston seals, an air charge, and an inlet opening equal to diameter of pipe in which arrestor is required.

.2 Acceptable products are:

.1 Watts Industries (Canada) Inc.;

.2 Zurn #Z1705;

.3 Precision Plumbing Products Inc. #SC;

.4 Mifab MWH Series

3 EXECUTION

3.01 DEMOLITION

.1 Refer to demolition requirements specified in Section entitled Demolition and Revision Work.

3.02 PIPING INSTALLATION REQUIREMENTS

.1 Provide required domestic water piping.

.2 Piping, unless otherwise specified, is as follows:

.1 for 12 mm (½") dia. trap seal primer tubing located underground or in concrete or masonry construction – semi-rigid polyethylene;

.2 for pipe inside building and aboveground in sizes to 100 mm (4") dia. – Type "L" hard copper with solder joints

.3 Lay pipes true to line and grade with bells upgrade. Fit sections together so that, when complete, pipe has a smooth and uniform invert. Keep pipe thoroughly clean so jointed compound will adhere. Inspect pipe for defects before being lowered into trench.

.4 Slope piping so it can be completely drained.

.5 Provide cast brass dielectric type adapters/unions at connections between ferrous and copper pipe or equipment.

3.03 INSTALLATION OF SHUT-OFF AND CHECK VALVES

.1 Refer to Part 3 of Section entitled Basic Mechanical Materials and Methods.

.2 For shut off valves installed on solder joint copper piping up to and including 75 mm (3") diameter, provide ball type valves, and for flanged joints copper or stainless steel piping larger than 75 mm (3") diameter provide butterfly type valves.

3.04 INSTALLATION OF DRAIN VALVES

.1 Provide a drain valve at the bottom of domestic water piping risers, at other piping low points, and wherever else shown.

.2 Locate drain valves so they are easily accessible.

3.05 INSTALLATION OF DOMESTIC HOT WATER PIPING BALANCING VALVES

.1 Provide balancing valves in domestic hot water recirculation piping where shown or required.

.2 Locate each valve so it is easily accessible.

3.06 INSTALLATION OF DOMESTIC HOT WATER THERMOSTATIC MIXING VALVES

.1 Provide a domestic hot water thermostatic mixing valve assembly

.2 Adjust each valve to design requirements and check and test operation. Set maximum temperature limit stops.

.3 Identify each valve and its water temperature delivery setting with an engraved nameplate.

3.07 INSTALLATION OF TRAP SEAL PRIMERS

.1 Provide required accessible trap seal primers to automatically maintain a water seal in floor drain traps, whether shown on drawings or not.

.2 Provide trap primer valves to prime single or multiple (1 to 6) traps. Install trap primer valves in domestic cold water piping to frequently used plumbing fixtures. Where from 2 to 6 traps are to be primed from same primer valve, provide appropriate supply and distribution tube assemblies. Ensure primer valves are accessible.

.3 Provide 115 volt, electronic, surface wall mounting trap primer assemblies for multiple (4 to 30) traps. Include for a 115 volt 15 ampere panel breaker and wiring in conduit from closest panelboards to primer assembly, all to wiring standards of Electrical Division. Adjust primer water flow and timing to suit number of traps served.

.4 Ensure trap primer piping is secured to floor drain primer tappings and not terminated through the tapping in the throat of the drain.

3.08 INSTALLATION OF WATER HAMMER ARRESTORS

.1 Provide accessible water hammer arrestors in domestic water piping in locations as follows:

.1 in headers at groups of plumbing fixtures;

.2 at top of risers;

.3 at ends of long horizontal runs of piping;

.4 in piping connecting solenoid valves or equipment with integral solenoid valves;

.5 wherever else shown or required by Code.

.2 Install each unit in a piping tee either horizontally or vertically in the path of potential water shock in accordance with manufacturer’s instructions and details.

3.09 FLUSHING AND DISINFECTING PIPING

.1 Flush and disinfect all new and/or reworked domestic water piping after leakage testing is complete.

.2 Isolate new piping from existing piping prior to flushing and disinfecting procedures.

.3 Flush piping until all foreign materials have been removed and flushed water is clear. Provide connections and pumps as required. Open and close valves, faucets, hose outlets, and service connections to ensure thorough flushing.

.4 When flushing is complete, disinfect the piping with a solution of chlorine in accordance with AWWA C601.

.5 When disinfecting is complete, submit water samples to a certified laboratory for purity testing and, when testing indicates pure water in accordance with governing standards, submit a copy of test results and fill the systems.

END OF SECTION

1 GENERAL

1.01 SUBMITTALS

.1 Submit shop drawings/product data sheets for all products specified in this Section except pipe and fittings.

.2 Submit a copy of plumbing inspection certificate prior to application for Substantial Performance of the Work.

2 PRODUCTS

2.01 PIPE, FITTINGS AND JOINTS

.1 PVC Sewer

.1 DR35 rigid, green PVC hub and spigot pattern sewer pipe and fittings to CAN/CSA B182.2, with gasket joints assembled with pipe lubricant.

.2 DR35 rigid, PVC sewer pipe and fittings, with solvent weld joints, all certified to CSA B182.1 and colour-coded as per local governing codes, regulations and standards.

.2 Copper - Solder Joint

.1 Type DWV hard temper to ASTM B306, with forged copper solder type drainage fittings and 50% lead - 50% tin solder joints.

.3 Cast Iron

.1 Class 4000 cast iron pipe, fittings, and mechanical coupling joints to CAN/CSA B70.

.4 Copper - Victaulic Coupling Joint

.1 Type DWV hard temper to ASTM B306, with factory or site rolled grooved ends (with grooving rolls designed for copper) and Victaulic "Copper Connection" wrought copper or cast bronze fittings and Style 606 gasket type couplings.

2.02 CLEANOUTS

.1 Horizontal Piping

.1 TY pipe fitting with an extra heavy brass plug screwed into the fitting.

.2 Vertical Piping

.1 Bronze or copper cleanout tees in copper piping, each complete with a bronze ferrule, and, for cast iron piping, "BARRETT" type cast iron cleanout tees, each gas and water-tight and complete with a bolted cover.

.3 Urinal(s)

.1 Wall access cleanout assemblies, each complete with a tapered plug, threaded brass insert, urethane rubber seal, and polished stainless steel access cover with vandal-proof stainless steel securing screw.

.2 Acceptable products are:

.1 Watts Industries (Canada) Ltd. #CO-590-RD;

.2 Jay R. Smith #SQ4-1819;

.3 Zurn #ZSS-1666-1;

.4 Mifab #C1440-RD.

2.03 FLOOR CLEANOUT TERMINATIONS

.1 Factory finished cast iron terminations, each adjustable and complete with a cast iron body with neoprene sleeve, solid, gasketed, polished nickel-bronze scoriated top access cover to suit floor finish, a seal plug, and captive, vandal-proof, stainless steel securing hardware.

.2 Acceptable products are:

.1 Watts Industries (Canada) Ltd. # CO-200-R-1;

.2 Jay R. Smith #4020-F-C Series;

.3 Zurn # ZN-1602-SP Series;

.4 Mifab # C1100-XR-1 or #C1000-R-3.

.3 Cleanout terminations in areas with a tile or sheet vinyl floor finish are to be as above but with a square top in lieu of a round top.

2.04 FLOOR DRAINS, FUNNEL FLOOR DRAINS AND HUB DRAINS

.1 Unless otherwise specified or indicated, floor drains are to be vandal-proof drains in accordance with drawing symbol list, each complete with a cast iron body and a trap seal primer connection. Cast iron components are to be factory finished with latex based paint coating.

.2 Floor drains in areas with a tile or sheet vinyl floor finish are to be as above but with a square grate in lieu of a round grate.

.3 Acceptable manufacturers are:

.1 Watts Industries (Canada) Ltd.;

.2 Jay R. Smith Manufacturing Co.;

.3 Zurn Industries Ltd.;

.4 Mifab Inc.

3 EXECUTION

3.01 DEMOLITION

.1 Refer to demolition requirements specified in Section entitled Demolition and Revision Work.

3.02 DRAIN AND VENT PIPING INSTALLATION REQUIREMENTS

.1 Provide required drainage and vent piping. Pipe, unless otherwise specified, as follows:

.1 for underground pipe inside building and to points 1.5 m (5') outside building lines – rigid PVC sewer pipe, minimum 75 mm (3") dia.;

.2 for pipe inside building and aboveground in sizes less than or equal to 65 mm (2-½") dia. – type DWV copper;

.3 for pipe inside building and aboveground in sizes greater than or equal to 75 mm (3") dia. – Class 4000 cast iron;

.2 Unless otherwise specified, slope horizontal drainage piping aboveground in sizes to and including 75 mm (3") dia. 25 mm (1") in 1.2 m (4'), and pipe 100 mm (4") dia. and larger 25 mm (1") in 2.4 m (8').

.3 Install and slope underground drainage piping to inverts or slopes indicated on drawings to facilitate straight and true gradients between points shown. Verify available slopes before installing pipes.

.4 Unless otherwise specified, slope horizontal branches of vent piping down to fixture or pipe to which they connect with a minimum pitch of 25 mm (1") in 1.2 m (4').

.5 Extend vent stacks up through roof generally where shown but with exact locations to suit site conditions and in any case a minimum of 3 m (10') from fresh air intakes. Terminate vent stacks a minimum of 330 mm (13") above roof (including roof parapets) in vent stack covers. Where not shown on drawings, route vent piping from source to building exterior as required in order to satisfy local governing codes and authority. Coordinate vent routing with other building services and ensure there is no architectural impact.

.6 Provide cast brass dielectric unions at connections between copper pipe and ferrous pipe or equipment.

.7 All above grade drainage piping associated with waterclosets, showers, or rainwater leaders are to be Class 4000 cast iron.

3.03 INSTALLATION OF CLEANOUTS

.1 Provide cleanouts in drainage piping in locations as follows:

.1 in building drain or drains as close as possible to inner face of outside wall, and, if a building trap is installed, locate cleanout on downstream side of building trap;

.2 at or as close as practicable to the foot of each drainage stack;

.3 at maximum 15 m (50') intervals in horizontal pipe 100 mm (4") dia. and smaller;

.4 at maximum 30 m (100') intervals in horizontal pipe larger than 100 mm (4") dia.;

.5 in the wall at each new urinal or bank of urinals in a washroom;

.6 wherever else shown on drawings.

.2 Cleanouts are to be same diameter as pipe in piping to 100 mm (4") dia., and not less than 100 mm (4") dia. in piping larger than 100 mm (4") dia.

.3 Where cleanouts in vertical piping are concealed behind walls or partitions, install cleanouts near floor and so cover is within 25 mm (1") of the finished face of the wall or partition.

3.04 INSTALLATION OF FLOOR CLEANOUT TERMINATIONS

.1 Where cleanouts occur in horizontal inaccessible underground piping, extend cleanout TY fitting up to floor, and provide a cleanout termination set flush with finished floor.

.2 In waterproof floors, ensure each cleanout termination is equipped with a flashing clamp device. Cleanout terminations are to suit floor finish.

.3 Where cleanout terminations occur in finished areas, confirm locations prior to rough-in and arrange piping to suit.

.4 Ensure cleanout termination covers in tiled floor are square in lieu of round.

3.05 INSTALLATION OF FLOOR DRAINS, FUNNEL FLOOR DRAINS AND HUB DRAINS

.1 Provide floor drains, funnel floor drains and hub drains.

.2 Coordinate location of floor drains, funnel floor drains and hub drains with equipment provided by Mechanical Division and Owner's supplied equipment. Install in accordance with manufacturer's instructions.

.3 Equip each drain with a trap.

.4 In equipment rooms and similar areas, exactly locate floor drains to suit location of mechanical equipment and equipment indirect drainage piping. In washrooms, exactly locate floor drains to avoid interference with toilet partitions.

.5 Confirm exact location of drains prior to roughing in. Where floor drains occur in washrooms coordinate locations with toilet partition installations.

.6 Temporarily plug and cover floor drains during construction procedures. Remove plugs and covers during final clean-up work and when requested, demonstrate free and clear operation of each drain. Replace any damaged grates, and refinish any areas of the drain where cast iron finish has been damaged or removed, including rusted areas.

END OF SECTION

1 GENERAL

1.01 SUBMITTALS

.1 Submit product data sheets (fixture cuts) for all plumbing fixtures and fittings.

2 PRODUCTS

2.01 GENERAL RE: PLUMBING FIXTURES AND FITTINGS

.1 Fixtures and fittings, where applicable, are to be in accordance with requirements of CAN/CSA B45 Series, General Requirements for Plumbing Fixtures, including supplements, ASME A112.1.18.1/CSA B125.1, Plumbing Supply Fittings, and CSA B125.3, Plumbing Fittings.

.2 Barrier-free fixtures and fittings are to be in accordance with governing Code requirements.

.3 Unless otherwise specified, vitreous china, porcelain enamelled, and acrylic finished fixtures are to be white.

.4 Unless otherwise specified, fittings and piping exposed to view are to be chrome plated and polished.

.5 Fittings located in areas other than private washrooms are to be vandal-proof.

.6 Fixture carriers are to be suitable in all respects for the fixture they support and construction in which they are located.

.7 Floor flanges for floor mounted water closets are to be cast iron or brass, secured to floor to prevent movement and complete with a wax seal and brass or stainless steel bolts, nuts, and washers. Plastic floor flanges will not be acceptable.

.8 Proper seal to mate with fixture carrier flange and produce a water-tight installation.

.9 Exposed traps for fixtures not equipped with integral traps, such as lavatories, are to be adjustable chrome plated cast brass "P" traps with cleanouts, minimum #17 gauge chrome plated tubular extensions, and chrome plated escutcheons, all to suit fixture type and drain connection.

.10 Concealed traps for fixtures not equipped with integral traps, such as counter sinks, are to be adjustable cast brass with cleanout plugs, all to suit fixture type and drain connection.

.11 Exposed supplies for fixtures which do not have supply trim/fittings with integral stops, i.e. lavatories, are to be solid chrome plated brass angle vales with screwdriver stops for public areas, wheel handle stops for private areas, flexible stainless steel risers, and stainless steel or chrome plated steel escutcheons, all arranged and sized to suit fixture.

.12 Water piping as specified, complete with ball type shut-off valves as specified with water piping, or Dahl Bros. Canada Ltd. ¼ turn Mini Ball Valves.

.13 All above grade drainage piping associated with waterclosets and showers are to be Class 4000 cast iron.

2.02 PLUMBING FIXTURES AND FITTINGS

.1 Plumbing fixtures and fittings are to be in accordance with the following:

.1 WC-1 TOILET - WALL MOUNTED WITH WALL OUTLET

.1 American Standard 2257101.020 Toilet – Afwall Millenium Flowise Toilet, Wall Hung with Wall outlet. Toilet Operates in the range of 4.2 to 6.0 lpf (1.1 – 1.6 gpf), while finish vitreous china, elongated bowl.

.2 Centoco 1500STSCCSSFE-001 Seat - FAST-N-LOCK, For elongated bowl, Open front, Heavy-duty, For commercial applications, Polypropylene, Toilet seat, Less seat cover, Self-sustaining plastic commercial check hinges, and Stainless steel hinge pin, Specified in White finish, FAST-N-LOCK mounting system with stainless steel bolts, 32 mm (1-1/4") high, 473 mm (18-5/8") long, 368 mm (14-1/2") wide.

.3 Sloan SL-ECOS 8111-1.28 OR Flush Valve - ECOS® Automatic no-touch Exposed Water closet flushometer, High Efficiency 4.8 LPF (1.28 GPF), 38 mm (1-1/2") spud coupling For top spud toilet, Battery powered, constructed from Semi-red brass, Polished chrome finish, Chloramine resistant PERMEX® synthetic rubber diaphragm, Smart Sense Technology™ self-adaptive infrared sensor, Sensor located on engineered metal cover with replaceable lens window, Courtesy Flush® electrical override button, Flush tube for 292 mm (11-1/2") rough-in, 25 mm (1") I.P.S. screwdriver Bak-Chek® angle control stop with free spinning vandal-resistant stop cap, Dual-filtered bypass, Sweat solder adapter kit with cover tube, High back pressure vacuum breaker, 25 mm (1") supply pipe, Cast wall flange with set screw, No external volume adjustment, Four (4) AA-size alkaline batteries included.

.4 Watts ISCA-101-L/R-M11 Carrier - Closet Carrier, Industry Standard single Horizontal adjustable Closet Carrier, Adjustable for standard and wheelchair height, 102 mm (4") no hub waste, 51 mm (2") no hub vent connections, patented compression seal faceplate assembly, epoxy coated cast iron, with incremental measurements embossed onto legs to easily adjust height of carrier to most commonly used fixture requirements, epoxy coated cast iron foot support, neoprene bowl gasket, epoxy coated cast iron, integral test cap, chrome cap nuts, Plated hardware, Adjustable ABS nipple, Tiling frame, Compliances and certifications: Carrier complies with requirements of ASME A112.6.1M up to a 500 lb (227 kg) static load.

.5 Mission NO HUB Series Coupling - shielded No-hub (MJ) coupling, For non-pressure gravity flow applications only, Recommended for above ground installations, (2 or 4) Type 301 stainless steel worm drive clamps, Type 301 corrugated stainless steel shield, One-piece molded elastomeric sealing gasket, Tightened to 69 kg.cm (60 in-lb) max. torque, Stainless steel conforms to ASTM A240/A240M, Meets & exceeds performance standard ASTM C1277, Rubber conforms to ASTM C564, Meets or exceeds all CISPI® 310 specifications, Conforms to CSA CLASS 7021 (B602), IAPMO FILE 0743 listed.

.2 WC-2 TOILET - WALL MOUNTED WITH WALL OUTLET – BARRIER FREE

.1 American Standard 2257101.020 Toilet – Afwall Millenium Flowise Toilet, Wall Hung with Wall outlet. Toilet Operates in the range of 4.2 to 6.0 lpf (1.1 – 1.6 gpf), while finish vitreous china, elongated bowl.

.2 Centoco 1500STSCCSSFE-001 Seat - FAST-N-LOCK, For elongated bowl, Open front, Heavy-duty, For commercial applications, Polypropylene, Toilet seat, Less seat cover, Self-sustaining plastic commercial check hinges, and Stainless steel hinge pin, Specified in White finish, FAST-N-LOCK mounting system with stainless steel bolts, 32 mm (1-1/4") high, 473 mm (18-5/8") long, 368 mm (14-1/2") wide.

.3 Sloan SL-ECOS 8111-1.28 OR Flush Valve - ECOS® Automatic no-touch Exposed Water closet flushometer, High Efficiency 4.8 LPF (1.28 GPF), 38 mm (1-1/2") spud coupling For top spud toilet, Battery powered, constructed from Semi-red brass, Polished chrome finish, Chloramine resistant PERMEX® synthetic rubber diaphragm, Smart Sense Technology™ self-adaptive infrared sensor, Sensor located on engineered metal cover with replaceable lens window, Courtesy Flush® electrical override button, Flush tube for 292 mm (11-1/2") rough-in, 25 mm (1") I.P.S. screwdriver Bak-Chek® angle control stop with free spinning vandal-resistant stop cap, Dual-filtered bypass, Sweat solder adapter kit with cover tube, High back pressure vacuum breaker, 25 mm (1") supply pipe, Cast wall flange with set screw, No external volume adjustment, Four (4) AA-size alkaline batteries included.

.4 Watts ISCA-101-L/R-M11 Carrier - Closet Carrier, Industry Standard single Horizontal adjustable Closet Carrier, Adjustable for standard and wheelchair height, 102 mm (4") no hub waste, 51 mm (2") no hub vent connections, patented compression seal faceplate assembly, epoxy coated cast iron, with incremental measurements embossed onto legs to easily adjust height of carrier to most commonly used fixture requirements, epoxy coated cast iron foot support, neoprene bowl gasket, epoxy coated cast iron, integral test cap, chrome cap nuts, Plated hardware, Adjustable ABS nipple, Tiling frame, Compliances and certifications: Carrier complies with requirements of ASME A112.6.1M up to a 500 lb (227 kg) static load.

.5 Franke Commercial CM-16104-WM Backrest – Wall mounting, Back Rest, Solid Core Plastic Laminate Panel Back, Antique White.

.6 Mission NO HUB Series Coupling - shielded No-hub (MJ) coupling, For non-pressure gravity flow applications only, Recommended for above ground installations, (2 or 4) Type 301 stainless steel worm drive clamps, Type 301 corrugated stainless steel shield, One-piece molded elastomeric sealing gasket, Tightened to 69 kg.cm (60 in-lb) max. torque, Stainless steel conforms to ASTM A240/A240M, Meets & exceeds performance standard ASTM C1277, Rubber conforms to ASTM C564, Meets or exceeds all CISPI® 310 specifications, Conforms to CSA CLASS 7021 (B602), IAPMO FILE 0743 listed.

.3 L-1 – WALL HUNG LAVATORY

.1 American Standard 9134004EC Basin - DECORUM®, Wall-hung Lavatory, Vitreous china, 3-hole 100mm (4”) centerset, EverClean® antimicrobial surface, White finish, Single hole centerset, Rear overflow. Overall Dimensions: 533 mm (21") long, 514 mm (20-1/4") wide, 181 mm (7-1/8") high, Bowl Dimensions: 381 mm (15") long, 370 mm (14-9/16") wide, 127 mm (5") deep.

.2 Moen 8894 Faucet - Manual, Single handle, Lavatory faucet, Polished chrome finish, Moen Model 99551 Anti-Rotation Deck Plate, Lead Free ANSI/NSF 61 compliant, brass construction, Auto timed metering cartridge, 1.9 LPM (0.5 GPM) maximum flowrate, Vandal-resistant pressure compensating non-aerated spray outlet, 0.2 GPC (0.75 LPC) maximum per cycle, Integral cast brass spout, 102 mm (4") spout reach, 143 mm (5-5/8") high, Push button. ADA compliant.

.3 Lawler 570-86820 Mixing Valve – Point of Use, thermostatic master water mixing control valve, lead free brass body construction, nickel plated finish, 1.9-30 lpm (0.5-8 gpm) range for flow rate, 11lpm (3 gpm) tempered flowrate @ 5psi pressure drop, 4-7/8” (124mm) height, 3/8” MNPT (9.5mm) inlet, 95-115F outlet water temperature range, 3/8” MNPT (9.5mm) outlet, internal checks, 125PSI max hydrostatic pressure, +/- 20% pressure variation.

.4 McGuire 155A Fixture Drain - Straight drain, Cast brass, Chrome-plated finish, Open grid PO plug, 7/32" (5.5 mm) Ø holes size, 17 gauge 32 mm (1-1/4") Ø tailpiece, 17 gauge 152 mm (6") long, Brass locknut, Heavy rubber basin washer Fiber friction washer, ASME A112.18.2 CSA B125.2, CSA compliant

.5 McGuire LFBV170 Supply - CONVERTIBLE™ Commercial Faucet Supply kit, consisting of (2) stop valves, (2) risers, (2) flanges (standard), Lead Free Brass body, Chrome-plated finish, 138 - 862 kPa (20 - 125 PSI) operating pressure, 4 to 60 °C (40 to 140 °F) operating temperature, Convertible loose key/triangle handle, Quarter turn ball valve, Angle stop, C.P. wrought steel deep bell wall flange (standard), C.P. prefabricated 127 mm (5") copper sweat tube extension nipple, 305 mm (12") C.P. lavatory flexible copper riser tubes (standard), 13 mm (1/2") Sweat inlet x 10 mm (3/8") O.D. outlet, 82 °C (180 °F) maximum during high-temperature system flush, AB 100 compliant, ASME A112.18.1 compliant, ASME A112.18.2-2 (risers), CSA B125.2 compliant (risers), Certified to NSF/ANSI 372, Certified to NSF/ANSI 61, UPC compliant.

.6 McGuire 8872C P-Trap - Heavy cast brass, Adjustable P-Trap, 292 mm (11-1/2") distance, With cleanout plug, Steel shallow flange, Neoprene gasket, Slipnuts, 17 gauge seamless tubular wall bend, ASME A112.18.2 CSA B125.2, CSA compliant

.7 Watts WCA-411 Carrier - WCA-411/WCA-411-WC, Lavatory carrier, Single floor-mounted lavatory carrier with concealed arms, For concealed arm carrier, adjustable arms, epoxy coated cast iron, integral welded feet, upper tie rod, Heavy gauge steel offset uprights, basin locking device, Plated hardware, levelling screws.

.4 L-2 – WALL HUNG LAVATORY – BARRIER FREE

.1 American Standard 9134004EC Basin - DECORUM®, Wall-hung Lavatory, Vitreous china, 3-hole 100mm (4”) centerset, EverClean® antimicrobial surface, White finish, Single hole centerset, Rear overflow. Overall Dimensions: 533 mm (21") long, 514 mm (20-1/4") wide, 181 mm (7-1/8") high, Bowl Dimensions: 381 mm (15") long, 370 mm (14-9/16") wide, 127 mm (5") deep.

.2 American Standard 0062000 Shroud- Acrylic shroud/knee contact guard less EverClean.

.3 Moen 8894 Faucet - Manual, Single handle, Lavatory faucet, Polished chrome finish, Moen Model 99551 Anti-Rotation Deck Plate, Lead Free ANSI/NSF 61 compliant, brass construction, Auto timed metering cartridge, 1.9 LPM (0.5 GPM) maximum flowrate, Vandal-resistant pressure compensating non-aerated spray outlet, 0.2 GPC (0.75 LPC) maximum per cycle, Integral cast brass spout, 102 mm (4") spout reach, 143 mm (5-5/8") high, Push button. ADA compliant.

.4 Lawler 570-86820 Mixing Valve – Point of Use, thermostatic master water mixing control valve, lead free brass body construction, nickel plated finish, 1.9-30 lpm (0.5-8 gpm) range for flow rate, 11lpm (3 gpm) tempered flowrate @ 5psi pressure drop, 4-7/8” (124mm) height, 3/8” MNPT (9.5mm) inlet, 95-115F outlet water temperature range, 3/8” MNPT (9.5mm) outlet, internal checks, 125PSI max hydrostatic pressure, +/- 20% pressure variation.

.5 McGuire 155WC Fixture Drain - Offset drain, Cast brass, Chrome-plated finish, Open grid PO plug, 7/32" (5.5 mm) Ø holes size, 17 gauge 32 mm (1-1/4") Ø tailpiece, 17 gauge, Brass locknut, Heavy rubber basin washer Fiber friction washer, ASME A112.18.2 CSA B125.2, CSA compliant

.6 McGuire LFBV170 Supply - CONVERTIBLE™ Commercial Faucet Supply kit, consisting of (2) stop valves, (2) risers, (2) flanges (standard), Lead Free Brass body, Chrome-plated finish, 138 - 862 kPa (20 - 125 PSI) operating pressure, 4 to 60 °C (40 to 140 °F) operating temperature, Convertible loose key/triangle handle, Quarter turn ball valve, Angle stop, C.P. wrought steel deep bell wall flange (standard), C.P. prefabricated 127 mm (5") copper sweat tube extension nipple, 305 mm (12") C.P. lavatory flexible copper riser tubes (standard), 13 mm (1/2") Sweat inlet x 10 mm (3/8") O.D. outlet, 82 °C (180 °F) maximum during high-temperature system flush, AB 100 compliant, ASME A112.18.1 compliant, ASME A112.18.2-2 (risers), CSA B125.2 compliant (risers), Certified to NSF/ANSI 372, Certified to NSF/ANSI 61, UPC compliant.

.7 McGuire 8872C P-Trap - Heavy cast brass, Adjustable P-Trap, 292 mm (11-1/2") distance, With cleanout plug, Steel shallow flange, Neoprene gasket, Slipnuts, 17 gauge seamless tubular wall bend, ASME A112.18.2 CSA B125.2, CSA compliant

.8 Watts WCA-411 Carrier - WCA-411/WCA-411-WC, Lavatory carrier, Single floor-mounted lavatory carrier with concealed arms, For concealed arm carrier, adjustable arms, epoxy coated cast iron, integral welded feet, upper tie rod, Heavy gauge steel offset uprights, basin locking device, Plated hardware, levelling screws.

.5 MS-1 FLOOR MOUNTED MOP SERVICE SINK

.1 Stern Williams SB-902-T-35-T-40-BP Sink - Single compartment sink, Mop service sinks, Without faucet ledge, Precast terrazzo Pearl grey marble chips and white Portland cement, 76 mm (3") pipe size, cast integrally and provides for a caulked lead connection not less than 25 mm (1") deep to a 76 mm (3") pipe, flat stainless steel strainer, Two side tiling flanges, with stainless steel cap. Bowl Dimension: 546 mm (21-1/2") long, 546 mm (21-1/2") wide, 254 mm (10") deep, Overall Dimension: 610 mm (24") long, 610 mm (24") wide, 305 mm (12") high.

.2 Stern Williams T-35 Hose and wall hook. Hose 36" long, with 3/4" chrome couplings. Wall bracket of stainless steel.

.3 Stern Williams T-40 Stainless Steel Mop Hanger of stainless steel with #4 finish. 24" long, with 3 rubber spring loaded grips.

.4 Stern Williams BP Splash Catcher Panels of 20 ga. type 304 stainless steel.

.5 Chicago Faucets 897-RCF Faucet - Wall-hung, Manual, Two handles, Mop sink faucet, Rough chrome plated finish, 194 - 213 mm (7-5/8" to 8-3/8") adjustable centerset, Round wall escutcheons, Brass construction, Less supply, Adjustable supply arms, 1/4 turn ceramic cartridge, No flow restrictor, Threaded hose end, Spout with pail hook, 146 mm (5-3/4") spout reach, 273 mm (10-3/4") high, Top brace, 60 mm (2-3/8") lever handle with indexed buttons, Less drain, Atmospheric vacuum breaker is not intended for continuous pressure applications.

2.03 ACCEPTABLE MANUFACTURERS

.1 Subject to compliance with requirements, manufacturers that may be incorporated into the Work include, but are not limited to, following:

.1 Flush Valves:

.1 Sloan

.2 Delta Commercial;

.2 Plumbing Brass:

.1 Moen Commercial.

.3 Stainless Steel Sinks:

.1 Franke Commercial;

.2 Novanni Commercial;

.3 Elkay;

.4 Arch Metal Ind.

.4 Drain Fittings, Angle Supplies, and Traps:

.1 McGuire;

.2 Delta Commercial;

.3 Zurn Industries.

.5 Fixture Carriers:

.1 Watts Industries;

.2 Jay R. Smith;

.3 Zurn Industries.

.6 Water Closets, Lavatories, and Urinal:

.1 American Standard;

.7 Thermostatic Mixing Valves:

.1 Lawler;

.8 Shower and Associated Trim:

.1 Acorn;

.2 Bradley.

.9 Toilet Seats:

.1 Centoco;

.10 Electronic “No Touch” Flush Valves:

.1 Sloan;

.2 Delta Commerical;

.11 Washfountains; Multilavs:

.1 Acorn

2.04 CAULKING

.1 General Electric Series SCS-1200 Silicone Construction Sealant or Dow Corning 780 silicone rubber sealant with primers as recommended by sealant manufacturer. Caulking colour(s) for coloured fixtures other than white, if any, will be selected by Consultant from sealant manufacturer’s standard colour range.

3 EXECUTION

3.01 DEMOLITION

.1 Refer to demolition requirements specified in Section entitled Demolition and Revision Work.

3.02 INSTALLATION OF PLUMBING FIXTURES AND FITTINGS

.1 Provide required plumbing fixtures and fittings.

.2 Where new fixtures and fittings are to be connected to existing piping, include for required piping revisions.

.3 Connect plumbing fixtures and fittings with minimum piping sized in accordance with below. Refer to manufacturer's published connection (rough-in) requirements. Where manufacturer requires piping connection larger than shown below, provide piping accordingly:

FIXTURE AND/OR FITTING	DRAIN SIZE MM (IN.)	VENT SIZE MM (IN.)	DHW SIZE MM (IN.)	DCW SIZE MM (IN.)	TEMP WATER SIZE MM (IN.)
Water Closets Flush Valve Type	100 (4)	38 (1-½)	----------	25 (1)	----------
Lavatories	32 (1-¼)	32 (1-¼)	12 (½)	12 (½)	----------
Prefab. Mop Sinks with Drain	75 (3)	38 (1-½)	20 (¾)	20 (¾)	----------

.4 Confirm exact location of plumbing fixtures and trim prior to roughing-in. Refer to architectural plan and elevation drawings.

.5 When installation is complete, check, and test operation of each fixture and fitting. Adjust or repair as required.

.6 For barrier-free fixtures, comply with mounting height and other requirements of governing Code(s).

.7 Supply templates for counter mounted fixtures and trim and hand to trades who will cut the counter. Ensure openings in counter are properly located.

.8 For electronic flush valves, locate transformer in ceiling space above electronic units to be served. Coordinate locations with electrical trade who will provide 120 volt line supply to transformers. Provide low voltage wiring from transformers to each electronic flush valve terminal point. Electrical line supply and low voltage wiring is to be concealed and access to transformer must be provided for servicing.

.9 Confirm exact mixing valve and shower head locations prior to roughing-in.

3.03 CAULKING AT PLUMBING FIXTURES AND FITTINGS

.1 Caulk around plumbing fixtures and fittings where they contact walls, floors, and any other building surface.

.2 Clean areas/surfaces to be caulked and prime in accordance with sealant manufacturer’s instructions. Where damage to a building surface may occur, mask surface to prevent damage and ensure a clean exact edge to the caulking bead.

.3 Apply caulking using a gun with proper size and shape of nozzle and force sealant into joints to ensure good surface contact and a smooth and even finished bead of sealant.

.4 If joints have been masked sealant may be tooled in a continuous stroke to obtain complete void filling. Remove masking tape immediately after tooling and before sealant begins to skin.

3.04 DISHWASHER CONNECTIONS

.1 Provide roughed-in water and drain connections for where Owner supplied dishwasher consisting of:

.1 15 mm (½") dia. domestic hot water connection with a Dahl "Mini-Ball" valve with hose end and water hammer arrestor;

.2 40 mm (1-½") dia. DWV copper drain connection with “P” trap and cleanout plug.

3.05 CLOTHES WASHER CONNECTIONS

.1 Provide roughed-in water and drain connections for where Owner supplied clothes washer consisting of:

.1 15 mm (½") dia. piping connection for both hot and cold water, each terminated in a Dahl "Mini-Ball" Valve with hose end and water hammer arrestor;

.2 50 mm (2”) dia. standing waste with a height to suit the washer drain and complete with a “P” trap.

END OF SECTION

1. GENERAL

1.01 RELATED WORK SPECIFIED IN OTHER SECTIONS

.1 The following work which is related to the work of this Section is specified in other Sections of the Specification:
- .1 supply of piping or equipment mounted temperature control components;
- .2 domestic water piping connections to equipment;
- .3 drainage piping connections to equipment drain pans;
- .4 provision of boilers;
- .5 provision of site applied thermal insulation for piping and equipment;
- .6 circulating system testing, adjusting and balancing.

1.02 SUBMITTALS

.1 Submit shop drawings for all products specified in this Section.

.2 Submit certified performance curves with all pump shop drawings.

2. PRODUCTS

2.01 CIRCUIT BALANCING VALVES

.1 Tour & Andersson Series 787 threaded and Series 788 flanged for precise flow measurement, balancing, and positive shut-off with no drip seat. Each valve to be wye pattern, globe style with self-sealing EPDM measurement points, EPDM seat, and wheel handles with locking tamper-proof setting.

.2 Circuit balancing valves shall be sized based on design water flow and manufacturer's performance data. Refer to the following circuit balancing valve schedule for sizes.

Size (in)	Nominal Flow			
	Min. (gpm)	Max. (gpm)	Min. (l/s)	Max. (l/s)
1/2	0.6	2.8	0.038	0.177
3/4	2.0	6.0	0.126	0.379
1	3.9	10.0	0.246	0.631
1-1/4	5.0	15.0	0.316	0.947
1-1/2	6.6	20.0	0.416	1.262
2	12.6	36.0	0.795	2.272
2-1/2	38.0	100.0	2.398	6.310
3	31.0	130.0	1.956	8.203
4	68.0	200.0	4.291	12.620
5	90.0	320.0	5.679	20.192
6	182.0	450.0	11.48	28.395

.3 Acceptable manufacturer is Tour & Anderson (TA Hydronics) only.

2.02 PRESSURE RELIEF VALVES

.1 Dresser Industries Canada Ltd., "CONSOLIDATED", ASME tested, rated and certified, cast iron, bronze fitted, 1725 kPa rated pressure relief valves, each capable of relieving the full output of the equipment it is associated with, and factory set at 105% (percent) times the system pressure at the point in the system where the pressure relief valve is installed.

.2 Acceptable manufacturers are Dresser Industries Canada Ltd., Watts Industries, Kunkle, Spirax Sarco Canada Ltd., Singer Valve Co. Ltd., and Lonergan.

2.03 SHUT-OFF VALVES

.1 Ball Type

.1 Class 600, 4140 kPa (600 psi) WOG rated full port ball valves, each complete with a forged brass or bronze body and cap, blowout-proof stem, solid forged brass chrome plated ball, "Teflon" or "PTFE" seat, threaded ends, and removable lever handle.

.2 Acceptable products are:

.1 Toyo Valve Co. Fig. 5044A;

.2 Watts Industries (Canada) Inc. #FBV-3;

.3 Kitz Corp. Code 58;

.4 Apollo Valve #77-100.

.2 Butterfly Type

.1 Cast ductile iron, lug body style, 1200 kPa (175 psi) rated butterfly valve, each complete with a neck to permit 50 mm (2") of insulation above the flange, a field replaceable EPDM seat, ductile iron disc, stainless steel shaft with EPDM seal, a lever handle for valves to and including 150 mm (6") diameter, a handwheel and gear type operator for valves larger than 150 mm (6") diameter, and each suitable for bubble-tight dead end service with valve closed and either side of connecting piping removed.

.2 Acceptable products are:

.1 DeZurik of Canada Ltd., Figure No. 632;

.2 Apollo Valve 143 Series;

.3 Watts Industries (Canada) Inc. #BF-03;

.4 Kitz Corp. 6112 Series;

.5 Toyo Valve Co. 918DESL/G2.

2.04 SWING CHECK VALVES

.1 Bronze - Screwed

.1 Class 125, 1380 kPa (200 psi) WOG rated horizontal swing check valves, each complete with a "Y" pattern bronze body, hinged brass disc, easy access screw-in cap, and screwed ends.

.2 Acceptable products are:

.1 Toyo Valve Co. Fig. 236;

.2 Nibco #T-433;

.3 Kitz Corp. Code No. 22.

.2 Cast Iron - Screwed and Flanged

.1 Cast iron, bronze trim, 1380 kPa (200 psi) rated swing check valves, each complete with a bronze disc and seat, malleable iron hinge, bolted cover, and screwed or flanged ends as required.

.2 Acceptable products are:

.1 Toyo Valve Co. Fig. 435A;

.2 Watts Industries (Canada) Inc. #F-511;

.3 Kitz Corp. Code No. 78.

2.05 VERTICAL LIFT CHECK VALVES

.1 Class 150, 1380 kPa (200 psi) WOG rated bronze vertical lift check valves, each complete with screwed ends and a bronze disc.

.2 Acceptable products are:

.1 Toyo Valve Co. Fig. 231;

.2 Watts Industries (Canada) Inc. #600;

.3 Kitz Corp. Code No. 36.

2.06 WAFER CHECK VALVES

.1 Threaded lug body type, full bore, ANSI Series 150, 1965 kPa (285 psi) rated at 38°C (100°F), non-slam wafer check valves, each complete with a carbon steel body, stainless steel discs, a shaft, springs, disc stop and thrust bearings constructed of type 316 stainless steel, and seat materials to suit the application. The inside diameter of the valve must equal the inside diameter of the connecting pipe.

.2 Acceptable products are:

.1 Gulf Valve Co. "WAFER CHECK";

.2 Watts Industries (Canada) Inc. Series ICV-125;

.3 The Metraflex Co. Style CVXX.

2.07 DRAIN VALVES

.1 Minimum 2070 kPa (300 psi) WOG rated, 20 mm (¾") diameter straight pattern bronze ball valves, each complete with a threaded outlet suitable for coupling connection of 20 mm (¾") diameter hose, and a cap and chain.

.2 Acceptable products are:

.1 Toyo Valve Co. Ltd. Fig. 5046;

.2 Watts Industries (Canada) Inc. #B-6000-CC;

.3 Kitz Corp. Code No. 68AC;

.4 Apollo Valves #78-104-01.

2.08 AIR VENTS

.1 Automatic Air Vents:

.1 Float actuated air vents, each complete with a semi-steel body and cap, a stainless steel float assembly and seat, and a neoprene head.

.2 Acceptable products are:

.1 Spirax Sarco Ltd., Type 13 W for system working pressures to 1035 kPa (150 psi), 13 WH for system working pressures greater than 1035 kPa (150 psi);
.2 Armstrong International Inc. No. 1-AV.

2.09 STRAINERS

.1 Cast iron wye shaped strainers, minimum 890 kPa (125 psi) rated and complete with a removable type 304 stainless steel screen with perforations sized to suit the application, and, for strainers 50 mm (2") diameter and larger, a blowdown pipe connection tapping.

.2 Acceptable products are:

.1 Spirax Sarco Ltd. Type IF-125 screwed or Type AF-250 flanged;

.2 Toyo Valve Co. Ltd. Fig. 380A screwed or Fig. 381 flanged;

.3 Armstrong International Inc. A1 Series;

.4 Watts Industries (Canada) Inc. #77SCI;

.5 Mueller Steam Specialty Products Model 11M screwed or Model 758 flanged.

3. EXECUTION

3.01 DEMOLITION

.1 Perform required hydronic piping system demolition/revision work. Refer to demolition requirements specified in Section entitled Demolition and Revision Work.

3.02 HEATING WATER PIPING INSTALLATION REQUIREMENTS

.1 Provide all required heating water piping.

.2 Pipe, unless otherwise noted, shall be mild black steel, Schedule 40 for pipe to 8” (200 mm) diameter, Schedule 30 for pipe 10” to 18” (250 mm to 450 mm) diameter, and Schedule 20 for pipe 20" to 24” (500 mm to 600 mm) diameter.

.3 Piping to and including 2” (50 mm) diameter shall be screwed. Piping 2-1/2” (65 mm) diameter and larger shall be welded.

.4 Slope horizontal mains to provide a minimum continuous up-grade of 1” (25 mm) in 20’ (6 m) to high points. Slope branch supply and return piping connections to equipment a minimum of 1” (25 mm) in 4’ (1.2 m).

.5 Provide shut-off valves in piping connections to equipment, to isolate piping risers, to isolate other sections of systems as shown, and wherever else indicated on drawiTOngs. Valves in piping to and including 50 mm (2") dia. are to be ball type. All other shut-off valves are to be ball or butterfly type unless otherwise specified. Locate valves so they are easily accessible. Wherever possible, install valves at uniform height. Provide chain operators for valves which are inaccessible for operation from floor level.

.6 Provide an air relief vent in the high points of closed loop piping systems if the piping is not adequately vented into equipment.

.7 Provide circuit balancing valves in piping generally where shown on the drawings but with exact locations in accordance with instructions of personnel doing system flow balancing work. Confirm locations prior to installation. Balancing valves shall be sized according to design flow Ensure that balancing valves are a minimum of 10 pipe diameters downstream of any pump or fitting and a minimum of 5 pipe diameters upstream of any fitting.

.8 Pipe the discharge of each liquid piping safety relief valve to drain unless otherwise shown or specified.

.9 Check and test the operation of each liquid piping safety relief valve. Replace defective

.10 Install automatic control valves, piping wells and similar piping and/or equipment mounted control components required for automatic temperature control systems supplied as part of the work specified the Section 25 05 05. Refer to the drawing control diagrams.

3.03 INSTALLATION OF PRESSURE RELIEF VALVES

.1 Provide factory set pressure relief valves. Pipe discharge of each water piping relief valve to drain unless otherwise shown or specified.

.2 Confirm relief valve settings.

3.04 INSTALLATION OF AUTOMATIC AIR VENTS

.1 Provide automatic air vent at the highest point of each heating water system; including glycol water heating system.

.2 Connect discharge pipe from the automatic air vent to the nearest floor drain in accordance with the local authorities Building Code.

3.05 INSTALLATION OF STRAINERS

.1 Provide strainers in piping. Locate strainers so baskets are easily accessible and removable. Clean strainer baskets during and after piping system flushing and cleaning is complete, and before water quantity balancing commences.

3.06 TESTING, ADJUSTING AND BALANCING

.1 Testing, adjusting and balancing for liquid heat transfer systems shall be performed by a Balancing Contractor retained directly by the Board and is not included in the mechanical contracts.

.2 The Mechanical Contractor shall co-operate with the Balancing Contractor and provide whatever assistance the Balancing Contractor may require in order to complete the work.

.3 Prepare the systems for balancing as follows:
- .1 open all valves to the fully open position;
- .2 check expansion tanks to ensure that they are not air bound and that the systems are full, check all air vents to ensure that they are installed properly and are operating freely and that all air is removed from the circulating systems, check operation of pumps, and check all strainer baskets to ensure that they are clean;
- .3 set all temperature controls so that all heat transfer equipment is operating at full output;
- .4 check the operation of automatic valves and adjust as required.

.4 The Consultant will spot check at the site, the results of the testing and balancing agency's testing and balancing report. Attend the spot checks.

.5 A copy of the approved testing and balancing report will be forwarded to you by the Consultant. Include a copy of the report in each copy of operating and maintenance manuals.

END OF SECTION

1 GENERAL

1.01 SUBMITTALS

.1 Submit shop drawings/product data sheets for all products specified in this Section except shop fabricated ductwork and fittings.

.2 Include capacity, throw and terminal velocity, noise criteria, and pressure drops with grille and diffuser shop drawing/product data sheet submission.

.3 Submit duct leakage test data prior to ductwork being covered from view.

1.02 QUALITY ASSURANCE

.1 Grilles and diffusers are to be tested and performance certified to ANSI/ASHRAE 70, Method of Testing the Performance of Air Outlets and Air Inlets.

2 PRODUCTS

2.01 GALVANIZED STEEL DUCTWORK

.1 Galvanized steel sheet is to be hot dipped in accordance with requirements of ASTM A653. G60 galvanizing for bare uncovered duct to be finish painted. G90 for all other galvanizing.

.2 Rectangular

.1 Lock forming grade hot dip galvanized steel, ASTM A653, shop fabricated, minimum #26 gauge.

.3 Round

.1 Factory machine fabricated, spiral, mechanically locked flat seam, single wall duct, fittings and couplings.

2.02 RECTANGULAR ALUMINUM DUCTWORK

.1 Alloy 3003 Temper H14 aluminum, ASTM B209, shop or factory fabricated, water-tight, with metal gauges and fabrication in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible to suit the duct working pressure classification, and type 316 stainless steel support hardware.

2.03 ROUND ALUMINUM DUCTWORK

.1 Alloy 3003 Temper H14 aluminum, ASTM B209, factory fabricated, water-tight, smooth interior, single wall duct, and fittings of spiral lockseam construction with site sealed beaded sleeve (slip type) joints, all in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible to suit duct working pressure classification, and type 316 stainless steel sheet metal screws and support hardware.

2.04 FLEXIBLE CONNECTION MATERIAL

.1 Waterproof, indoor-outdoor type flexible connection material meeting requirements of NFPA 90A, consisting of woven glass fibre fabric coated on both sides with synthetic rubber. Acceptable products are:

.1 Duro Dyne Canada Inc. "DUROLON";

.2 Dyn Air Inc. "HYPALON".

.2 Waterproof, flameproof, high temperature flexible connection material meeting requirements of NFPA 90A, consisting of a woven glass fibre fabric coated on both sides with silicone rubber. Acceptable products are:

.1 Duro-Dyne Canada Inc. "THERMAFAB";

.2 Dyn Air Inc. "SILICON HI-T".

2.05 FLEXIBLE METALLIC DUCTWORK

.1 Bare

.1 Spirally wound, semi-rigid, self-supporting corrugated aluminum duct with continuous triple lock seams, SMACNA Form "M-UN", ULC S110 listed and labelled as a Class 1 Air Duct, constructed of dead soft aluminum strip, and supplied in 3 m (10') lengths.

2.06 FLEXIBLE CONNECTION MATERIAL

.1 Waterproof, indoor-outdoor type flexible connection material meeting requirements of NFPA 90A, consisting of woven glass fibre fabric coated on both sides with synthetic rubber. Acceptable products are:

.1 Duro Dyne Canada Inc. "DUROLON";

.2 Dyn Air Inc. "HYPALON".

2.07 METAL DUCT SYSTEM JOINT SEALANT

.1 ULC listed and labelled, premium grade, grey colour, water base, non-flammable duct sealer, brush, or gun applied, with a CAN/ULC S102 tested maximum flame spread rating of 5 and smoke developed rating of 0.

.2 Acceptable manufacturers are:

.1 Johns Manville;

.2 Manson Insulation;

.3 Knauf Insulation.

2.08 ACOUSTIC LINING

.1 Minimum 25 mm (1") thick acoustic lining material meeting 25/50 flame spread and smoke developed ratings tested in accordance with CAN/ULC S102, meeting NFPA 90A, ASTM C1071, and ASTM G21 requirements, not supporting microbial growth, flexible for round ducts, board type for rectangular ducts, consisting of a bonded fiberglass mat coated on inside (airside) face with a black fire-resistant coating.

.2 Acceptable manufacturers are:

.1 Johns Manville;

.2 Manson Insulation;

.3 Knauf Insulation.

2.09 CASING AND PLENUM MATERIAL AND ACCESSORIES

.1 Unless otherwise specified, casing and plenum material is to be same as connecting duct material.

.2 Accessories such as access doors and drain pans are to be constructed of same material as casing and plenum and are to be in accordance with Chapter 6 of SMACNA HVAC Duct Construction Standards Metal and Flexible.

2.10 PLENUM ACCESS DOORS

.1 Factory fabricated, double wall insulated access doors, sized as indicated on drawings, and constructed of same material as connecting ductwork in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible to suit operating pressure of the system.

2.11 ROUND TO RECTANGULAR DUCT CONNECTIONS

.1 Equal to Flexmaster Canada Ltd. galvanized steel, flared, flanged or notched "Spin-On" round duct take-off collars with locking dampers in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.

2.12 SPLITTER DAMPERS

.1 Minimum #20 gauge damper blade constructed of same material as duct, reinforced as required to suit blade size, system velocity, and to prevent "chatter", and complete with operating hardware equal to DynAir Inc. #Q-50 "DYN-A-QUAD S-S" quadrant regulator with RW-50 backup washers to prevent leakage, long square bearing pin, and slide pin.

2.13 AIR TURNING VANES

.1 For square elbows, multiple-radius turning vanes interconnected with bars, adequately reinforced to suit pressure and velocity of system, constructed of same material as duct they are associated with, and in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.

.2 For short branch ducts at grille and diffuser connections, air extractor type each equipped with a matching bottom operated 90° opposed blade volume control damper, constructed of same material as duct it is associated with and in accordance with requirements and details in ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.

2.14 MANUAL BALANCING (VOLUME) DAMPERS

.1 Flanged and drilled, single or parallel blade (depending on damper size) manual balancing dampers, each constructed of same material as connecting ductwork unless otherwise specified, each designed to maintain internal free area of connecting duct, and each complete with:

.1 hexagonal or square shaft extension through frame;

.2 non-stick, non-corrosive synthetic bearings for rectangular dampers, flange stainless steel bearings for round dampers;

.3 blade stops for single blade dampers, designed to prevent blade from moving more than 90°;

.4 linkage for multiple blade dampers;

.5 locking hand quadrant damper operator with, for insulated ducts 50 mm (2") standoff mounting.

.2 Rectangular Dampers: Nailor Industries Inc. 1800 Series, maximum size 1.2 m x 1.2 m (4' x 4') for a single damper.

.3 Round Dampers: Nailor Industries Inc. Model 1890, maximum 600 mm (24") diameter, equipped with a minimum 200 mm (8") deep frame, and blade stiffeners where required.

.4 Multiple Rectangular Damper Section Assembly: Rectangular assembly supplied with the dampers or site constructed, of same material as damper and designed for tight and secure mounting of individual dampers.

.5 Acceptable manufacturers are:

.1 Nailor Industries Inc.;

.2 T.A. Morrison & Co. Inc. "TAMCO";

.3 NCA Manufacturing Ltd.;

.4 Greenheck Fan Corp.;

.5 Ruskin Co.

2.15 BACKDRAFT DAMPERS

.1 Nailor Industries Model 1370CB counterbalanced backdraft dampers, vertical or horizontal mounting, 50 mm (2") wide, sized as shown and complete with:

.1 extruded 6063-T5 aluminum frame, 2.3 mm (0.090") nominal wall thickness, with mitred corners;

.2 extruded 6063-T5 aluminum blades, 1.3 mm (0.050") nominal wall thickness on 92 mm (3-5/8") centres, and with extruded PVC blade seals;

.3 corrosion-resistant synthetic bearings;

.4 adjustable plated steel counterweights mounted internally in the airstream;

.5 concealed blade linkage located out of the airstream.

.2 Acceptable manufacturers are:

.1 Nailor Industries Inc.;

.2 T.A. Morrison & Co. Inc. "TAMCO";

.3 NCA Manufacturing Ltd.;

.4 Greenheck Fan Corp.;

.5 Ruskin Co.;

.6 Alumavent.

2.16 FUSIBLE LINK DAMPERS

.1 Curtain blade type, dynamic, galvanized steel (unless otherwise specified) fusible link dampers, ULC classified to CAN/ULC S112 and in accordance with NFPA 90A requirements, factory tested for closure under airflow, 1-1/2 hour or 3 hour rated as required, and complete with a constant force type 301 stainless steel closure spring, a blade lock assembly, a steel sleeve, retaining angles, and, unless otherwise specified, a 74°C (165°F) rated standard fusible link.

.2 Fusible link dampers are to be Type "B" or Type "C" (as required) with folded curtain blade out of air stream except where damper size or location requires use of type "A" dampers with curtain blade in air stream.

.3 Acceptable manufacturers are:

.1 Nailor Industries Inc.;

.2 Greenheck Fan Corp.;

.3 NCA Manufacturing Ltd.;

.4 Ruskin Co.;

.5 Price Industries (E.H. Price);

.6 Alumavent.

2.17 COMBINATION FIRE/SMOKE DAMPERS

.1 Nailor Industries Series 1220, ULC listed to CAN/ULC S112 and CAN/ULC S112.1, meeting requirements of NFPA 80, 90A, 92, 101 and 105, consisting of type A, B, or C fusible link fire dampers as required and a fail-safe, opposed blade, normally closed, motor operated smoke damper complete with factory installed and tested 120 V electric actuator.

.2 For applications where supply or return ducts terminate at a grille, at your option, provide:

.1 Nailor Industries 1221-OW “out of wall” high performance combination fire/smoke damper, ULC listed to CAN/ULC S112 and CAN/ULC S112.1, meeting requirements of NFPA 80, 90A, 92, 101 and 105, consisting of type A, B, or C fusible link fire dampers as required and a fail-safe, opposed blade, normally closed, motor operated smoke damper complete with factory installed and tested 120 V electric actuator accessible through the front supply/return grille, intumescent thermal insulation on all sides of sleeve.

.2 Nailor Industries 1221G combination fire/smoke damper for grilles, ULC listed to CAN/ULC S112 and CAN/ULC S112.1, meeting requirements of NFPA 80, 90A, 92, 101 and 105, consisting of type A, B, or C fusible link fire dampers as required and a fail-safe, opposed blade, normally closed, motor operated smoke damper complete with factory installed and tested 120 V electric actuator accessible through the front supply/return grille, grille mounting flanges. Coordinate grille size and mounting with damper requirements.

.3 ULC 1-1/2 hour fire rated and ULC Class I leakage rated for smoke, and equipped with a 74°C (165°F) ULC classified fusible link that will cause damper to close and lock independent of actuator when duct temperature reaches maximum temperature of damper assembly.

.4 Supply damper with factory installed sleeves of minimum 400 mm (16") length, field verified by contractor dependent on wall thickness. Caulk sleeves to ULC requirements and constructed of 20 gauge for sizes up to 2.1 m (84") wide and 18 gauge for sizes greater than 2.1 m (84") wide.

.5 Acceptable manufacturers are:

.1 Nailor Industries Inc.;

.2 Greenheck Fan Corp.;

.3 NCA Manufacturing Ltd.;

.4 Ruskin Co.;

.5 Price Industries (E.H. Price).

2.18 MOTORIZED DAMPERS

.1 TAMCO Series 9000 BF low leakage/thermal break thermally insulated air foil damper capable of achieving a 6.7 cfm/sq. ft. (34 l/s/sq. m.) at – 40 °F (– 40 °C) leakage rate at 4” (1 kPa) differential pressure and bearing the AMCA certification seal for air leakage and complete with:

.1 0.080” (2.03 mm) thick 4” (100 mm) deep extruded aluminium insulated frame with extruded TPE thermoplastic seals on the sides of the frame. Entire frame shall be thermally broken by means of polyurethane resin pockets, complete with thermal cuts;

.2 extruded aluminium, broken frame damper blade internally insulated with non-CFC expanded polyurethane foam, with EPDM gasketed blade seals integrally secured to the damper blade;

.3 acetal copolymer (Celcon) and polycarbonate bearings with no metal-to-metal contact;

.4 out-of-airstream linkages and crank arms constructed of aluminium and corrosion resistant, zinc & nickel plated steel, complete with cup-point trunnion screws.

.2 Dampers shall be sized for "flanged" installation (damper blade area to be equal to duct or plenum cross section area).

.3 Acceptable damper manufacturer is TAMCO only.

2.19 DUCT ACCESS DOORS

.1 In accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, with sizes suitable in all respects for purpose for which they are provided, and, unless otherwise specified, constructed of same material as duct they are associated with.

2.20 DUCTWORK DRAIN POINTS

.1 Equal to Ductmate Canada Ltd. "Moisture Drain", 20 mm (¾") diameter moisture drains with galvanized sheet metal funnel, and chrome plated brass threaded drain, nut and cap.

2.21 INSTRUMENT TEST PORTS

.1 Equal to Duro-Dyne of Canada Ltd. #IP1 or #IP2 (to suit insulation thickness where applicable) gasketed, leakproof instrument test ports for round or rectangular ducts as required, each complete with a neoprene expansion plug and a plug securing chain.

2.22 LOUVRES

.1 Price Industries Inc. DE439 or DE635, 100 mm (4") or 150 mm (6") deep (to suit wall thickness) factory assembled stationary, drainable, storm-proof louvres sized as indicated on drawings, each AMCA water penetration and air performance certified, constructed of welded, extruded, alloy 6063-T5 aluminum with drainable blades, mounting and securing hardware to suit the application, and 12 mm (½") mesh aluminum birdscreen in an aluminum frame.

.2 Louvres are to be factory finished with a finish equal to PPG Industries "Duranar" fluoropolymer powder coating over primer with colour as selected from manufacturer’s standard colour range.

.3 Acceptable manufacturers are:

.1 Price Industries Inc.;

.2 The Airolite Co. LLC;

.3 Construction Specialities;

.4 Nailor Industries Inc.;

.5 Greenheck Fan Corp.

2.23 LOUVRE BLANK-OFF PANELS

.1 Insulated, framed, sandwich construction panels consisting of 40 mm (1-½") thick rigid insulation (meeting NFPA 90A requirements) between minimum #20 gauge galvanized sheet steel with exterior face of panels finished to match finish of exterior wall louvres.

2.24 GRILLES AND DIFFUSERS

.1 Grilles and diffusers of type, size, capacity, finish, and arrangement as shown on drawings and in accordance with drawing schedule, each equipped with all required mounting and connection accessories to suit mounting location and application.

.2 Acceptable manufacturers are:

.1 Price Industries Inc.;

.2 Anemostat;

.3 Krueger Division of Air System Components Inc.;

.4 Titus;

.5 Nailor Industries Inc.;

.6 Tuttle & Bailey;

.7 Metalaire.

2.25 WALL BOXES

.1 Equal to Zonex model SWB in accordance with the drawing schedule and the following requirements:

.1 Constructed from 26 gauge galvanized steel and sealed, leak-proof construction;

.2 5/8” mounting flange;

.3 Integral backdraft damper;

.4 Integral condensation run-offs;

.5 Wall box grilles (model SWBG) to suit wall box size, construction from aluminium and complete with an integral drainage slot.

3 EXECUTION

3.01 CLEANLINESS REQUIREMENTS FOR HANDLING AND INSTALLATION OF DUCTWORK

.1 Handle and install ductwork in accordance with SMACNA's Duct Cleanliness for New Construction Guidelines at the Advanced Level.

3.02 FABRICATION AND INSTALLATION OF GALVANIZED STEEL DUCTWORK

.1 Provide required ductwork, rectangular, round and/or flat oval. Where rectangular ductwork is shown, round or flat oval ductwork of equivalent cross-sectional area is acceptable.

.2 It is to be understood that all duct dimensions shown on drawings are clear internal dimensions.

.3 Confirm routing of all ductwork at site and site measure ductwork prior to fabrication. Duct dimensions may be revised to suit site routing and building element requirements, if dimension revisions are reviewed with and approved by Consultant. Duct routing and/or dimension revisions to suit conditions at site are not grounds for a claim for an extra cost.

.4 Refer to structural drawings. Where ductwork is to be run within or through open web steel joists, ductwork shown on mechanical drawings is schematic only and is to be altered as required to suit steel joist configuration, spacing, panel points, and cross-bridging at no additional cost.

.5 Wherever ductwork is required at locations where sprayed fireproofing is applied to building construction, install ductwork only after fireproofing work is complete and do not compromise fire rating of sprayed fireproofing.

.6 Install (but do not connect) duct system mounted automatic control components supplied as part of the automatic control work.

.7 Where indicated, provide duct connections to fan powered heat transfer equipment with integral coils.

.8 Flange connect ductwork to hot water reheat coils in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible. Coils will be suspended independent of connecting ductwork as part of the heat transfer work.

.9 Support horizontal rectangular ducts inside building in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, but use trapeze hangers with, unless otherwise specified, galvanized steel channels, and galvanized steel hanger rods for exposed ducts and concealed ducts wider than 500 mm (20"). Support hardware constructed of same material as duct for metal duct, and, unless otherwise specified, type 316 stainless steel for non-metal duct. Supports for "heavy" duct such as cementitious core duct is to be suitable in all respects for the application and approved by Consultant.

.10 Support round and flat oval ducts inside building in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, but, unless otherwise specified, for both uninsulated and insulated ducts exposed in finished areas, use bands and secure at top of duct to a hanger rod, all similar to Ductmate Canada Ltd. type "BA". If duct is insulated, size strap to suit diameter of insulated duct. Unless otherwise specified, duct support hardware for metal duct is constructed of same material as duct, and for non-metal duct, type 316 stainless steel.

.11 Where flanged duct joints are used, do not locate joints in wall or slab openings, or immediately at wall or slab openings. Do not use flanged joints for exposed uninsulated ducts in finished areas.

.12 Where watertight horizontal ductwork is required, construct ducts without bottom longitudinal seams. Solder or weld joints of bottom and side sheets. Seal all other joints with duct sealer. Slope horizontal duct to hoods, risers, or drain points. Provide drain points. Provide watertight ductwork for:

.1 shower exhaust ducts from grilles to duct main or riser;

.13 Seal all ductwork in accordance with SMACNA Seal Class "A", except for round duct with self-sealing gasketed fittings and couplings which does not require site applied sealant. Apply sealants by brush or gun to cleaned metal surfaces. Where bare ductwork is exposed apply neat uniform lines of sealant. Randomly brushed, sloppy looking sealant applications will be rejected and must be repaired or replaced with a neat application of sealant.

.14 Apply sealants by brush or gun to cleaned metal surfaces. Where bare ductwork is exposed apply neat uniform lines of sealant. Randomly brushed, sloppy looking sealant applications will be rejected and must be repaired or replaced with a neat application of sealant.

.15 Clean exterior exposed (uninsulated) ducts and coat with a heavy full coverage of Bakor #410-02 black metal paint.

.16 Where dissimilar metal ducts are to be connected, isolate ducts by means of flexible duct connection material.

3.03 INSTALLATION OF ALUMINUM DUCTWORK

.1 Provide aluminum ductwork, rectangular or round.

.2 Provide aluminium ductwork for:

.1 Shower exhaust.

.3 Wherever bare aluminum ductwork comes in contact with ferrous metal or copper, paint ferrous metal or copper surface with a heavy, 100% covering coat of zinc chromate paint, asphalt paint or otherwise isolate direct contact with the bare aluminum.

.4 Refer to "Commentary on Aluminum Ducts" in ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, however, do not use drive and S cleats for joining waterproof aluminum ductwork. Use following SMACNA joining methods:

.1 T-21 - welded flange;

.2 T-22 - companion angle and gasket;

.3 T-24A - flanged.

.5 Keep longitudinal joints at top surface of horizontal runs. Provide proper transverse supports to prevent deflection. Ensure duct is rigid.

.6 When mastic is used for sealing such as sealing longitudinal joints, apply mastic to both surfaces before they are mated. When dry, apply mastic again for a water-tight seal.

3.04 INSTALLATION OF FLEXIBLE DUCTWORK

.1 Provide maximum 3 m (10') long lengths of flexible ductwork for connections between galvanized steel duct mains and branches, and necks of ceiling grilles and diffusers. Do not install flexible ductwork through walls, even if shown on drawings.

.2 At rectangular galvanized steel duct, accurately cut holes and provide flanged or "Spin-in" round flexible duct connection collars. Seal joints with duct sealer.

.3 Install flexible ducts as straight as possible and support in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, and secure at each end with nylon or stainless steel gear type clamps, and seal joints. Provide long radius duct bends where they are required.

.4 Do not penetrate fire barriers with flexible duct.

3.05 INSTALLATION OF ACOUSTIC LINING

.1 Provide acoustic lining in ductwork in locations as follows:

.1 wherever shown and/or specified on drawings;

.2 all transfer air ducts.

.2 Install lining in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible, however, for all installations regardless of velocity, at leading and trailing edges of duct liner sections, provide galvanized steel nosing channel in accordance with detail entitled Flexible Duct Liner Installation found in the ANSI/SMACNA manual referred to above.

3.06 INSTALLATION OF CASINGS AND PLENUMS

.1 Provide required shop or site fabricated casings and plenums. Unless otherwise specified or shown, construct casings and plenums of same material as connecting duct system.

.2 Construct and install casings and plenums in accordance with Chapter 6 of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible to suit systems' pressure classification. Ensure plenums and casings secured to building structure are gasketed air-tight and equipped with angle reinforcing.

.3 Provide drain pans with accessible trapped drains for fresh air intake plenums, and wherever else shown.

3.07 INSTALLATION OF CASING AND PLENUM ACCESS DOORS

.1 Provide access doors into all site or shop fabricated casings and plenums requiring access, and wherever shown.

.2 Construct access doors to open in or out to suit positive and negative pressures of system.

.3 Provide pitot tube openings in access doors where required for system air quantity balancing purposes.

.4 Provide suitably sized, engraved, red-white laminated Lamacoid warning nameplates on access doors into casings and plenums where equipment is located, i.e. fans.

3.08 INSTALLATION OF ROUND TO RECTANGULAR DUCT CONNECTIONS

.1 Cut round holes in rectangular ducts and provide round to rectangular lock-in fittings with dampers for connection of flexible round ductwork.

3.09 INSTALLATION OF SPLITTER DAMPERS

.1 Provide splitter dampers in supply ductwork at branch duct connections off supply air mains, and wherever else shown and/or specified on drawings. Install splitter dampers so they cannot vibrate and rattle and so damper operation mechanisms are in an easily accessible and operable location. Ensure operators for dampers in insulated ducts are equipped with stand-off mounting brackets.

3.10 INSTALLATION OF TURNING VANES

.1 Provide turning vanes in ductwork elbows where shown on drawings and wherever else required where, due to site installation routing and duct elbow radius, turning vanes are recommended in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.

.2 Provide volume extractor type turning vanes in short branch supply duct connections off mains to grilles and diffusers where shown and/or specified.

3.11 INSTALLATION OF MANUAL BALANCING (VOLUME) DAMPERS

.1 Provide manual balancing dampers as required to provide a fully balanced system, including but not limited to in all open end ductwork, in all duct mains, and wherever else shown and/or specified.

.2 Install dampers so operating mechanism is accessible and positioned for easy operation, and so dampers cannot move or rattle. Ensure operating mechanisms for dampers in insulated ducts are complete with stand-off mounting brackets.

.3 Where a duct for which a balancing damper is required has dimensions larger than dimensions of maximum size volume damper available, provide multiple dampers bolted together in a properly sized assembly, or bolted to a heavy-gauge black structural steel angle or channel framework which is properly sized. Seal to prevent air by-pass, and provide connecting linkage.

.4 Confirm exact damper locations with personnel doing air quantity balancing testing work and install dampers to suit. Include for providing 5 additional dampers at no additional cost.

3.12 INSTALLATION OF BACKDRAFT DAMPERS

.1 Provide backdraft dampers.

.2 Install and secure dampers so they cannot move or rattle.

3.13 INSTALLATION OF FUSIBLE LINK DAMPERS

.1 Provide fusible link dampers. Ensure damper rating (1-½ or 3 hr.) is suitable for fire barrier it is associated with.

.2 Install dampers with retaining angles on all 4 sides of sleeve on both sides of damper and connect with ductwork in accordance with damper manufacturer’s instructions and details, and Code requirements.

.3 Provide expansion clearance between damper or damper sleeve and opening in which damper is required. Ensure openings are properly sized and located, and all voids between damper sleeve and opening are properly sealed to maintain rating of fire barrier.

.4 Where size of fire barrier opening requires use of a sectionalized fire damper assembly, provide multiple fusible link dampers (sized to CAN/ULC S112) bolted together in a properly sized assembly or bolted to a heavy-gauge black structural steel angle or channel framework.

3.14 INSTALLATION OF COMBINATION FIRE/SMOKE DAMPERS

.1 Provide combination fire/smoke dampers. Install dampers with retaining angles on all 4 sides of each side of damper, and, where required, connect with ductwork, all in accordance with damper manufacturer's instructions and details, and Code requirements.

.2 Coordinate damper installation with electrical work where electrical connections to damper actuators are specified.

3.15 INSTALLATION OF FLEXIBLE CONNECTION MATERIAL

.1 Provide a minimum of 100 mm (4") of flexible connection material where ducts, plenums, and/or easings connect to fans, and wherever else shown or specified.

.2 Rigidly secure a minimum of 75 mm (3") of duct material (minimum #24 gauge) to each edge of flexible fabric and to fan, duct, plenum, etc., in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible. Ensure connections to flexible fabric material are arranged and supported so as to not impose any external forces on the fabric.

3.16 INSTALLATION OF DUCT ACCESS DOORS

.1 Provide access doors in ductwork for access to all components which will or may need maintenance and/or repair, including reheat coils. Install in accordance with requirements of ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.

.2 Identify access doors provided for fusible link damper maintenance with "FLD" stencil painted or marker type red lettering and ensure doors are properly located for damper maintenance.

.3 When requested, submit a sample of proposed duct access doors for review.

.4 Where sectionalized fusible link dampers and/or balancing dampers are provided in large ducts, provide a plenum type access door to suit, and adequately reinforce ductwork to suit access door installed.

3.17 INSTALLATION OF INSTRUMENTS TEST PORTS

.1 Provide instrument test ports in all main ducts at connections to fans, plenums or casings, in all larger branch duct connections to mains, and wherever else required for proper air quantity balancing and testing.

.2 Locate test ports where recommended by personnel performing air quantity testing and balancing work.

3.18 INSTALLATION OF LOUVRES

.1 Provide louvres for wall openings.

.2 Install louvre assemblies and secure in place in accordance with manufacturer's instructions and details.

.3 Confirm exact louvre sizes and finish prior to ordering.

3.19 INSTALLATION OF LOUVRE BLANK-OFF PANELS

.1 Provide blank-off panels for inactive portions of exterior wall louvres.

.2 Secure panels in place with non-ferrous hardware so they cannot move or rattle, yet are easily removable.

.3 Confirm exact finish of panels prior to fabrication.

3.20 INSTALLATION OF GRILLES AND DIFFUSERS

.1 Provide grilles and diffusers. Wherever possible, grilles and diffusers are to be product of same manufacturer.

.2 Unless otherwise specified connect grilles and diffusers in accordance with requirements of SMACNA HVAC Duct Construction Standards Metal and Flexible.

.3 Exactly locate grilles and diffusers to conform to final architectural reflected ceiling plans and detailed wall elevations, and to conform to final lighting arrangement, ceiling layout, ornamental and other wall treatment.

.4 Equip supply diffusers having a basic 4-way or all round air pattern for operation in 1-, 2-, or 3-way pattern where indicated on drawings.

.5 Confirm grille and diffuser finishes prior to ordering.

3.21 INSTALLATION OF WALL BOXES

.1 Provide wall boxes and corresponding wall box grille.

.2 Install in accordance with manufacturer’s instructions.

3.22 DUCT SYSTEM PROTECTION, CLEANING AND START-UP

.1 Temporarily cover all open ends of ducts during construction.

.2 Remove all dirt and foreign matter from entire duct systems and clean duct system terminals and interior of air handling units prior to operating fans.

.3 Prior to starting any supply air handling system provide 50 mm (2") thick glass fibre construction filters at fan equipment in place of permanent filters.

.4 Provide cheesecloth over duct system inlets and outlets and run system for 24 hours, after which remove cheesecloth and construction filters, and install new permanent filters.

.5 Include all labour for a complete site walk-through with testing and balancing personnel following route of all duct systems to be tested, adjusted and balanced for the purpose of confirming proper position and attitude of dampers, location of pitot tube openings, and any other work affecting testing and balancing procedures. Perform corrective work required as a result of this walk-through.

END OF SECTION

1 GENERAL

1.01 SUBMITTALS

.1 Submit shop drawings/product data sheets for radiation units, including accessories, and any required control wiring schematics.

.2 Submit a site inspection and start-up report from manufacturer's representative as specified in Part 3 of this Section.

2 PRODUCTS

2.01 FIN-TUBE TYPE DIRECTION RADIATION

.1 Hot water fin-tube type direct radiation units with capacities/lengths as indicated on the drawings.

.2 Wall-fin convectors complete with:

.1 copper-aluminum elements consisting of minimum 32 mm (1-¼") IPS seamless copper tubing mechanically expanded into and permanently bonded to 110 mm (4-½") square plate type aluminum fins;

.2 enclosures, as indicated on drawings, each removable and constructed of #16 gauge cold rolled steel, factory cleaned, phosphatized and finished with primer, and equipped with stamped grilles, flush slip joint enclosure to enclosure joints where required, access doors for valve access, and any required enclosure trim such as column to column extension pieces, column enclosures, etc.;

.3 continuous minimum #20 gauge steel top support wall guard strip prime coat painted as for enclosure and arranged to maintain the top back edge of enclosure 20 mm (¾") from face of wall, enclosure supports with enclosure locks constructed and finished as for wall strip and designed to hook onto top strip, and steel element support cradles which attach to slots in wall guard strip;

.3 Acceptable manufacturers are:

.1 Engineered Air;

.2 Sigma Corporation;

.3 Modine Manufacturing Co..

3 EXECUTION

3.01 INSTALLATION OF FIN-TUBE DIRECT RADIATION UNITS

.1 Provide fin-tube type direct radiation units.

.2 Secure enclosure brackets in place at maximum 900 mm (35") centres and install element supports or cradles. Slope elements to ensure proper water circulating and to eliminate air. Ensure enclosures are level and plumb. Provide required enclosure accessories.

.3 Connect elements with piping. Provide radiator type valves in piping at each element or group of series connected elements, shut-off type in supply piping, balancing type in return piping. Unless otherwise noted or specified, locate valves and accessories inside enclosures or behind trim, and ensure valves are accessible.

.4 Where 2 or more heating elements are connected in series, join elements with piping the full size of the element tubes or use piping sized to supply pipe size and connect elements with eccentric fittings.

.5 Equip each element or group of series connected elements with a manual air vent installed in an accessible location.

END OF SECTION

1 GENERAL

1.01 SUBMITTALS

.1 Submit shop drawings/product data sheets for following:

.1 all control system components;

.2 identified schematic control diagrams with component identification, catalogue numbers, and sequence of operation for all systems;

.3 certified wiring diagrams for all systems.

.2 Submit following samples for review:

.1 control damper section with linkage, operator, and certified flow and leakage data;

.2 wall mounting control system flow diagram as specified in Part 2 of this Section;

.3 each type of thermostat to be used, each identified as to intended use.

.3 Submit a site inspection and start-up report from manufacturer's representative as specified in Part 3 of this Section.

.4 Submit written confirmation from control component manufacturer that site installation personnel are qualified and experienced in installation of components, and have parts and service availability on a 24/7 basis.

1.02 QUALITY ASSURANCE

.1 Control systems are to be installed by control component manufacturer or by licensed personnel authorized by control component manufacturer. Submit written confirmation from control component manufacturer.

.2 Control system installation company is to have local parts and service availability on a 24/7 basis.

.3 Control wiring work is to be performed by licensed journeyman electricians, or under direct daily supervision of journeyman electricians.

2 PRODUCTS

2.01 CONTROL DAMPER AND ACTUATORS

.1 Unless otherwise specified, control dampers are to conform to requirements specified in Section entitled HVAC Distribution.

.2 Actuators to be 24V only and operate on a 0-10VDC or 2-10VDC signal.

.3 Two-position (on/off) actuator are not acceptable.

.4 Each actuator shall be "fail safe" and complete with external adjustable stops to limit the length of stroke in either direction. Operators shall be mounted on adjustable brackets. Operating arms shall have double yoke linkages and double set screws for fastening to the damper shaft. Damper operators shall be selected to operate maximum damper loads of 20 sq. ft. (1.9 sq.m). Where damper sizes exceed this area rating, multiple damper operators shall be provided.

.5 Damper actuators shall be spring return to fail safe position.

.6 Equip operators for dampers connected into the building fire alarm system or to freeze protection with additional relays to permit the dampers to respond and go to the required position in less than fifteen (15) seconds upon receipt of signal.

.7 Damper actuators associated with air handling units shall operate on a 0-10 VDC signal only.

.8 Damper actuators exposed to the exterior elements shall be provided with a Belimo ZS-100 Series Weather Shield, or equivalent, weatherproof enclosure.

.9 Belimo MFT actuators are not acceptable.

.10 Acceptable actuator manufacturers are Siemens Building Technologies and Belimo.

2.02 AUTOMATIC CONTROL VALVES AND OPERATORS

.1 Each control valve must be suitable in all respects for the application, including system pressure, and must have design output and flow rates with maximum pressure drops as follows:

.1 heating water/glycol solution valves for coils: 7.5 kPa (1.1 psi);

.2 heating water valves for radiation units: 7.5 kPa (1.1 psi);

.2 Actuators to be 24V only and operate on a 0-10VDC or 2-10VDC signal.

.3 All valve actuators shall be spring return to fail safe position.

.4 Unless otherwise indicated control valves shall be fully modulating type with equal percentage characteristics. Two-position (On/Off) control valves are not acceptable. All valves are to have position indicators. Valves for outdoor applications must be suitable in all respects for the application.

.5 Automatic control valves for air handling systems and heat exchanger to be globe style valves.

.6 Automatic 3-way control valves to be globe style valves.

.7 Automatic 2-way control valves to be ball style valves.

.8 Unless otherwise specified, control valves in hydronic piping systems are to conform to requirements specified in Section entitled Hydronic Piping Specialties and Pumps.

.9 Each automatic control valve must provide the design output and flow rates at pressure drops compatible with equipment selected, must be suitable for the particular system working pressure, and shall be fitted with a position indicator and "fail-safe" operator capable of tight shut-off against the differentials imposed by the system.

.10 Heating valves shall be normally open unless otherwise noted. Cooling valves shall be normally closed unless otherwise noted.

.11 Butterfly type control valves with motorized gear operators will be acceptable where shown and/or specified on the drawings.

.12 Electric valve operators are to be equal to Belimo "EF Series" enclosed reversible gear type operators that can accept modulating control signals as required. Each is to be 1-phase AC, 120 or 24 volt as required or indicated, overload protected, and complete with an enclosure to suit the mounting location.

.13 Acceptable valve manufacturers are Siemens Building Technologies and Belimo.

2.03 FIELD DEVICES

.1 Components specified below are required for control of equipment and systems in accordance with drawing control diagrams and sequences of operation. Not all required components may be specified.

.2 Sensor/transmitter input devices must be suitable in all respects for the application and mounting location. Devices are as follows:

.1 unless otherwise specified, temperature sensors are to be resistance type, either 2-wire 1000 ohm nickel RTD or 2-wire 1000 ohm platinum RTD with accuracy (includes errors associated with sensor, lead wire, and A to D conversion), equipped with type 316 stainless steel thermowells for pipe mounting applications, as follows:

.1 chilled water, room temperature, and duct temperature points, ±1°C (±0.5°F);

.2 all other points, ±0.75°C (±1.3°F).

.2 space temperature sensor (public areas or secure areas) for measurement of space temperature of space temperature only in areas subject to vandalism as shown on the floor plans and/or as described in the Sequence of Operation. Sensor operating temperature range from 4°C to 60°C (40°F to 140°F). Stainless steel flat plate surface type with sensor epoxy-bonded to back of cover plate and tamperproof/secure concealed fasteners. Set-point adjustment is to be concealed behind the cover.

.3 outside air sensors designed and constructed for ambient temperatures and to withstand environmental conditions to which they are exposed, complete with a NEMA 3R enclosure, solar shield, and a perforated plate surrounding sensor element where exposed to wind velocity pressure;

.4 insertion duct mounting sensors type with lock nut and mounting plate, designed to mount in an electrical box (weather-proof with gasket and cover where outside) through a hole in duct;

.5 for ducts greater than 1.2 m (4') or for ducts where air temperature stratification occurs, averaging type sensors with multiple sensing points, and for plenums for applications such as mixed air temperature measurement to account for air turbulence and/or stratification, an averaging string of sensors with capillary supports on the sides of duct/plenum;

.6 factory solid-state relative humidity sensors with an element that resists contamination, weather-proof with a NEMA 3R enclosure for outside air applications, supplied with a type 304 stainless steel probe with mounting bracket and hardware for duct mounting, each complete with a factory calibrated humidity transmitter which is accurate (including lead loss and analog to digital conversion) to 3% between 20% to 80% RH at 25°C (77°F) and equipped with non-interactive span and zero adjustments, and a 2-wire isolated loop powered, 4-20 mA, 0 to 100% linear proportional output;

.7 carbon dioxide sensors for air quality control purposes having a maximum 20 second response time, suitable for operating conditions from 0°C to 50°C (32°F to 122°F) and 0 to 100% RH non-condensing, complete with a calibration kit (to be handed to Owner) and characteristics as follows:

.1 measurement range: 0 to 2000 ppm;

.2 accuracy: ±100 ppm;

.3 repeatability: ±20 ppm;

.4 drift: ±100 ppm per year;

.5 output signal: 0 to 10 VDC proportional over the 0 to 2000 ppm range.

.3 Pressure transmitters are to be constructed to withstand 100% pressure over-range without damage and to hold calibrated accuracy when subject to a momentary 40% over-range input. Pressure transmitters are to transmit a 0 to 5 VDC, 0 to 10 VDC, or 4 to 20 mA output signal. Differential pressure transmitters used for flow measurement are to be sized to the flow sensing device and supplied with a tee fitting and shut-off valves in the high and low sensing pick-up lines to allow permanent ease of use connection for balancing, etc. Transmitter housing is to suit mounting location. Standalone pressure transmitters are to be mounted in a minimum NEMA 1 (NEMA 2 in sprinklered area) by-pass valve assembly panel with high and low connections piped and valved, air bleed units, by-pass valves, and compression fittings. Transmitters are to be as follows:

.1 low differential water pressure, 0 to 5 kPa (0 to 20" wc): equal to Setra or Mamac industrial quality transmitter capable of transmitting a linear 4 to 20 mA output in response to variation of flow meter differential pressure or water pressure sensing points, each complete with non-interactive zero and span adjustments adjustable from outside the cover, and performance as follows:

.1 maintain accuracy up to 20 to 1 ratio turndown;

.2 reference accuracy: +0.2% of full scale.

.2 medium to high differential water pressure, over 5 kPa (20" wc): equal to Setra or Mamac transmitters as specified above for low pressure transmitters but with a pressure range of from 2.5 kPa (10" wc) to 2070 kPa (300 psi), a reference accuracy of ±1% of full span (includes non-linearity, hysteresis, and repeatability);

.3 building differential air pressure: equal to Setra or Johnson Controls Inc. industrial quality transmitter with a range suitable for the application, capable of transmitting a linear 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points, each complete with non-interactive zero and span adjustments adjustable from outside the cover, and performance as follows:

.1 maintain accuracy up to 20 to 1 ratio turndown;

.2 reference accuracy: +0.2% of full span.

.4 low differential air pressure, 0 to 1.25 kPa (0" to 5" wc): equal to Setra or Johnson Controls Inc. industrial quality transmitter with a range suitable for the application, capable of transmitting a linear 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points, each complete with non-interactive zero and span adjustments adjustable from outside the cover, and performance as follows:

.1 maintain accuracy up to 20 to 1 ratio turndown;

.2 reference accuracy: +0.2% of full span.

.5 medium differential air pressure, over 1.5 kPa (5" wc): equal to Setra or Johnson Controls Inc. transmitters as specified above for low pressure air transmitters but performance requirements as follows:

.1 zero and span: (c/o F.S./Deg. F); .04% including linearity, hysteresis, and repeatability;

.2 accuracy: 1% F.S. (best straight line); static pressure effect: 0.5% F. S.;

.3 thermal effects: <+0.33 F.S./°F over 40°F to 100°F (calibrated at 70°F).

.4 Air and water flow monitoring stations and probes are to be Air Monitor Corp., Tek-Air Systems Inc., Ebtron, or Dietrich Standard products as follows:

.1 Fan Inlet Air Flow Measuring Station: At fan inlet and near exit of inlet sound trap, air flow traverse probes are to continuously monitor fan air volume and system velocity pressure, and traverse probes are to be as follows:

.1 each probe is to be of a dual manifold, cylindrical, anodized type 3003 extruded aluminium construction probe with sensors located along the stagnation plane of approaching air flow, and the static pressure manifold is to incorporate dual offset static tops on opposing sides of averaging manifold so as to be insensitive to flow angle variations for as much as ±20° in approaching air stream;

.2 each probe is not to introduce a measurable pressure drop, nor is sound level within duct to be amplified by its singular or multiple presence in air stream, and each probe is to contain multiple static and total pressure sensors places at equal distances along its length in accordance with ASHRAE Standards for duct traversing.

.2 Single Probe Air Flow Measuring Sensor: Duct mounting hot wire anemometer type which utilizes 2 temperature sensors, one is a heater element temperature sensor and the other is to measure downstream temperature, with temperature differential related directly to air flow velocity. Sensor insertion length is to be adjustable up to 200 mm (8"), and transmitter is to produce a 4 to 20 mA or 0 to 10 VDC signal linear to air velocity.

.3 Duct Flow Measuring Stations: #14 gauge galvanized steel casing with duct connection flanges of a size to mate with connecting ductwork, and complete with an air directionalizer and a 98% free area parallel cell 20 mm (¾") honeycomb profile suppressor across entering air stream to equalize velocity profile and eliminate turbulent and rotational flow from the air stream prior to measuring point, mechanically fastened to casing so as to withstand velocities of up to 1828 m (6000') per minute. Additional requirements as follows:

.1 total pressure measurement side (high side) is to be designed and spaced to requirements of Industrial Ventilation Manual, 16th Edition, page 9-5, and self-averaging manifolding is to be constructed of brass and copper components;

.2 static pressure sensing probes (low side) is to be bullet-nose shaped, per detailed radius, as illustrated in Industrial Ventilation Manual referred to above, page 9-5;

.3 main take-off point from both total pressure and static pressure manifolds is to be symmetrical, and manifolds are to terminate with external ports for connection to control tubing;

.4 each station is to be equipped with a label on casing indicating unit model number, size, area, and specified air flow capacity;

.5 each station is to have a self-generated sound rating of less than NC 40, and sound level within duct is not to be amplified nor is additional sound to be generated.

.4 Static Pressure Traverse Probe: Duct mounting, complete with multiple static pressure sensors located along exterior surface of cylindrical probe.

.5 Shielded Static Air Probe: Indoor type or outdoor type as required, each with multiple sensing ports, an impulse suppression chamber, and air flow shielding.

.6 Water Flow Monitoring: Equal to Onicon microprocessor-based electromagnetic water flow meters with an accuracy of 0.25%.

.5 Power (amps) monitoring is to be performed by a combination of a current transformer and a current transducer with transformer sized to reduce full amperage of monitored circuit to a maximum 5 ampere signal which will be converted to a 4 to 20 mA DDC compatible circuit for use by building automation system. Current transformer and current transducer are as follows:

.1 equal to Veris Industries split core current transformer with an operating frequency of from 50 to 400 Hz, 0.6 Kv class, 10 Kv BIL insulation, and 5 ampere secondary;

.2 equal to Veris Industries current to voltage or current to mA transducer with an accuracy of ±5%, a minimum load resistance of 30 kOhm, an input of 0 to 20 amperes and an output of 4 to 20 mA, and a 24 VDC regulated power supply.

.6 Duct mounting smoke detectors supplied as part of electrical work for mounting as part of control system work.

.7 Double contact switches to monitor equipment status and safety conditions, and generate alarms when a failure or abnormal condition occurs. Status and safety switches are to be as follows:

.1 current sensing switches: equal to Veris Industries self-powered dry contact output switches for sensing run status of motor loads, each calibrated to indicate a positive run status only when motor is operating under load, and each consisting of a current transformer, a solid-state current sensing circuit, adjustable trip point, solid-state switch, SPDT relay, and a LED to indicate on or off status;

.2 air filter status switches: equal to Johnson Controls Inc. or Cleveland Controls automatic reset type differential pressure switches, each complete with SPDT contacts rated for 2 amperes at 120 VAC, a scale range and differential pressure adjustment appropriate for the service, and an installation kit which includes static pressure taps, tubing, fittings, and air filters;

.3 air flow switches: equal to Johnson Controls Inc. or Cleveland Controls pressure flow switches, bellows actuated mercury switch or snap-acting micro-switch type with an appropriate scale range and pressure adjustment;

.4 air pressure safety switches: equal to Johnson Controls Inc. or Cleveland Controls manual reset switches, each complete with SPDT contacts rated for 2 amperes at 120 VAC and an appropriate scale range and pressure adjustment;

.5 water flow switches: equal to Johnson Controls Inc. Model P74;

.6 low temperature limit switches: manual reset type equal to Johnson Controls Inc. Model A70, each complete with DPST snap acting contacts rated for 16 amperes at 120 VAC, a minimum 4.5 m (15') sensing element for mounting horizontally across duct/plenum with sensing reaction from coldest 450 mm (18") section of element, and where sensing element does not provide full coverage of air stream, additional switches are to be supplied as required.

.8 Control relays as follows:

.1 control pilot relays: equal to Johnson Controls Inc. or Lectro modular plug-in design with snap-mount mounting bases, retaining springs or clips, DPDT, 3 PDT or 4 PDT as required for the application, with contacts rated for 10 amperes at 120 VAC;

.2 lighting control relays: latching type with integral status contacts rated for 20 amperes at 120 VAC, each complete with a split low voltage coil that moves the voltage contact armature to On or Off latched position, each controlled by a pulsed tri-state output (preferred) or pulsed paired binary outputs, and each designed so power outages will not result in a change-of-state and so multiple same state commands will simply maintain commanded state.

.9 Electronic signal isolation transducers equal to Advanced Control Technologies for installation whenever an anolog output signal from building automation system is to be connected to an external control system as an input (i.e. equipment control panel), or is to receive as an input signal from a remote system, and to provide ground plane isolation between systems.

.10 Each manual override station is to be complete with contacts rated minimum 1 ampere at 24 VAC and is to provide following:

.1 integral H-O-A switch to override controlled device pilot relay;

.2 status input to building automation system to indicate whenever switch is not in the Auto position;

.3 status LED to illuminate whenever output is On;

.4 override LED to illuminate whenever H-O-A switch is in either the Hand or Off position.

.11 Electronic/pneumatic transducers equal to Johnson Controls Inc. transducers with an output of from 3 to 15 psig, an input of from 4 to 20 mA or 10 VDC, manual output adjustment, a pressure gauge, and an external replaceable supply air filter.

.12 Thermostats:

.1 Wall mounting adjustable set-point thermostats, each suitable in all respects for equipment (and operating sequence) they are provided for, equipped with a thermometer, a cover and any required mounting and connection accessories.

.2 Line voltage thermostats are to be 115 volt.

.3 Low voltage thermostats are to be 24 volt electronic type.

.4 Set-point adjustment for thermostats in public spaces is to be concealed behind cover. Set-point adjustment for other thermostats is to be accessible through cover.

.5 Covers are to be removable, tamper-proof covers with temperature set-point and thermometer displays.

.6 Guards for thermostats are to be clear, ventilated polycarbonate covers with allen key locking hardware.

.13 Humidistats:

.1 Direct or reverse acting (to suit system), proportional type, adjustable humidity controllers, each corrosion resistant, suitable in all respects for the application and complete with a nylon element, replaceable cartridge type air filter, internally adjustable limit stops for maximum and minimum settings, a cover, and required mounting and connection accessories.

.2 Electric humidistats are to be line voltage (115 volt), or 24 volt electronic type.

.3 Wall mounting humidistats are to be complete with a tamper-proof display type cover.

.4 Duct mounting humidistats are to be complete with a display type cover, duct sampling chamber with 300 mm (12") long extruded pick-up tube for duct mounting, a moulded mounting base, and a ventilated cover.

.14 Hardware to permit building automation system control and monitoring of input/output points in accordance with Section entitled Building Automation System, points schedule, and drawing control diagrams and operation sequences. All such hardware is to be suitable in all respects for interface with the building automation system.

2.04 SYSTEM WIRING MATERIALS

.1 System wiring, conduit, boxes, and similar materials are to be in accordance with requirements specified in appropriate Section(s) of Electrical Work specification.

3 EXECUTION

3.01 DEMOLITION

.1 Perform required control system demolition work.

.2 Refer to demolition requirements specified in Section entitled Demolition and Revision Work.

3.02 GENERAL RE: INSTALLATION OF CONTROLS

.1 Provide complete systems of control and instrumentation to control and supervise building equipment and systems in accordance with this Section and drawings.

.2 Control systems are to generally be as indicated on drawing control diagrams and are to have all the elements therein indicated or implied.

.3 Control diagrams show only the principal components controlling the equipment and systems. Supplement each control system with all relays, transformers, sensors, etc., required to enable each system to perform as specified and to permit proper operation and supervision.

3.03 SUPPLY AND INSTALLATION OF CONTROL AIR DAMPERS AND OPERATORS

.1 Unless otherwise specified, supply required control dampers. Hand dampers to sheet metal trade at site in location where they are required for installation as part of sheet metal work. Ensure each damper is correctly located and mounted.

.2 Provide linkage and operators for dampers. Wherever possible locate damper operators so they are accessible from outside duct, plenum, and equipment casings. Bracket mount operators on ducts or plenums clear of insulation where applicable.

.3 Where sequence operation is indicated, or where multiple operators drive a series of dampers, provide pilot positioners to couple their action.

.4 Ensure dampers located in ductwork other than galvanized steel are constructed of type 316 stainless steel.

3.04 SUPPLY AND INSTALLATION OF AUTOMATIC CONTROL VALVES AND OPERATORS

.1 Unless otherwise specified, supply required automatic control valves. Hand valves to appropriate piping trades at site in locations they are required for installation as part of piping work. Ensure each valve is properly located and installed.

.2 Mounting of valves in piping, unless otherwise noted, will be done as part of the piping work specified in preceding Sections of this Division of the Specification. Make the valves available at the site, at the locations where they are required, and ensure that each valve is properly mounted.

.3 Provide an operator from each valve, connect complete, check and test operation, and adjust as required.

3.05 SUPPLY OF ACTUATORS, CONTROLLERS, AND TRANSFORMERS FOR TERMINAL UNITS

.1 Supply required 24 volt actuators, controllers, and transformers for terminal units.

.2 Deliver actuators and controllers to successful terminal unit manufacturer's factory.

.3 Coordinate delivery of product with General Contractor and successful terminal unit manufacturer.

3.06 INSTALLATION OF THERMOSTATS

.1 Unless otherwise noted, provide required thermostats.

.2 Provide a ventilated clear polycarbonate cover for each thermostat located in finished areas, and a wire type guard for each thermostat located in unfinished areas and in areas such as mechanical rooms where thermostat is subject to damage.

.3 Unless otherwise indicated, mount room thermostats in accordance with requirements of local governing authority and, where applicable, barrier-free requirements. Review exact location of thermostats with Consultant prior to roughing-in.

.4 Provide stand-off mounting and an insulated sub-base for thermostats on outside walls.

.5 Perform control wiring associated with installation of electric or electric-electronic thermostats.

3.07 INSTALLATION OF CONTROL SYSTEM COMPONENTS

.1 Provide required control system components and related hardware. Refer to drawing control diagrams and sequences.

.2 Where components are pipe, duct, or equipment mounted supply components at proper time, coordinate installation with appropriate trade, and ensure components are properly located and mounted.

3.08 CONTROL WIRING

.1 Perform required control wiring work for control systems except:

.1 power wiring connections to equipment and panels, except as noted below;

.2 control wiring associated with mechanical plant equipment and systems whose control is not part of work specified in this Section;

.3 starter interlock wiring.

.2 Except as specified below, install wiring in conduit. Unless otherwise specified, final 600 mm (2') connections to sensors and transmitters, and wherever conduit extends across flexible duct connections is to be liquid-tight flexible conduit.

.3 Control wiring in ceiling spaces and wall cavities may be plenum rated cable installed without conduit but neatly harnessed, secured, and identified.

.4 Wiring work is to be in accordance with certified wiring schematics and instructions, and wiring standards specified in appropriate Sections of Electrical Work Specification.

3.09 IDENTIFICATION AND LABELLING OF EQUIPMENT AND CIRCUITS

.1 Refer to identification requirements specified in Section entitled Basic Mechanical Materials and Methods.

.2 Identify equipment as follows:

.1 enclosures and components: engraved laminated nameplates with wording listed and approved prior to manufacture of nameplates;

.2 wiring: numbered sleeves or plastic rings at both ends of conductor, with numbering corresponding to conductor identification on shop drawings and "as-built" record drawings.

3.10 TESTING, ADJUSTING, CERTIFICATION, START-UP, AND TRAINING

.1 When control work is complete, check installation of components and wiring connections, make any required adjustments, and coordinate adjustments with personnel doing HVAC testing, adjusting and balancing work.

.2 Refer to Section entitled Basic Mechanical Materials and Methods for equipment/system manufacturer certification requirements.

.3 Refer to Section entitled Basic Mechanical Materials and Methods for equipment/system start-up requirements.

.4 Include for 2 full, 8 hour days on-site operation demonstration and training sessions. Training is to be a full review of all components including but not limited to a full operation and maintenance demonstration, with abnormal events.

.5 Include for 2 follow-up site training and troubleshooting visits, one 6 months after Substantial Completion and other at end of warranty period, both when arranged by Owner and for a full, 8 hour day to provide additional system training as required, and to demonstrate troubleshooting procedures.

END OF SECTION

END OF SECTION

PROJECT NAME: Ajax HS Washroom & Gym Renovation
105 Bayly St. E, Ajax ON

RDZ PROJECT NUMBER: 24110

Following Supplementary Electrical Bid Form is submitted by:

…….

(Bidding Company)

…….

(Street Address or P. O. Box No.)

…….

(City, Province and Postal Code)

Dated …… And which is an integral part of Bid Form.

In accordance with Instructions to Bidders, we provide the Supplementary Electrical Bid Form. We understand that the information provided to be considered an integral part of Bid Form and is to be completed in full.

Where instructions are not provided, submit Supplementary Electrical Bid Form by time of Bid closing, via e-mail addressed to:

RDZ Engineers Ltd.
Attention: Tanweer Mozaffar
E-mail : tanweer@rdzeng.ca

Supplementary Bid Form Signature:

…….

(Signature of Authorized Representative)

…….

(Print Name)

…….

(Title)

A. LIST OF MANUFACTURERS/SUPPLIERS

We submit, herein, typed or neatly printed, the names of the manufacturers upon whose products our Bid Price is based and which we will supply. If no name is indicated, or if name identified is not listed in issued documents, or if more than one name is indicated for a particular product, we will if requested, provide the base specified manufacturer's product. Where products are named in the specifications with only one (1) manufacturer/supplier, or are not listed herein, we are also prepared to provide the base specified named product. We will provide Canadian manufactured products if costs and quality are similar.

We understand that the first manufacturer specified for any product is the manufacturer upon whose product the design is based, and that the other manufacturers specified for a particular product are manufacturers acceptable to the Owner and whose product produces equivalent quality, performance, and size. We further understand if we indicate a manufacturer other than the manufacturer whose product is the basis of the design, we are responsible for ensuring that the product supplied is equivalent in quality, performance, and size to the base design product, and that any additional costs incurred as a result of use of such products will be borne by us. Acceptance of non-base specified manufacturers with respect to their equivalency shall be as sole discretion of consultant.

We also acknowledge that failure to submit this list as specified or failure to submit within time defined may result in provision of base specified manufacturer's product, at discretion of consultant.

SECTION	PRODUCT	MANUFACTURER/SUPPLIER & CATALOGUE NUMBER
26 27 26	Wiring Devices	
26 28 23	Disconnect Switches-Fused and Non-Fused	
26 29 01	Contactors	
26 50 00	Lighting	
26 52 00	Emergency Lighting	

B. SUBCONTRACTORS

We enclose herewith a list of Subcontractors to the Electrical Building Services which is an integral part of the Bid. We agree that the Subcontractors shall not be changed without good reason and permission for same must be obtained from the Owner.

Section — Subcontractor

27 51 16 – Public Address System_____

28 46 00 - Fire Detection and Alarm System _____

C. UNIT PRICES AND LABOUR RATES

We enclose herewith Unit Prices and Labour Rates which are an integral part of the Bid. Unit prices and labour rates are in effect for the duration of this Project's construction period. Owner is not obligated to accept unit prices and labour rates quoted.

1. Labour Rates:
Labour at the following rates shall be applied for additions or deletions to the work not covered by unit prices. The prices consist of salary, all agreed local union benefits. The rate quoted represents the net cost to the Contractor, exclusive of overhead and profit.

Journeyman $/hour _____

Foreman $/hour _____

2. Unit Prices:
The following unit costs will apply to all additional or deleted work from the Contract and should include their proportional share of all labour equipment, materials, accessories, profits, overhead and taxes for a job completely installed. Applications of unit prices will be to the net difference of quantities of individual products and materials in each contemplated Change Notice or Revision Notice.

3. The unit prices will be used for additions and deletions. Credit rate for deletions shall be at 80%

4. Conduit and Cable:
Supply and install the following conduit and cables including fastenings, clips, connectors, coupling boxes, etc. as required based on length as shown.

27mm Empty Conduit for length of 3500mm	$ _____
2#12-16mmC for length of 3500mm	$ _____
3#12-16mmC for length of 3500mm	$ _____
2#10-21mmC for length of 3500mm	$ _____
3#10-21mmC for length of 3500mm	$ _____
3#8-21mmC for length of 3500mm	$ _____

5. Receptacles:
Supply and installation of one duplex receptacle, shall include the receptacle box, cover plate, 3000mm of conduit and wiring, including connection to adjacent receptacle and/or outlet box.

$ _____

6. Light Switches:
Supply and installation of one light switch shall include the switch box, cover plate, conduit, wiring and connection to box containing the lighting circuit.

$ _____

7. Fire Alarm System:
Supply and installation of one fire alarm pull station, including conduits, wiring and connections, to the nearest fire alarm pull station based on 15000mm conduit and wiring length.

$ _____

Supply and installation of one fire alarm cone speaker complete with strobe lights including, conduit, wiring and connections to nearest fire alarm cone speaker based on 15000mm conduit and wiring length.

$ _____

8. Light Fixtures:

Supply and installation of the following lighting fixtures. The supply and installation of lighting fixtures shall include the fixtures, flexible conduit, wiring and connection to nearest outlet box containing 347 and/or 120volt circuits and the supply and installation of built-in drivers, 0-10V dimmers, etc. (Base conduit and wiring on 4500mm length).

.1 Supply and installation of one type 'A' fixture. $ _____

.2 Supply and installation of one type `A1' fixture. $ _____

.3 Supply and installation of one type `C' fixture. $ _____

.4 Supply and installation of one type `D' fixture. $ _____

END OF DOCUMENT

1. General

1.1 GENERAL

.1 This Section covers items common to Sections of Division 26, Division 27, and Division 28. The General Conditions, Supplementary Conditions and Division 1 are a part of this Specification and shall apply to this Division. This section also supplements requirements of Division 1, Division 23, Division 27, Division 28, Division 33, and Division 34.

.2 Issued for Construction documents are issued for Contractors' convenience for reference only and are a consolidation of issued drawings, specifications, and addenda. Consultant makes no representation of their completeness. Exact construction requirements to be based on official Bid issued drawings, specifications, and issued separate addenda. Contact Consultant for any clarifications.

1.2 APPLICATION

.1 This Section specifies requirements that are common to Electrical Divisions work Sections, and it is a supplement to each Section and is to be read accordingly. Where requirements of this Section contradict requirements of Divisions 00 or 01, conditions of Division 00 or 01 to take precedence.

.2 Mention herein, or indication on the Drawings of articles, materials, operations, or methods requires that all such items shall be provided in the quality and quantity required, and that the operations shall be performed according to the methods prescribed, complete with all necessary labour and incidentals.

.3 <u>These Specifications shall be considered as an integral part of the accompanying Drawings. Any item or subject omitted from either the Specifications or the Drawings, but which is mentioned or reasonably specified in the other shall be considered as properly and sufficiently specified and shall be provided.</u>

1.3 REFERENCES

.1 All work shall conform to the latest Codes, requirements and approval of the Authorities having jurisdiction and shall be subject to acceptance by the Consultant, and the following codes and standards:

- OBC, Latest Edition and Local Building Department requirements.
- Ontario Fire Marshall latest requirements.
- OESC – Latest Edition
- Electrical Safety Authority – Latest Inspection Bulletins
- CSA C22.1, Canadian Electrical Code, Part 1 - Latest Edition

1.4 DEFINITIONS

.1 The following are definitions of words found in Electrical Divisions of the Specification and on associated drawings:
  .1 "concealed" – means hidden from normal sight in furred spaces, shafts, ceiling spaces, walls, and partitions.
  .2 "exposed" – means work normally visible, including work in equipment rooms, service tunnels, and similar spaces.
  .3 "finished" - means when in description of any area or part of an area or a product which receives a finish such as paint, or in case of a product may be factory finished.
  .4 "provision" or "provide" (and tenses of "provide") – means supply and install complete. Include labour, materials, and services necessary to supply and install items or work referred to.

.5 "install" (and tenses of "install") – means secure in position, connect complete, test, adjust, verify, and certify.
.6 "As instructed" or where instructed" – means as instructed by the Consultant including supplementary instruction notices and job site instruction notices.
.7 "listed" - means that the materials or equipment has been tested in accordance with applicable standards and methods and has been approved and listed for the intended use by a testing company approved by the Authorities having jurisdiction.
.8 "supply" – means to procure, arrange for delivery to site, inspect, accept delivery, and administer supply of products; distribute to areas; and include manufacturer's supply of any special materials, standard on site testing, initial start-up, programming, basic commissioning, warranties, and assistance to Contractor.
.9 "delete" or "remove" (and tenses of "delete" or "remove") – means to disconnect, make safe, remove obsolete materials and patch and repair/finish surfaces to match adjoining similar construction; include for associated re-programming of systems and/or change of documentation identifications to suit deletions, and properly dispose of deleted products off site unless otherwise instructed by consultant.
.10 "BAS" – means building automation system; "BMS" – means building management system, "FMS" – means facility management system; and "DDC" means direct digital controls; references to "BAS", "BMS", "FMS" and "DDC" generally mean same.
.11 "Governing authority" and/or "authority having jurisdiction" and/or "regulatory authority" and/or "Municipal authority" – means government departments, agencies, standards, rules, and regulations that apply to and govern work and to which work must adhere.
.12 "Mechanical Divisions" – refers to Divisions 20, 21, 22, 23, 25 and other Divisions as specifically noted, and which work as defined in Specifications and/or on drawings is responsibility of Mechanical Contractor, unless otherwise noted.
.13 "Electrical Divisions" – refers to Divisions 26, 27, 28 and other Divisions as specifically noted, and which work as defined in Specifications and/or on drawings is responsibility of Electrical Contractor, unless otherwise noted.
.14 "Approved" or "Approval" - means approved by Authorities having jurisdiction as conforming to Codes, Standards, By-Laws, etc.
.15 "Acceptable" or "Acceptance" – means acceptable to the Consultant as conforming together to the requirements of the contract documents.
.16 "Submit for Review" or "Submit Notice" – means submit to the Consultant.
.17 "Subject to Review" – means work shall be laid out for review by the Consultant. No work shall proceed until instructions have been obtained from the Consultant. Submit further information, shop drawings, samples etc. as specified and as may be requested by the Consultants.
.18 "Accessible" - means reachable by person with tools as required and where obstacles may be removed and replaced without cutting or breaking out materials.
.19 "board", "owner" - means School board.

.2 Wherever words "indicated", "shown", "noted", "listed", or similar words or phrases are used in Contract Documents they are understood, unless otherwise defined, to mean product referred to is "indicated", "shown", "listed", or "noted" on Contract Documents.

.3 Wherever words "reviewed", "satisfactory", "as directed", "submit", or similar words or phrases are used in Contract Documents they are understood, unless otherwise defined, to mean that work or product referred to is "reviewed by", "to the satisfaction of", "submitted to", etc., Consultant.

1.5 DOCUMENTS

.1 Documents for bidding include but are not limited to issued Drawings, Specifications and Addenda.

.2 Drawings and Specifications are portions of Contract Documents and identify labour, products, and services necessary for performance of work and form a basis for determining pricing. They are intended to be cooperative. Perform work that is shown, specified, or reasonably implied on the drawings but not mentioned in Specification, or vice-versa, as though fully covered by both.

.3 Read Drawings and Specifications in conjunction with documents of other Divisions and, where applicable, Code Consultant's report.

.4 Unless otherwise specifically noted in Specifications and/or on Drawings, Sections of Electrical Divisions are not intended to delegate functions nor to delegate work and supply of materials to any specific trade, but rather to generally designate a basic unit of work, and Sections are to be read as a whole.

.5 Drawings are performance drawings, diagrammatic, and show approximate locations of equipment and connecting services. Any information regarding accurate measurement of building is to be taken on site. Do not scale Drawings, and do not use Drawings for prefabrication work.

.6 Drawings are intended to convey the scope of work and do not show architectural and structural details. Provide, at your cost, offsets, fittings, transformations, and similar products required as a result of obstructions and other architectural and/or structural details but not shown on Drawings.

.7 Locations of equipment and materials shown may be altered, when reviewed by consultant, to meet requirements of equipment and/or materials, other equipment or systems being installed, and of building, all at no additional cost to Contract.

.8 Specification does not generally indicate specific number of items or amounts of material required. Specification is intended to provide product data and installation requirements. Refer to schedules, Drawings (layouts, riser diagrams, schematics, details) and Specification to provide correct quantities. Singular may be read as plural and vice versa in Specification.

.9 Starter/motor control centre (MCC)/variable frequency drive (VFD) schedule drawings are both mechanical and electrical and apply to work of Mechanical Divisions and Electrical Divisions. Be responsible for reviewing starter, MCC, VFD, and motor specification requirements prior to Bid submission and confirm exact scope of work and responsibility of work between Mechanical Divisions and Electrical Divisions.

.10 Drawings and Specifications have been prepared solely for use by party with whom Consultant has entered a contract and there are no representations of any kind made by consultant to any other party.

.11 When scale and date of Drawings are the same, or when discrepancy exists within Specification, include most costly arrangement to take precedence.

.12 Unless otherwise specified in Division 00, Division 01, or "General Conditions", in the case of discrepancies or conflicts between Drawings and Specification, documents will govern in following order:
- .1 Specification.
- .2 Drawings of larger scale.
- .3 Drawings of smaller scale.
- .4 Drawings of later date when scale of Drawings is same.

1.6 IMPERIAL AND METRIC MEASUREMENTS

.1 Generally, both metric and imperial units of measurement are given in Sections of Specification governed by this section. Measurement conversions may be generally "soft" and rounded off. Exact measurements to be confirmed based on application. Where measurements are related to installation and onsite applications, confirm issued document measurements with applicable local code requirements, and/or as applicable, make accurate measurements onsite. Where significant discrepancies are found, immediately notify Consultant for direction.

1.7 EXAMINATION OF DOCUMENTS AND EXISTING SITE CONDITIONS

.1 Carefully examine Documents and visit site to determine and review existing site conditions that will or may affect work and include for such conditions in Bid Price.

.2 Carefully examine electrical, structural, mechanical, and architectural drawings, and fully understand the functioning of the system described and specified under this Section. If in doubt, contact the engineer before submitting the Bid Price.

.3 Report to Consultant, prior to Bid Submittal, any existing site condition that will or may affect performance of work as per Documents. Failure to do so will not be grounds for additional costs.

.4 Upon finding discrepancies in, or omissions from Documents, or having doubt as to their meaning or intent, immediately notify Consultant, in writing.

1.8 WORK STANDARDS

.1 Where any code, regulation, bylaw, standard, contract form, manual, printed instruction, and installation and application instruction are quoted it means, unless otherwise specifically noted, latest published edition at time of submission of Bids adopted by and enforced by local governing authorities having jurisdiction. Include for compliance with revisions, bulletins, supplementary standards, or amendments issued by local governing authorities.

.2 Where regulatory codes, standards and regulations are at variance with Drawings and Specification, more stringent requirement will apply unless otherwise directed by consultant.

.3 Supplementary mandatory specification and requirements to be used in conjunction with project include but are not limited to following:
.1 Ontario Building Code (OBC)
.2 Electrical Safety Authority (ESA)
.3 Ontario Electrical Safety Code (OESC)
.4 Canadian Standards Association (CSA)
.5 Underwriters' Laboratories of Canada (ULC)
.6 National Standards of Canada (CAN)
.7 National Building Code of Canada (NBC)
.8 National Fire Protection Association (NFPA)
.9 American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., (ASHRAE)
.10 National Electrical Manufacturers Association (NEMA)
.11 Electrical and Electronic Manufacturers Association of Canada (EEMAC)
.12 American National Standards Institute (ANSI)
.13 Illuminating Engineering Society (IES)
.14 Building Industry Consulting Services, International (BICSI)
.15 Electronic Industries Association (EIA)
.16 Canadian General Standards Board (CGSB)

.17 Institute of Electrical and Electronic Engineers (IEEE)
.18 Occupational Health and Safety Act (OHSA)
.19 Technical Standards and Safety Authority (TSSA)
.20 Workplace Hazardous Materials Information System (WHMIS)
.21 International Standards Organization (ISO)
.22 Material Safety Data Sheets by product manufacturers.
.23 Local utility inspection permits.
.24 Codes, standards, and regulations of local governing authorities having jurisdiction.
.25 Additional codes and standards listed in Trade Sections.
.26 Owner's standards.

.4 Provide applicable requirements for barrier free access in accordance with latest edition of local governing building code.

.5 Where any governing Code, Regulation, or Standard requires preparation and submission of special details or drawings for review they are to be prepared and submitted. Pay associated costs associated with these submittals.

.6 Unless otherwise specified, equipment is to be installed in accordance with the equipment manufacturer's recommendations and instructions, and requirements of governing Codes, Standards, and Regulations. Governing Codes, Standards, and Regulations take precedence over manufacturer's instructions.

.7 Work is to be performed by journeyperson tradesmen who perform only the work that their certificates permit, or by apprentice tradesmen under direct on-site supervision of an experienced journeyperson tradesman. Journeyperson to apprentice ratio is not to exceed ratio determined as stated in Ontario College of Trades and Apprenticeship Act.

.8 Journeyperson tradesmen are to have a copy of valid trade certificates available at site for review by consultant at any time.

.9 Experienced and qualified superintendent is to be on-site at times when work is being performed.

.10 Coordinate work inspection reviews and approvals with governing inspection department to ensure that construction schedule is not delayed. Be responsible for prompt notification of deficiencies to consultant and submission of reports and certificates to consultant.

.11 Properly protect equipment and materials on site from damage due to elements and work of trades, to satisfaction of consultant. Equipment and materials are to be in new condition upon Substantial Performance of the Work.

.12 Electrical equipment and devices shall be certified and bear stamp or seal of a recognized testing agency such as CSA, UL, ULC, ETL, etc., or bear a stamp to indicate special electrical utility approval.

.13 Makes and quality of the materials used shall be approved by the Consultants and authority having jurisdiction.

.14 Products and materials provided shall be new and free from all defects. Related materials shall be of the same manufacturer throughout the Project.

.15 Products and materials called for on the drawings or in the specifications by trade names, manufacturer names and catalogue reference are those which shall be used based on the Tender.

.16 Alternative products and materials to those specified shall only be considered if they are shown in the Tender as a material variation with an appropriate price adjustment. The Consultant reserves the right to accept or reject any alternative without explanation.

.17 Assume full responsibilities for ensuring that when providing alternative products or materials, all space, weight, connections, power, and wiring requirements, etc., are considered. Any costs incurred for additional components, changes to services, structural or space requirements, layouts, and plans, etc., that may be necessary will be borne by this Division.

.18 Materials or equipment rejected by the Consultants shall be immediately removed from the project and suitable materials shall be provided.

1.9 PERMITS, CERTIFICATES AND FEES

.1 Contact and confirm with local authorities having jurisdiction including utility providers, requirements for approvals from such authorities. Obtain and pay for permits, certificates, and approvals required to complete Work.

.2 Be responsible for ensuring that authorities having jurisdiction which require on-site inspection of work, have ample notification to perform inspection, with sufficient lead time to correct deficiencies in a manner that will not impede schedule of completion of Work.

.3 Submit to Consultant, approval/inspection certificates issued by governing authorities to confirm that Work as installed is in accordance with rules and regulations of local governing authorities.

.4 Include in each copy of operating and maintenance instruction manuals, copies of approvals and inspection certificates issued by regulatory authorities to certify that completed Work is in accordance with regulations of regulatory authorities and is acceptable to them.

1.10 REQUIREMENTS FOR CONTRACTOR RETAINED ENGINEERS

.1 Professional engineers retained to perform consulting services with regards to Project work, i.e., seismic engineer, fire protection engineer, structural engineer, are to be members in good standing with local Association of Professional Engineers and are to carry and pay for errors and omissions professional liability insurance in compliance with requirements of governing authorities in Place of the Work.

.2 Retained engineer’s professional liability insurance is to protect Contractor's Consultants and their respective servants, agents, and employees against any loss or damage resulting from professional services rendered by aforementioned Consultants and their respective servants, agents, and employees in regard to the Work of this Contract.

.3 Liability insurance requirements are as follows:
- .1 coverage is to be a minimum of $1,000,000.00 inclusive of any one occurrence.
- .2 insurance policy is not to be cancelled or changed in any way without insurer giving Owner minimum thirty days written notice.
- .3 liability insurance is to be obtained from an insurer registered and licensed to underwrite such insurance in the Place of the Work.
- .4 retained Consultants are to ascertain that Sub-Consultants employed by them carry insurance in the form and limits specified above.
- .5 evidence of the required liability insurance in such form as may be required is to be issued to Owner, Owner’s Consultant, and Municipal Authorities as required prior to commencement of aforementioned Consultant’s services.

1.11 WORKPLACE SAFETY

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials. Submit WHMIS MSDS (Material Safety Data Sheets) for products where required and maintain one copy at site in a visible and accessible location available to personnel.

.2 Comply with requirements of Occupational Health and Safety Act and other regulations pertaining to health and safety, including worker's compensation/insurance board and fall protection regulations. When working in confined spaces, comply with requirements of Occupational Health and Safety Act - Ontario Regulation 632, "Confined Spaces".

1.12 PLANNING AND LAYOUT OF WORK

.1 Base installation layout, design, terminations, and supply of accessories, on Contract Documents with specific coordination with reviewed shop drawings.

.2 Plan, coordinate, and establish exact locations and routing of services with affected trades prior to installation such that services clear each other as well as other obstructions. Generally, order of right of way for services to be as follows:
.1 large ducts (main runs)
.2 cable tray and bus duct
.3 conduit 100 mm (4") dia. and larger
.4 smaller branch ductwork
.5 conduit less than 100 mm (4") dia.

.3 Unless otherwise shown or specified, conceal work in finished areas, and conceal work in partially finished and/or unfinished areas to extent made possible by the area construction. Install services as high as possible to conserve headroom and/or ceiling space. Notify Consultant where headroom or ceiling space appears to be inadequate prior to installation of the work.

.4 Do not use Contract Drawing measurements for distribution equipment layout, conduit installation work and such other work. Locations and routing are to generally be in accordance with Contract Drawings, however, prepare layout drawings for such work. Use established benchmarks for both horizontal and vertical measurements. Coordinate with and make allowances for work of other trades. Accurately layout work and be entirely responsible for work installed in accordance with layout drawings. Where any grade or size is at variance with Contract Drawings, notify Consultant prior to proceeding with work.

.5 Prepare plan and interference drawings (at a minimum drawing scale of 1:50 or ¼"=1' 0") of the work for coordination with General Contractor. Arrange for preparation of detailed section drawings of ceiling spaces of corridors and any other congested areas. Sections are to be cross referenced with plan drawings so that trades may make use of section drawings. Section drawings to indicate lateral and elevation dimensions of major services within ceiling space. Lateral dimensions are to be from grid lines and elevations from top of floor slab. Obtain from Consultant, disks of engineering drawings for this use. Prints and/or disks of Contractors' interference drawings are to be distributed among other Trade Contractors and General Contractor. Submit drawings to consultant for review. Failure of General Contractor to prepare and coordinate overall interface drawings of trades does not relieve respective Division Contractor of responsibility to ensure that work is properly planned and coordinated.

.6 Carry out alterations in arrangement of work that has been installed without proper coordination, study, and review, even if in accordance with Contract Documents, in order to conceal work behind finishes, or to allow installation of other work, without additional cost. In addition, make necessary alterations in other work required by such alterations, without additional cost.

.7 Junction boxes for lighting, power, fire alarm, power packs, lighting controllers and such other systems devices and products located above suspended ceilings must be located for easy access for servicing and/or removal. Products which do not meet this location requirement are to be relocated to an accessible location at no additional cost.

.8 Be responsible for making necessary changes, at no additional cost, to accommodate structural and building conditions that were missed due to lack of coordination by this Division.

1.13 COORDINATION OF THE WORK

.1 Fully understands the functions of the systems specified and have no doubts regarding the extent of the Contract.

.2 Examine the Architectural, Structural, Mechanical and Electrical drawings and become fully familiar with the work of other Divisions.

.3 Co-ordinate with all Divisions providing equipment and services and ensure that there is no confliction. Coordination requirements are to include but not be limited to following:
- .1 requirements for openings, sleeves, inserts and other hardware necessary for installation of work.
- .2 concrete work such as housekeeping pads, sumps, bases, etc., required for work, and including required dimensions, operating weight of equipment, location, etc.
- .3 depth and routing of excavation required for work, and requirements for bedding and backfill.
- .4 wiring work required for equipment and systems but not specified to be done as part of mechanical work, including termination points, wiring type and size, and any other requirements.

.4 Ensure materials and equipment are delivered to site at proper time and in such assemblies and sizes to enter building and be moved into spaces where they are to be located without difficulty.

.5 Wherever possible, coordinate equipment deliveries with manufacturers and/or suppliers so equipment is delivered to site when it is required, or so it can be stored within building and protected from elements.

.6 Ensure proper access and service clearances are maintained around equipment, and, where applicable, access space for future equipment removal or replacement is not impeded. Comply with code requirements with regards to access space provision around equipment. Remove and replace any equipment which does not meet this requirement.

.7 Arrange equipment in proper relation with other apparatus, the building construction, the Architectural finish and with all work specified.

.8 Where space is shown for future equipment leave such space clear and ensure that the necessary connections can be made to the future equipment.

.9 Where work is to be integrated or is to be installed in close proximity with work of other trades, coordinate work prior to and during installation.

.10 Failures to fully understand Drawings and allow for the work of other Divisions or where relocations are necessary due to lack of co-ordination between Divisions shall be remedied at the expense of this Division.

1.14 WORKMANSHIP

.1 All work shall be executed in a workmanlike manner and present a neat mechanical appearance.

1.15 EQUIPMENT AND MATERIALS

.1 Be responsible for ordering of products (equipment and materials) in a timely manner to meet project-scheduling timelines. Failure to order products to allow manufacturers sufficient production/delivery time to meet project-scheduling timelines is an unacceptable reason to request for other suppliers or substitutions.

.2 Provide Canadian manufactured products wherever possible and where required quality and performance is obtainable. Unless otherwise specified, all materials and apparatus shall be new and shall comply with applicable Canadian Standards Association (CSA) Standards and/or Underwriters Laboratories of Canada (ULC) Standards and the requirements of the authorities having jurisdiction.

.3 Materials and equipment scheduled and/or specified, have been selected to establish a performance and quality standard, and, in some instances, a dimensional standard. In most cases, base specified manufacturers are stated for material and equipment, specified by manufacturer's name and model number. Unless otherwise noted, the Bid Price may be based on materials and equipment supplied by any of the manufacturers named as acceptable for the particular material or equipment. If acceptable manufacturers are not stated for a particular material or piece of equipment, base the Bid Price on material supplied by the base specified manufacturers.

.4 Documents have been prepared based on product available at time of Bidding. If, after award of Contract, and if successful manufacturer can no longer supply a product that meets base specifications, notify Consultant immediately. Be responsible for obtaining other manufacturers product that complies with base specified performance and criteria and meets project timelines. Proposed products are subject to review and consideration by consultant and are considered as substitutions subject to a credit to Contract. In addition, if such products require modifications to room spaces, mechanical systems, electrical systems, etc., include required changes. Such changes are to be submitted in detail to consultant for review and consideration for acceptance. There will be no increase in Contract Price for revisions. Note that above conditions supplement and are not to supersede any specification conditions with regards to substitutions or failure to supply product as per issued documents.

.5 If materials or equipment supplied by a manufacturer named as acceptable are used in lieu of the manufacturer specified, be responsible for ensuring that the substituted material or equipment is equivalent in quality, performance and operating characteristics (including energy consumption if applicable) to the specified materials or equipment, and, it shall be understood that any additional costs, and changes to associated or adjacent work resulting from provision of materials supplied by a manufacturer other than the specified manufacturer is included in the Bid Price. In addition, in equipment spaces where equipment named as acceptable is used in lieu of specified equipment and the dimension of such equipment differs from the specified equipment, prepare, and submit for review, accurately dimensioned layouts of rooms affected.

.6 In addition to the manufacturers specified or named as acceptable, other manufacturers of materials or equipment may be proposed to the Consultant for acceptance, listing in each case a corresponding credit for each alternative proposed, however, the Bid Price must be based on equipment, or materials specified or named as acceptable. Certify in writing to the Consultant that the proposed alternative meets all space, power, design, energy consumption, and all other requirements of the specified or acceptable material or equipment. In addition, it shall be understood that there will be no increase in the contract Price by reason of any changes to associated equipment, mechanical and/or electrical, required by acceptance of proposed alternatives. The Consultant has sole discretion in accepting any such proposed alternative material or equipment.

.7 Where products you intend to provide are proposed as "an equal" and/or "or approved equal", to specified products, certify in writing that the proposed product to be used in lieu of specified product, at least meets space, power, design, energy consumption, noise criteria and other requirements of the specified product and thus shall be equivalent to or better than the specified product. When requested by the Consultant, provide full design detail drawings and specifications of proposed products. Acceptance of these "or equal" and/or "or approved equal" products shall be at the sole discretion of the Consultant. The Consultant's decision shall be final and shall not require explanation. There shall be no increase in the contract Price due to the Consultant's rejection of a proposed equivalent product.

.8 Only base specified products specified acceptable products or equipment listed as alternate will be considered for acceptance by the owner. No proposed substitutions will be accepted.

.9 Indicate in Form of Supplementary Electrical Tender, names of manufacturers for proposed products to be supplied, and which were based specified or scheduled with a manufacturer’s name. Names of proposed manufacturers on list must be one of names stated as acceptable for products unless prior approval from Owner has been given for use of products by other manufacturers. Submit to Consultant for review as directed.

1.16 SHOP DRAWINGS

.1 At start-up meeting, confirm with consultant products to be included in shop drawing submission. Prepare and submit list of products to consultant for review.

.2 Submit for review, drawings showing in detail design, construction, and performance of equipment and materials as requested in Specification. Submit shop drawings to consultant for review prior to ordering and delivery of product to site. Include minimally for preparation and submission of following, as applicable:
- .1 Product literature cuts.
- .2 Equipment data sheets.
- .3 Equipment dimension drawings.
- .4 System block diagrams.
- .5 Sequence of operation.
- .6 Connection wiring schematic diagrams.
- .7 Functionality with integrated systems.

.3 Each shop drawing or product data sheet is to be properly identified with project name and product drawing or specification section reference. Shop drawing or product data sheet dimensions are to match dimension type on drawings.

.4 Where any item of equipment is required by Code or Standard or By-Law to meet a specific energy efficiency level, or any other specific requirement, ensure this requirement is clearly indicated on submission.

.5 Ensure proposed products meet each requirement of Project. Endorse each shop drawing copy "CERTIFIED TO BE IN ACCORDANCE WITH ALL REQUIREMENTS". Include company name, submittal date, and sign each copy. Shop drawings that are received and are not endorsed, dated, and signed will be returned to be resubmitted. Submit electronic copies of shop drawings unless otherwise directed by consultant. Confirm exact requirements with consultant.

.6 Approval of a drawing by this Division implies the following:

1. The drawing has been checked by the person making the approval.

2. The equipment or material complies in all respects with the requirements of the specifications and drawings.

3. The quantities, if indicated on the drawing, are correct.

4. The physical dimensions of the components are such that they can be installed without interference with the building structure or other equipment, and that, after installation, there are sufficient clearances on all sides for the maintenance, servicing, and operation of the equipment.

.7 Consultant will review shop drawings and indicate review status by stamping shop drawing copies as follows:

.1 "REVIEWED" or "REVIEWED AS NOTED" (appropriately marked) – If Consultant's review of shop drawing is final, Consultant to stamp shop drawing.

.2 "REVISE AND RESUBMIT" – If Consultant's review of shop drawing is not final, Consultant to stamp shop drawing as stated above, mark submission with comments, and return submission. Revise shop drawing in accordance with Consultant's notations and resubmit.

.8 Following is to be read in conjunction with wording on Consultant's shop drawing review stamp applied to each shop drawing or product data sheet submitted:

"THIS REVIEW BY CONSULTANT IS FOR THE SOLE PURPOSE OF ASCERTAINING CONFORMANCE WITH GENERAL DESIGN CONCEPT. THIS REVIEW DOES NOT MEAN THAT CONSULTANT APPROVES DETAIL DESIGN INHERENT IN SHOP DRAWINGS, RESPONSIBILITY FOR WHICH REMAINS WITH CONTRACTOR, AND SUCH REVIEW DOES NOT RELIEVE CONTRACTOR OF RESPONSIBILITY FOR ERRORS OR OMISSIONS IN SHOP DRAWINGS OR OF CONTRACTOR'S RESPONSIBILITY FOR MEETING REQUIREMENTS OF CONTRACT DOCUMENTS. BE RESPONSIBLE FOR DIMENSIONS TO BE CONFIRMED AND CORRELATED AT JOB SITE, FOR INFORMATION THAT PERTAINS SOLELY TO FABRICATION PROCESSES OR TO TECHNIQUES OF CONSTRUCTION AND INSTALLATION, AND FOR COORDINATION OF WORK OF SUB-TRADES."

.9 Resubmit any drawing on which notations have been made, after it has been modified or corrected.

.10 Drawings that are re-submitted shall have a distinct notation of the fact made on each drawing.

.11 Works shall not proceed on any equipment, material or installation until the drawings have been reviewed by the Consultant.

.12 Each system and each major component are to be separate shop drawing submissions. Shop drawings for common devices such as devices of each system are to be submitted together.

.13 Obtain shop drawings for submission from product manufacturer's authorized representatives and supplemented with additional items specified herein.

.14 Where extended warranties are specified for equipment items, submit specified extended warranty with shop drawing submittal.

1.17 EQUIPMENT LOADS

.1 Supply equipment loads (self-weight, operating weight, housekeeping pad, inertia pads, etc.) to consultant, via shop drawing submissions, prior to construction.

.2 When choice of specific equipment is made by Contractor, actual weight, location, and method of support of equipment may differ from those initially given to consultants and thus from those assumed for design. Consequently, it is necessary to back-check equipment loads, location, and supports.

.3 Where supporting structure consists of structural steel framing, it is imperative that equipment loads, location, and method of support be confirmed prior to fabrication of structural steel. Be responsible for confirming locations of equipment with consultant prior to construction.

1.18 OPENINGS

.1 Supply opening sizes and locations to consultant to allow verification of their effect on design, and for inclusion on structural drawings where appropriate.

.2 No openings are permitted through completed structure without written approval of consultant. Show required openings on a copy of structural drawings. Identify exact locations, elevations, and size of proposed openings and submit to consultant for review, well in advance of doing work.

.3 Chases, openings, cutting, patching, etc. shall be provided by this Division in accordance with those sections of the specification detailing the requirements.

.4 Flashing required for openings in walls, floors and roofs shall, unless otherwise noted, be provided by this Division.

.5 Electrical conduit roof flashing shall be similar to National Roofing supply product code# ECP-PVCH (electrical conduit post PVCH), Gooseneck S.S.A ARPGN2 (2")/ ARPGN3 (3").

.6 Drilling for hangers, rods, inserts and work of a similar nature shall be provided by this Division.

.7 Provide all necessary sleeves, inserts, anchor bolts, etc., prior to pouring of concrete or building of walls, roofs, etc.

.8 Advise the extent of such work and supply all information and details as to sizes and locations within thirty days after the award of the Contract.

.9 Failures to comply with the above requirements shall be remedied at this Division's expense.

.10 Where conduits pass through fire rated walls/ areas, proper fire stop material shall be used by Division 26. Submit shop drawings for review before installation.

1.19 SCAFFOLDING, RIGGING, AND HOISTING

.1 Unless otherwise specified or directed, supply, erect and operate scaffolding, rigging, hoisting equipment and associated hardware required for work, and subject to review by and coordination with consultant.

.2 Immediately remove from site scaffolding, rigging and hoisting equipment when no longer required.

.3 Do not place major scaffolding/hoisting equipment loads on any portion of structure without approval from consultant.

1.20 TEMPORARY CRANES

.1 Submit following to consultant for review:
- .1 Propose details showing existing structures and surfaces being used for lifting locations.
- .2 Copies of approvals of authorities for work.
- .3 Copies of approvals of property management of buildings affected by hoisting work, allowing for work.
- .4 Copies of required insurance for work.

1.21 CHANGES OR REVISIONS TO THE WORK

.1 Whenever Consultant proposes in writing to make a change or revision to design, arrangement, quantity, or type of work from that required by Contract Documents, prepare, and submit to consultant for approval, a quotation being proposed cost for executing change or revision.

.2 Quotation is to be a detailed and itemized estimate of product, labour, and equipment costs associated with change or revision, plus overhead and profit percentages and applicable taxes and duties.

.3 If overhead and profit percentages are not specified in Division 00 or 01, but allowable under Contract as confirmed with consultant prior to contract signing, then allowable maximum percentages for overhead and profit are to be 7% and 5% respectively.

.4 Unless otherwise specified in Divisions 00 or 01, following requirements apply to all quotations submitted:
- .1 When change or revision involves deleted work as well as additional work, cost of deleted work (less overhead and profit percentages but including taxes and duties) is to be subtracted from cost of additional work before overhead and profit percentages are applied to additional work.
- .2 Material costs are not to exceed those published in local estimating price guides.
- .3 Electrical material labour unit costs are to be in accordance with National Electrical Contractors Association Manual of Labour Units.
- .4 Costs for journeyperson and apprentice labour must not exceed prevailing rates at time of execution of Contract and must reflect actual personnel performing work.
- .5 Cost for site superintendent must not exceed 10% of total hours of labour estimated for change or revision and change or revision must be such that site superintendent’s involvement is necessary.
- .6 Costs for rental tools and/or equipment are not to exceed local rental costs.
- .7 Overhead percentage will be deemed to cover quotation costs other than actual site labour and materials, and rentals.
- .8 Quotations, including those for deleted work, to include a figure for any required change to Contract time.

.5 Quotations submitted that are not in accordance with requirements specified above will be rejected and returned for re-submittal. Failure to submit a proper quotation to enable Consultant to expeditiously process quotation and issue a Change Order will not be grounds for any additional change to Contract time.

.6 Make requests for changes or revisions to work to Consultant in writing and, if Consultant agrees, will issue Notice of Change.

.7 Do not execute any change or revision until written authorization for the change or revision has been obtained from consultant.

1.22 BREAKDOWN OF ELECTRICAL WORK COST

.1 Prior to submittal of first progress payment draw, submit a detailed breakdown of work cost to assist Consultant in reviewing and approving progress payment claims.

.2 Payment breakdown is subject to Consultant's approval and progress payments will not be processed until an approved breakdown is in place. Breakdown is to include one-time claim items such as mobilization and demobilization, insurance, bonds (if applicable), shop drawings and product data sheets, commissioning including system testing and verification, and project closeout submittals.

.3 Indicate equipment, material, and labour costs for site services (if applicable) and indicate work of each trade in same manner as indicated on progress draw.

1.23 NOTICE FOR REQUIRED FIELD REVIEWS

.1 Whenever there is a requirement for consultant to perform a field review prior to concealment of any work, to inspect/re-inspect work for deficiencies prior to Substantial Performance of the Work, for commissioning demonstrations, and any other such field review, give minimum 5 working days' notice in writing to consultant.

.2 If Consultant is unable to attend a field review when requested, arrange an alternative date and time.

.3 Do not conceal work until consultant advises that it may be concealed.

.4 When Consultant is requested to perform a field review and work is not ready to be reviewed, reimburse Consultant for time and travel expenses.

1.24 PRELIMINARY TESTING

.1 When directed by consultant, promptly arrange, pay for, and perform site tests on any piece of equipment or any system for such reasonable lengths of time and at such times as may be required to prove compliance with Specification and governing Codes and Regulations, prior to Substantial Performance of the Work.

.2 When, in Consultant's opinion, tests are required to be performed by a certified testing agency, arrange, and pay for such tests.

.3 These tests are not to be construed as evidence of acceptance of work, and it is agreed and understood that no claim for delays or damage will be made for injury or breakage to any part or parts of equipment or system due to test where such injuries or breakage were caused by faulty parts and/or workmanship of any kind.

.4 When, in Consultant's opinion, tests indicate that equipment, products, etc., are defective or deficient, immediately remove such equipment and/or products from site and replace them with acceptable equipment and/or products, at no additional cost.

1.25 PROVISIONS FOR SYSTEMS/EQUIPMENT USED DURING CONSTRUCTION

.1 Confirm with Consultant what equipment can be used during construction.

.2 Any system or piece of equipment that is specified to be provided under requirements of Documents and is required to be used during construction stages of work prior to issuing of Certificate of Substantial Performance of the Work, are to be provided with special interim maintenance and service to cover systems/equipment during time of use during construction period of project until project has been certified as substantially performed and such systems/equipment are turned over to Owner.

.3 During this period of construction, such systems/equipment to not become property of Owner or be Owner's responsibility for maintenance or service. Systems/equipment are to remain property of respective manufacturers/suppliers or Contractor, who are responsible for full maintenance and servicing of systems/equipment in order to maintain validity of warranties after turning over to Owner.

.4 Prior to application for a Certificate of Substantial Performance of the Work and turn over to Owner, such systems/equipment to be cleaned, restored to "new" condition, paint finishes "touched up" etc.

1.26 MAINTAINING EQUIPMENT PRIOR TO ACCEPTANCE

.1 Maintain equipment in accordance with the manufacturer's printed instructions prior to start-up, testing, and commissioning.

1.27 PROTECTION

.1 Protect all finished and unfinished work from damage due to carrying out the work specified.

.2 Repair all damage resulting from execution of the work to the satisfaction of the Consultant.

.3 Should the project be stopped for any cause, provide all necessary protection to prevent damage by weather or other causes while such stoppage exists.

1.28 HANDLING AND STORAGE

.1 Materials and equipment shall be handled and stored in such a manner so that no damage shall be done to the materials, the structure of the building or surrounding property.

.2 Packaged or bundled materials and equipment shall be stored in dry weathertight secure enclosures in original undamaged condition with manufacturer's seals and labels intact.

.3 All metals shall be protected against corrosion and bending.

.4 Storage of materials, equipment etc. in the building structure shall not be permitted unless otherwise noted.

1.29 MINOR FIELD CHANGES

.1 The location, arrangement and connection of equipment and materials as shown on the drawings represents a close approximation to the intent and requirements of the Contract.

.2 The right is reserved to make reasonable changes required to accommodate conditions arising during the progress of the work. Such changes, if made prior to the installation, shall be done at no additional cost, unless the location, arrangement or connection is more than six feet from that shown on the drawings.

1.30 CLEANING UP

.1 During construction, and daily, keep the site reasonably clear of rubbish and waste material resulting from electrical work to the satisfaction of the Consultant. Before applying for a Certificate of Substantial Performance of the Work, remove all rubbish and debris, and arrange for and pay for the repair of any damage caused as a result of electrical work.

.2 Clean the interior and exterior of all equipment and remove any debris during construction.

.3 Inspect and clean all systems and equipment prior to energizing and ensure that they are safe.

Perform a complete and thorough clean-up to the exterior and interiors of all systems and equipment before the final inspection. The interiors shall be cleaned using an industrial vacuum cleaner.

1.31 ELECTRICAL CONDUCTOR FIRE PTROTECTION

.1 Fire rated enclosures shall be provided to form service spaces for conduits containing electrical conductors for emergency power, elevators, and life safety equipment in accordance with the requirements of the Authorities having jurisdiction.

.2 Fire rated access panels shall be provided in the enclosures where required.

.3 The fire rated enclosures required by this Division shall, unless otherwise noted, be provided by this Division and shall be in accordance with the sections of the specification detailing the fire rated enclosures requirements.

.4 Advise the extent of the fire rated enclosures required and supply all information and details as to size and locations within thirty days after the award of the contract.

.5 Failures to comply with the above requirements shall be remedied at this Division's expense.

.6 Where fire rated cables, that comply with the requirements of the Authorities having jurisdiction, are provided it shall not be required that they be installed in fire rated enclosures.

1.32 SPRINKLER PROOF EQUIPMENT

.1 Where sprinklers are installed; electrical equipment shall be constructed so that water from the sprinkler heads shall not impair the effectiveness of the equipment.

.2 A separate and complete roof shall be provided on free standing or surface mounted equipment. An overhang at the front, rear and sides shall prevent the entrance of water either at the top or through projecting face plates, meters, etc. Provide complete gaskets to suit.

.3 Where openings are required in the roofs or sides of incoming and outgoing conduits and cables, removable gasketed plates shall be provided and the conduits and cables shall be installed using waterproof fittings. The plates are to be grounded by a separate copper strap to the equipment.

.4 Distribution and power panels, panel boards, etc. and switchboards shall be complete with gaskets and doors.

1.33 EQUIPMNENT AND MATERIAL COLOURS

.1 Where materials and equipment are specified to be a specific colour, a sample of the colour proposed by the manufacturer shall be submitted with the shop drawing.

.2 Where materials and equipment are specified to be of colours as selected by the Consultant, these shall be determined during the Contract. Obtain the colour requirements from the Consultant prior to submitting shop drawings so that the appropriate sample of the colour can be submitted with the shop drawings.

1.34 SLEEVES

.1 Provide sleeves of galvanized steel pipe with machine cut ends of ample size to accommodate conduits passing through walls, partitions, ceilings, floors, etc.

.2 For wall partitions and ceilings, the ends of the sleeves shall be flush with the finish on both sides. For floors they shall extend 50mm above and below finished floor level.

.3 The space between the sleeve and the conduit and spare sleeves shall be filled with Dow Corning silicone RTV foam for fire stop. Caulk around the top and bottom with approved permanently resilient, non-flammable and weatherproof silicone base compound.

1.35 EXCAVATION AND BACKFILL

.1 The excavation and backfill required by this Division shall, unless otherwise noted, be provided by this Division and shall be in accordance with the Sections of the Specification detailing the excavation and backfill requirements.

.2 Advise the extent of the excavation and backfill work required by this Division and supply all information and details as to size and locations within thirty days after the award of the Contract.

.3 Failures to comply with the above requirements shall be remedied at this Division's expense.

1.36 HOUSEKEEPING PAD

.1 All floor mounted electrical equipment installed by this Division shall be mounted on concrete housekeeping pads which shall, unless otherwise noted, be provided by this Division.

.2 Advise the extent of the housekeeping pads required by this Division and supply all information and details as to size and location within thirty days after the award of the Contract.

.3 Failures to comply with the above requirements shall be remedied at this Division's expense.

1.37 CONCRETE

.1 The concrete and reinforcing required by this Division shall, unless otherwise noted, be provided by this Division and shall be in accordance with the Sections of the Specifications detailing the concrete and reinforcing requirements.

.2 Advise the extent of the concrete and reinforcing work required by this Division and supply all information and details as to size and locations within thirty days after the award of the Contract.

.3 Failures to comply with the above requirements shall be remedied at this Division's expense.

1.38 PAINTING

.1 All equipment shall be supplied with manufacturer's standard finish coat, unless otherwise noted.

.2 All supports, hangers, etc. provided or fabricated by this Division shall be painted with two coats of zinc chromate primer.

.3 Where the finish on any materials or equipment installed by this Division is damaged, it shall be touched up, completely repainted or replaced to the satisfaction of the Consultant.

1.39 IDENTIFICATIONS

.1 Identify each item of equipment installed by this Division, whether supplied by it or not.

.2 Metal surfaces shall be thoroughly cleaned before application of identification.

.3 Identifications shall be installed after painting has been completed and shall be secured with self-tapping screws or rivets except when installed on the inside of doors when gluing will be acceptable.

.4 Manufacturer's nameplates shall be affixed to each item supplied showing the size, name of equipment, serial number and all information usually provided including voltage, cycle, phase, horsepower, etc., and the name of the Manufacturer and his address. Ensure that all stamped, etched, or engraved lettering on plates is perfectly legible. Do not paint over nameplates and where equipment is to be concealed attach the nameplates in an accessible location.

.5 Panels and all other equipment which have exposed faces in finished areas shall not have any visible trademarks or other identifying symbols. Nameplates shall be mounted on the inside of the doors.

.6 Each lighting panel shall have a directory mounted on the inside of the door behind a protective plastic screen. The directories shall be typewritten and shall identify each branch circuit used. Spares and spaces shall be noted in pencil.

.7 The nameplates for switchboards, distribution panels, power panels, etc. shall be Lamicoid with 13mm high letters with typical identification of e.g., "PP`AA, 600V 3 PH., 4W, fed from Switchboard `A' ".

.8 The nameplates for panel boards shall be Lamicoid with 9.5mm high letters with typical identification of: e.g., "LP`B', 208V, 3Ph, 4W, fed from PP'A'".

.9 Each breaker, switch, instrument, meter, etc. in switchboards, distribution panels, power panels, etc. shall have a Lamicoid nameplate with 6.4mm high letters with typical identification of: e.g., "Elevator #1" or “Pump-1A”.

.10 The nameplates for disconnect switches, starters, time clocks, dimmers etc. shall be Lamicoid with 6.4mm high letters with typical identification of: e.g., "Supply Fan "S4", 5 HP, 600V, 3Ph., 3W, fed from `PP-1'".

.11 Each feeder cable and feeder conduit shall be identified with 25mm high letters with typical identification of "208V, 3Ph, 4W to LP'B'". The identification shall be provided at each access door, each change of direction, each junction box, at each floor or platform for vertically exposed conduits or cables at 2 metres above floor, at not more than 15 metres apart in straight runs, and on both sides of sleeves through walls.

.12 The interior, exterior and lids of all junction boxes and outlet boxes shall be neatly identified with different colours of paint. The colours shall be consistent throughout the project for the following systems:
- .1 347/600 Volt System – Black
- .2 120/208 Volt System – Blue
- .3 120/208 Volt Lighting – Yellow
- .4 120/208 Volt Emergency Lighting System – Orange
- .5 Intrusion Detection System – Purple
- .6 Computer System – Pink
- .7 Fire Detection and Alarm System – Red
- .8 Telephone System – Brown
- .9 P.A./Telephone System – Green

.10 Cable TV – White (Co-ordinate with the Board)

.13 Provide all signs and marking of equipment as required by the Authorities having jurisdiction.

.14 Outlet boxes for light switch(es) and receptacle(s) and junction boxes provided for lighting or power connections shall be identified on the box cover with circuits contained in the box, the panels from which they are fed, the voltage and the purpose of the outlet.

.15 Each power switch and receptacle shall be complete with permanent printed adhesive label installed on faceplate, identifying panel and circuit from which it is fed.

1.40 MOCK-UP

.1 A mock-up of the ceiling shall be provided by another Division of the Specification.

.2 Provide samples of the lighting fixtures, fire alarm devices and all other items of equipment mounted in or on the ceiling and obtain acceptance for the samples and their installation.

1.41 TEMPORARY AND TRIAL USAGE

.1 When it is claimed that a portion of the work is completed and in accordance with the Drawings and Specifications, the Owner shall have the privilege of temporary and trial usage for a reasonable length of time for making a complete and thorough test of the portion of the work completed.

.2 Temporary or trial usage by the Owner of any electrical device, machinery, apparatus, equipment or any other work or materials supplied under this Contract before final completion and written acceptance, is not to be construed as evidence of acceptance of same.

1.42 RECORD (AS-BUILT) DRAWINGS

.1 Drawings for this project have been prepared on a CAD system using AutoCAD software of release version confirmed with consultant. For purpose of producing record "as built" drawings, copies of Contract Drawings can be obtained from consultant by paying $1,000. Drawings may also to be used for preparation of layouts and interference drawings.

.2 As work progresses at site, clearly mark in red in a neat and legible manner on a set of bound white prints of Contract Drawings, changes, and deviations from routing of services and locations of equipment shown on Contract Drawings, daily. Changes and deviations include those made by addenda, change orders, and site instructions. Use notes marked in red as required. Maintain white print red line as-built set at site for exclusive use of recording as-built conditions, keep always set up to date, and ensure set is always available for periodic review. As-built set is also to include the following:
   .1 Dimensioned location of inaccessible concealed work.
   .2 Locations of control devices with identification for each.
   .3 Location of all pull boxes and junction boxes.
   .4 Locate, with dimensions to the building grid and datum lines, all buried and concealed services, pull boxes, junction boxes, etc. for all systems.
   .5 Location of all conduits, ducts, wiring, and conductor runs for all systems including sizes, types of components, circuit numbers, etc. exactly as installed.
   .6 Location of concealed services terminated for future extension.
   .7 Room names and numbering, equipment names, etc. shall be in accordance with the Owner's designation and may not necessarily be those shown on the drawings.

.3 Before applying for a Certificate of Substantial Performance of the Work, update a clean copy of Contract Drawing set in accordance with marked up set of "as-built" white prints including deviations from original Contract Drawings, thus forming an "as-built" drawing set. Submit "as-built" site drawing prints to consultant for review. Make necessary revisions to drawings as per Consultant's comments, to satisfaction of consultant.

.4 Reviews of the record drawings by the Consultant shall be for general conformance only and is not an approval of the accuracy of the drawings. Electrical Division shall be responsible for the accuracy of the record drawings.

.5 Submit final reviewed "as-built" drawing set to consultant to produce final "as-built" CAD drawings for submission to the School Board.

.6 Transfer all recorded information from marked-up set of As-Built condition to AutoCAD.

.7 Unless otherwise noted in Divisions 00 or 01, failure to maintain accurate record drawings will incur additional 5% holdback on progress claims until drawings are brought up to date to satisfaction of consultant.

1.43 TESTING AND COMMISSIONING

.1 All systems, equipment and installation shall be inspected, tested, adjusted, and commissioned to ensure compliance with the Drawings, Specifications and the Requirements of the Authorities having jurisdiction.

.2 Provide testing equipment, instruments, material and labour for all testing and commissioning.

.3 Submit reports of all testing and commissioning for review by the Consultants.

.4 This Division shall include for the cost of one qualified serviceman, completely familiar with the project, complete with appropriate spare parts and tools, to become part of the commissioning team for the project. The serviceman shall assist the Owner for a total of 60 hours during the commissioning process. This work will be required at or near the substantial completion phase of the project. Each Division and/or trade providing serviceman shall ensure continuity of their function by having only one such person assigned to the commissioning team.

.5 The actual performance of this work will be scheduled and coordinated by the Owner.

1.44 SYSTEM ACCEPTANCES

.1 Prior to requesting final inspection, submit, for review by the Consultant, letters from the manufacturers of equipment and systems indicating that their Technical Service Representatives have inspected and tested the equipment and systems and are satisfied with the methods of installation, connections, and operation.

.2 Acceptance letters shall be submitted for the following, when applicable:
- .1 Switchboard
- .2 Distribution Panels
- .3 Power Panels
- .4 Panel Boards
- .5 Fire Detection and Alarm System
- .6 Emergency Lighting System
- .7 Intrusion Detection System
- .8 Video Surveillance System
- .9 Public Address System
- .10 Lighting Control System

1.45 INSTRUCTIONS AND DEMONSTRATIONS

.1 Instruct the Owner's designated personnel during construction and prior to requesting final inspection so that they are fully familiar with all aspects in the function, installation, operation and maintenance of all systems and equipment.

.2 Arrange for and pay for the services of manufacturer's service technicians, engineers and other personnel required for instruction on specialized systems or installation.

.3 After commissioning of the systems, equipment, and installation they shall be fully demonstrated by this Division and representatives of the manufacturers to the Authorities having jurisdiction.

.4 Prior to requesting final inspection submit, for each system, the following:
.1 Dates and durations of instructions given to designated personnel and the names of persons instructed.
.2 Signature of each person instructed stating that they understand and are familiar with the function, installation, operation, and maintenance of the system.
.3 Dates and durations of demonstrations to Authorities having jurisdiction and names of all persons present.

1.46 OPERATING AND MAINTENANCE INSTRUCTION MANUALS

.1 Supply one hard copy of operating and maintenance (O&M) manuals consolidated in hardcover three "D" ring binders with each binder sized to include approximately 25% spare space for future data. Confirm exact quantity of manuals with consultant. Each binder to include:
.1 On front cover: project name; wording – "Electrical Systems Operating and Maintenance Manual"; and date.
.2 Introduction sheet listing Consultant, Contractor, and Subcontractor names, street addresses, telephone and fax numbers, and e-mail addresses.
.3 Equipment manufacturer's authorized contact person name, telephone number and company website.
.4 Table of Contents sheet, and corresponding Index tab sheets for all electrical specification sections.
.5 Copy of each "Reviewed" or clean, updated "Reviewed As Noted" shop drawing or product data sheet, with manufacturer’s/supplier’s name, telephone and fax numbers, email address, company website address, and email address for local source of parts and service; when shop drawings are returned marked "REVIEWED AS NOTED" with revisions marked on shop drawing copies, they are to be revised by equipment supplier to incorporate comments marked on "reviewed" shop drawings and a clean updated copy is to be included in operating and maintenance manuals;
.6 Testing and commissioning reports, and certificates issued by governing authorities.
.7 Operating data is to include:

.1 Demonstration and instruction certificate.
.2 Description of each system and its controls.
.3 Control schematics for equipment/systems.
.4 Description of operation of each system.
.5 Operation instruction for each system and each component.
.6 Description of actions to be taken in event of emergencies and/or equipment failure.
.7 Testing procedures.
.8 Trouble finding procedure.

.8 Maintenance data is to include:

.1 Servicing maintenance, operation, and trouble-shooting instructions for each item of equipment and each system.
.2 Schedules of tasks, frequency, tools required, and estimated task time.
.3 Complete spare parts lists with numbers.
.4 Catalogue sheets for all components.
.5 Approved shop drawings.
.6 Wiring diagram.

.9 Copies of warranties.
.10 Items requested specifically in Section Articles.

.2 Operating and maintenance instructions are to relate to job specific equipment supplied under this project and related to Owner's building. Language used in manuals is to contain simple practical operating terms and language easy for in-house maintenance staff to understand how to operate and maintain each system.

.3 Before applying for a Certificate of Substantial Performance of the Work, assemble one copy of O&M Manual and submit to consultant for review prior to assembling remaining copies. Incorporate Consultant's comments into final submission.

.4 Provide 1 digital copies of contents of operating and maintenance manuals and load onto separate USB type flash drives and submit to consultant. Prepare digital copies using version of Adobe Acrobat Portable Document Format or equal as confirmed with consultant and enhanced with bookmarks and internal document links. Each PDF file name shall be the same as that indicated in the binder. The contents in each PDF file shall be searchable.

1.47 COMMISSIONING

.1 A commissioning Authority will be appointed by the Board/Owner to oversee the commissioning activities of the electrical contract. Cooperate and coordinate with the Authority. Perform all commissioning activities for all aspects of work provided in Electrical Divisions. Perform all corrective work identified by the Authority.

.2 Comply with the requirements of sections 20 05 40 and 25 05 15, prepared by Commissioning consultant.

1.48 WARRANTY

.1 Unless otherwise specified in Divisions 00 and 01, warrant electrical work to be in accordance with Contract Documents and free from defects for a period of one (1) year from date of issue of a Certificate of Substantial Performance of the Work.

.2 Where equipment includes extended warranty period, e.g., five (5) years, first year of warranty period is to be governed by terms and conditions of warranty in Contract Documents, and remaining years of warranty are to be direct from equipment manufacturer and/or supplier to Owner.

.3 Warranty to include parts, labour, travel costs and living expenses incurred by manufacturer's authorized technician to provide factory authorized on-site service.

.4 Repair and/or replace any defects that appear in Work within warranty period without additional expense to Owner. Be responsible for costs incurred in making defective work good, including repair or replacement of building finishes, other materials, and damage to other equipment. Ordinary wear and tear and damage caused wilfully or due to carelessness of Owner's staff or agents is exempted.

.5 Do not include Owner deductible amounts in warranties.

.6 It is understood that warranties are to commence from time of Substantial Performance of the Work, regardless of what is noted within following Sections of Specification. Be responsible for providing whatever "bridging" or additional extended warranty period is required from time that material is purchased until this time.

.7 Submit signed and dated copies of extended warranties to consultant which clearly states herein specified requirements.

.8 Visit building during warranty period with Owner representatives. Owner to organize these visits. At these meetings, Owner representatives are to review performance of systems. If performance is satisfactory, then no further action needs to be taken. If unsatisfactory, then correct deficiencies, as directed by Owner representatives, to satisfaction of Owner's representatives. These site visits to occur:
.1 once during first month of building operation.
.2 once during third month of building operation.
.3 once between fourth and tenth month in a season opposite to first- and third-month visits.

.9 The following table indicates the warranty period that shall be provided for the following equipment:

EQUIPMENT	ITEMS	WARRANTY
LIGHTING	All types of lighting fixtures including LED lamps, drivers, and other associated components.	5 YEARS
LIGHTING CONTROLS	Lighting controls components including occupancy sensors, power packs, dimming switches, room controllers, control wiring and other associated components	5 YEARS

.10 The Owner/Board reserves the right to initiate a service contract for all equipment with one of the boards approved certified service companies. This shall not affect any of the above extended warranties provided by the manufacturers.

1.49 EQUIPMENT AND SYSTEM MANUFACTURER’S CERTIFICATION

.1 When equipment/system installation is complete, but prior to start-up procedures, arrange and pay for equipment/system manufacturer’s authorized representative to visit site to examine installation, and after any required corrective measures have been made, to certify in writing to consultant that equipment/system installation is complete and in accordance with equipment/system manufacturer’s instructions.

1.50 EQUIPMENT AND SYSTEM START-UP

.1 When installation of equipment/systems is complete but prior to commissioning, perform start-up for equipment/systems as specified in electrical work Sections in accordance with following requirements:
.1 Submit a copy of each equipment/system manufacturer’s start-up and verification report sheet to consultant for review and incorporate any comments.

.2 Under direct on-site supervision and involvement of equipment/system manufacturer's representative, start-up equipment/systems, make any required adjustments, document procedures, leave equipment/systems in proper operating condition, and submit a complete set of start-up and verification documentation sheets signed by manufacturer/supplier and Contractor, to consultant.

1.51 PROJECT CLOSEOUT SUBMITTALS

.1 Prior to application for Substantial Performance of the Work, submit required items and documentation specified, including following:
.1 Operating and Maintenance Manuals.
.2 As-built record drawings and associated data.
.3 Extended warranties for equipment as specified.
.4 Operating test certificates, i.e., Fire alarm verification Certificate.
.5 Final commissioning report.
.6 Identified keys for equipment and/or panels for which keys are required, and other items required to be submitted.
.7 Other data or products specified.

1.52 INSTRUCTIONS TO OWNER

.1 Refer to equipment and system operational and maintenance training requirements specified in Division 01.

.2 Train Owner's designated personnel in aspects of operation and maintenance of equipment and systems as specified. Demonstrations and training are to be performed by qualified technicians employed by equipment/system manufacturer/supplier. Supply hard copies of training materials to each attendee.

.3 Unless where specified otherwise in trade Sections, minimum requirements are for manufacturer/suppliers of each system and major equipment, to provide minimum two separate sessions each consisting of minimum 4 hours on site or in factory training (at Owner's choice), of Owner's designated personnel (for up to 6 people each session), on operation and maintenance procedures of system.

.4 For each item of equipment and for each system for which training is specified, prepare training modules as specified below. Use Operating and Maintenance Manuals during training sessions. Training modules include but are not limited to:
.1 Operational Requirements and Criteria – equipment function, stopping and starting, safeties, operating standards, operating characteristics, performance curves, and limitations.
.2 Troubleshooting – diagnostic instructions, test, and inspection procedures.
.3 Documentation – equipment/system warranties, and manufacturer's/supplier's parts and service facilities, telephone numbers, email addresses, and the like.
.4 Maintenance – inspection instructions, types of cleaning agents to be used as well as cleaning methods, preventive maintenance procedures, and use of any special tools.
.5 Repairs – diagnostic instructions, disassembly, component removal and repair instructions, instructions for identifying parts and components, and review of any spare parts inventory.
.6 The training sessions shall be scheduled and co-ordinated by the Commissioning Agent. The Commissioning Consultant shall video tape the sessions. Refer to Section 20 05 40 for further requirements.

.5 Before instructing Owner's designated personnel, submit to consultant for review a preliminary copy of training manual and a proposed schedule of demonstration and training dates and times. Incorporate Consultant's comments in final copy.

.6 Obtain in writing from consultant a list of Owner’s representatives to receive instructions. Submit to Consultant prior to application for a Certificate of Substantial Performance of the Work, a complete list of systems for which instructions were given, stating for each system:
.1 Date instructions were given to Owner’s staff.
.2 Duration of instruction.
.3 Names of persons instructed.
.4 Other parties present (manufacturer’s representative, consultants, etc.).

.7 Obtain signatures of Owner’s staff to verify they properly understood system installation, operation, and maintenance requirements, and have received operating and maintenance instruction manuals and "as-built" record drawings.

.8 Submit to Consultant, copy of electronic version of training materials used to train Owner's designated personnel. Include in operating and maintenance manuals submission.

1.53 FINAL INSPECTION

.1 Submit to Consultant, written request for final inspection of systems. Include written certification that:
.1 Deficiencies noted during job inspections have been completed.
.2 Field quality control procedures have been completed.
.3 Systems have been tested and verified, adjusted, and are ready for operation.
.4 Maintenance and operating data have been completed and submitted to, reviewed, and accepted by consultant.
.5 Tags and nameplates are in place and equipment identifications have been completed.
.6 Clean-up is complete.
.7 Spare parts and replacement parts specified have been provided and acknowledged by consultant.
.8 As built and record drawings have been completed and submitted to, reviewed, and accepted by consultant.
.9 Owner’s staff has been instructed in operation and maintenance of systems.
.10 Commissioning procedures have been completed.

1.54 SUB-CONTRACTORS TO THE ELECTRICAL CONTRACTOR

.1 The Electrical Contractor agrees to employ those sub-contractors proposed in the Electrical Form(s) of Tender and accepted by the Board/Owner at the signing of the Contract with the General Contractor.
.1 The Board/Owner may, for reasonable cause object to the use of a proposed Sub-Contractor and consequently, may require the Electrical Contractor to employ one of the other Sub- Contractors or Bidders.

.2 If the Board/Owner requires a change from a proposed Sub-Contractor originally proposed by the Electrical Contractor, the Contract Price shall be adjusted by the difference in cost.

.3 The Electrical Contractor shall not be required to employ as a Sub-Contractor, a firm to whom he may reasonably object.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CAN/CSA-C22.2 No. 131, Type TECK 90 Cable.
.2 CSA-C22.2 No. 51 (latest edition), Armoured Cables.
.3 CSA C22.2 No. 38 (latest edition), Thermoset-Insulated Wires and Cables.
.4 CSA C22.2 No. 75 (latest edition), Thermoplastic-Insulated Wires and Cables.
.5 CSA C22.2 No .0.3 (latest edition), Test Methods for Electrical Wires and Cables.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Low voltage wires and cables up to 4/0 shall, unless otherwise noted, have copper conductors with T90 Nylon, 600-volt insulation.

.3 Low Voltages wires and cables 250 MCM and larger shall, unless otherwise noted, have copper conductors with RW90 X-Link minus 40 degrees F, 1000-volt insulation.

.4 Aluminium sheathed feeder cables shall, unless otherwise noted, have a corrugated seamless aluminium sheath, copper conductors, RA90 X-Link minus 40 degrees F, 1000-volt insulation and without P.V.C. jacket.

.5 M.I.C.C. cables shall have solid copper conductors insulated with magnesium oxide and enclosed in a seamless copper sheath with a protective jacket where required.

.6 All outdoor and underground wiring shall have copper conductors with RWU-90, X-Link, minus 40 degrees F, 1000-volt insulation.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Wires and cables shall be selected so that their current carrying capacity conforms to the standards of the Authorities having jurisdiction.

.3 Feeders and branch circuits shall be as indicated on the drawings. Supporting of wires and cables with tie wires, perforated straps, etc., shall not be permitted. Electrical Contractor shall use approved clips.

.4 Unless otherwise indicated on the drawings no wire smaller than #12 AWG shall be used except for internal wiring of lighting fixtures which can be #14.

.5 BX90 aluminium sheathed cable, unless otherwise noted, may be used in accessible ceiling space and where concealed only. Install BX cables with anti-short bushings.

.6 Aluminium sheathed and M.I.C.C. cables shall be installed with horizontal supports at not more than 1220mm intervals and shall be spaced, bonded, and grounded in accordance with the requirements of the Authorities having jurisdiction.

.7 Aluminium sheathed and M.I.C.C. cables shall be terminated with moisture proof connectors.

.8 Where single conductor cables enter a ferrous box, provide the required non-ferrous plates. Slotting between the knockouts shall not be accepted.

.9 Aluminium sheathed and M.I.C.C. cables shall be suitably protected, when installed within 5 feet of the floor and in all locations where they might be subject to mechanical injury.

.10 Joints in feeder cables shall not be permitted.

.11 Joints in branch circuit wiring shall only occur where such circuits divide at a junction box and shall be mechanically and electrically sound and shall be securely fastened by means of "Ideal" 600V special service wire nut connectors.

.12 Conductors shall be colour coded and the colour coding shall be consistent throughout the project.

.13 Conductors shall be identified with self-sticking wire markers, indicating circuit number at all terminations and joints, at panels, pull boxes, junction boxes, etc.

.14 Termination lugs for feeder cables shall be compression type.

.15 All outdoor and underground wiring shall have copper conductors with RWU-90, X-Link, minus 40 degrees F, 1000-volt insulation.

.16 Wiring terminated in an outlet box for future lighting or power shall have 250mm of slack and each cable shall be terminated in a connector.

.17 Exposed cable runs shall be installed parallel to, or horizontally on, the walls of the building.

.18 Loads shall be circuited to provide fully balanced feeders.

.19 Only lubricants approved by the Authorities having jurisdiction shall be used and they shall be suitable for the type of cables installed.

END OF SECTION

1.1 GENERAL

1.2 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.3 REFERENCES

.1 Canadian Standards Association (CSA)
  .1 OESC – Latest Edition.
  .2 Electrical Safety Authority – Latest Inspection Bulletins.
  .3 CSA C22.1, Canadian Electrical Code, Part 1 – Latest Edition.
  .4 CAN/CSA Z32, Electrical Safety and Essential Electrical Systems in Health Care Facilities, where applicable.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 The grounding equipment shall be in accordance with CSA C22.2 and the copper grounding conductors in accordance with ASA G7.1.

.3 Provide non corroding accessories necessary for the grounding system.

.4 Building ground system to consist of a grid of copper welded ground rods (minimum 4' to 10' (1.2m to 3m) long spaced minimum of 10' (3m) apart, interconnected with bare minimum No. 3/0 AWG copper loop. Ground rods shall be driven sufficiently to contact permanent water table. Provide minimum No. 3/0 AWG copper ground loop inside electrical room and vaults for grounding of equipment enclosures and connect to ground grid. Connect building water service pipes (both street and building sides), gas service pipes and sprinkler system pipes, supply and return hot water heating pipes to ground system with minimum No. 3/0 AWG copper ground conductor in conduit. Perform resistivity test on soil to determine exact quantity of rods (minimum of 4).

.5 All buried ground connections shall be Thermit welded type.

.6 Provide one (1) No. 3/0 AWG insulated green copper ground conductor in conduit from the main building ground to the main Telephone/LAN Room. Provide a minimum 24" (600mm) long x 2" (50mm) high x 3/8" (10mm) thick copper ground bus and install on wall with standoff isolators and connect to 3/0 cable. Ground bus to have eight drilled taps. Provide one (1) #6 AWG green ground conductor in conduit from this ground bus and extend to each satellite LAN Room and coil for future connection to computer cable termination rack.

.7 Where cable trays are used for the data cabling pathways, ensure that they are grounded and bonded in accordance with the Ontario Electrical Safety Code.

.8 Continuous rows of fluorescent/LED fixtures shall be equipped with No. 12 bare copper ground wire for the full length of fixture row.

.9 The accessories shall be as manufactured by Burndy, Erico, Amp or Caldweld.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Provide complete permanent and continuous, system and equipment grounding systems including, ground rods, conductors, connectors, accessories, to conform to requirements of the Authorities having jurisdiction.

.3 Install connectors to manufacturer's instructions.

.4 Protect exposed grounding conductors from mechanical injury.

.5 All non-current carrying metal parts shall be bonded in accordance with ESA, CSA, and provincial inspection department standards.

.6 The neutrals of the dry-type transformer shall be connected by a separate copper ground wire to the ground bus in the switchboard.

.7 A separate copper ground wire to the ground bus in the switchboard shall be provided for each isolation transformer and isolated ground lighting panel.

.8 Separate copper wire shall be installed in all flexible conduits, in all rigid conduits, in wall or below slab conduits, EMT conduits and all non-metallic conduits.

.9 Connect the ground bus in the main switchboard to the main ground and incoming water main ahead of the water meter and provide a water meter shunt.

.10 The grounding system in the main switchboard shall be suitable for use with the ground fault system.

.11 Install separate grounding/bonding systems for telephone system, fire detection and alarm system, public address system, video surveillance system and intrusion detection system, in accordance with the systems suppliers' requirements.

.12 Install grounding system for pad mounted transformer in accordance with ESA and Local Hydro requirements.

.13 All grounding conductors run inside of building, except in electrical and LAN rooms, shall be run in EMT conduit.

.14 Install separate ground conductor for outdoor lighting standards.

.15 Install grounding connections to typical equipment included in, but not necessarily limited to following list: Service equipment, transformers, switchgear, duct systems, motor frames, motor control centres, starters, control panels, building steel work, generators, elevators and escalators, distribution panels, outdoor lighting etc.

.16 Install electrode interconnections where metal parts, circuits, or grounding conductors and/or electrodes are in proximity to lightning rod conductors.

.17 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Owner's Representative and local authority having jurisdiction over installation.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Type `C', `D', `T' and `E' pull boxes, junction boxes and cabinets shall be made of code gauge steel with corners lapped and welded and shall be painted and identified as noted in this specification.

.3 Cabinets shall provide proper space for conduits, wires and connections and their size shall be in accordance with the requirements of the Authorities having jurisdiction.

.4 The trim and cover shall be as required by the service and location.

.5 Splitters shall be sheet metal enclosure complete with welded corners and formed hinged cover suitable for locking in closed position.

.6 Splitters main and branch lugs/connection bars shall match the required size and number of incoming and outgoing conductors as indicated on drawings.

.7 At least three spare terminals shall be provided on each set of lugs in splitters less than 400A.

.8 The metal cabinets shall be as manufactured by Eaton, Square-D, Siemens, or Hammond.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Pull boxes, junction boxes and cabinets shall be independently supported from the conduit connected to them.

.3 Pull boxes shall be installed in inconspicuous but accessible locations.

.4 The cabinets shall be suitable for the installation and location.

.5 Cabinets shall be mounted with top not higher than 2m above finished floor.

.6 All electrical pull boxes above drywall ceilings shall be accessible via a properly sized access door installed directly below the respective pull box in drywall ceilings. Temporary removal of electrical light fixtures will not be considered safe access to above ceiling electrical boxes and shall not be permitted and acceptable.

.7 Install splitters and mount plumb, true and square to the building lines.

.8 All pull boxes, cabinets, equipment shall be identified in accordance with Section 26 05 01, Electrical Work General Instructions.

.9 Identification labels shall be provided indicating system name voltage and phase.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CSA C22.1, Canadian Electrical Code, Part 1.
.2 OESC – Latest Edition.
.3 Electrical Safety Authority – Latest Inspection Bulletins.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Size boxes in accordance with latest edition of OESC and/or CSA C22.1.

.3 102 mm square or larger outlet boxes shall be provided as required for special devices.

.4 Blank cover plates shall be provided for all outlet boxes without wiring devices.

.5 347 V outlet boxes shall be provided for 347 V switching devices.

.6 Barriers shall be provided for outlet boxes where more than one system are grouped.

.7 Outlet boxes used with rigid steel conduit shall be `FS' or `FD' Feraloy condulets.

.8 Outlet boxes used with EMT conduit shall be electro-galvanized and made of code gauge steel except when they are surface mounted on walls and then they shall be `FS' or `FD' Feraloy condulets.

.9 Outlet boxes installed outside the building shall be weatherproof type, with neoprene gasket and cast cover.

.10 Electro-galvanized steel masonry single and multi-gang boxes shall be provided for devices flush mounted in exposed block walls.

.11 Electro-galvanized sheet steel concrete type boxes shall be provided for flush mount in concrete with matching extension and plaster rings as required.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 All outlet boxes shall be supported independently of connecting conduits.

.3 Outlet boxes shall have adequate knockouts, but only those knockouts actually required shall be opened.

.4 Outlet boxes shall be securely fastened to the surface on which they are mounted. If the boxes are not mounted on a surface, then adequate and independent supports must be provided.

.5 Outlet boxes shall be provided for each surface mounted lighting fixture.

.6 Outlet boxes shall be provided for each recessed mounted lighting fixture.

.7 Multi-gang outlet boxes with single cover plate shall be used where switches are grouped.

.8 Unused opened knockouts shall be closed with steel knockout plugs.

.9 Correct size of openings shall be provided in boxes for conduit, mineral insulated and armoured cable connections. Installation of reducing washers will not be acceptable and allowed.

.10 All electrical outlet boxes above drywall ceilings shall be accessible via a properly sized access door installed directly below the box in drywall ceilings. Temporary removal of electrical light fixtures will not be considered safe access to above ceiling electrical boxes and shall not be permitted and acceptable.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CSA C22.2 No. 45, Rigid Metal Conduit.
.2 CSA C22.2 No. 83, Electrical Metallic Tubing.
.3 CSA C22.2 No. 211.2, Rigid PVC (Un-plasticized) Conduit.
.4 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
.5 CAN/CSA C22.2 No. 227.3, Flexible PVC conduit. Non-metallic Mechanical Protection Tubing (NMPT), a National Standard of Canada.

1.3 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Submit the following to the Consultant for review:
.1 Location drawings for all required sleeves and formed openings in poured concrete or precast concrete construction.
.2 Samples of materials and any other items as specified in succeeding Sections of this Division of the Specification.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Rigid metal conduits shall be electro-galvanized and made of standard weight steel pipe and connected with electro-galvanized threaded couplings.

.3 Electrical metallic tubing shall be a metal raceway which has a wall thinner than that of rigid metal conduit and an outside diameter sufficiently different from that of rigid metal conduit to render it impracticable for anyone to thread it with a standard pipe thread.

.4 Rigid PVC conduits shall be a rigid non-metallic conduit of un-plasticized polyvinyl chloride.

.5 Rigid Type I shall be similar to rigid PVC duct, Type EB1, to CSA Standard B196.1 requiring encasement in concrete.

.6 Rigid Type II shall be similar to Type I except of heavier construction and suitable for direct burial.

.7 Flexible conduits shall be liquid-tight flexible metal conduit.

.8 Rigid metal conduits entering boxes in dry locations shall be secured with galvanized steel locknuts and nylon insulated steel bushings.

.9 Rigid metal conduits entering boxes in wet locations shall be secured with steel bullet hub connectors, nylon insulated with neoprene `O' ring.

.10 Connectors for EMT surface mounted conduit shall be steel, set screw and nylon insulated.

.11 Connectors for EMT conduit in concrete shall be steel, raintight, concrete tight and nylon insulated.

.12 Couplings for EMT conduit surface mounted shall be steel set screw type.

.13 Couplings for EMT conduit in concrete shall be steel, rain tight and concrete tight.

.14 Connectors for flexible conduit shall be steel, liquid-tight, nylon insulated with neoprene `O' ring.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 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 CSA/UL certification of these components.

.3 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.4 Raceways shall be as shown on the Drawings and as detailed in the Specification.

.5 The size of conduit shall be in accordance with the requirements of the Authorities having jurisdiction.

.6 All conduits inside the building shall, unless otherwise noted, be electrical metallic tubing.

.7 Unless otherwise noted branch circuit conduits shall be concealed in wall and ceilings or exposed in unfinished areas and shall not be installed below or in any concrete slab unless otherwise approved by the owner/consultant. Where it is noted that branch circuit conduits can be installed in a concrete slab that is not on grade the conduit shall be electrical metallic tubing with a copper ground wire.

.8 Conduits exposed to the weather, in wet locations, subject to mechanical injury or in any hazardous locations, shall be rigid metal conduit.

.9 Conduits in plenums shall be rigid metal conduit.

.10 Telephone zone conduits shall be PVC conduit when installed in concrete and EMT in other locations.

.11 Telephone distribution conduits shall be rigid P.V.C. conduit when installed in concrete or underground and EMT conduit in other locations.

.12 Motor feeder drops shall be in rigid conduit with a maximum 910mm of flexible metal conduit. Rigid conduit for the drops shall start at least 910mm ahead of the actual bend and have two additional clips over normal requirements. The minimum conduit size for the drops shall be 19mm.

.13 Liquid tight flexible metal conduit shall be used for connection to motors or vibrating equipment in damp, wet or corrosive locations.

.14 Explosion proof flexible connection shall be used for connection to explosion proof motors.

.15 Conduit sealing fittings shall be installed complete with compound in hazardous areas.

.16 Conduits in finished areas shall be concealed and those in unfinished areas shall be surface mounted unless otherwise noted.

.17 Feeder conduits shall not be installed in or below any concrete slab, unless approved by the Consultant.

.18 Conduits shall be installed so that the conductors can be drawn in without strain or injury.

.19 Expansion fittings shall be installed in conduits crossing expansion joints.

.20 Conduits shall be installed to provide for expansion and expansion fittings shall be provided where required.

.21 Conduits shall not be installed within 75mm of water, sprinkler, drain or waste piping.

.22 Exposed conduits shall run parallel to or horizontally on the walls of the building.

.23 Conduit ends shall be carefully plugged during construction with steel capped bushings.

.24 The use of running threads shall not be permitted. Ericson couplings shall be used where required.

.25 Conduits shall not pass-through structural members without the approval of the Consultants.

.26 Powder activated fastenings can only be used if approved by the Consultant.

.27 Conduits shall be fastened with approved clips. Supporting of conduits with tie wires, perforated straps, etc. shall not be permitted. If a conduit rests on structural steel, etc., this will not be considered as a support. Provide proper supports, hangers, etc. and supports conduits from the top of structural beams/joists.

.28 Conduits shall not be attached or suspended from the metal deck unless approved by the Consultant.

.29 Conduit supports shall be spaced in accordance with the requirements of the Authorities having jurisdiction.

.30 An adequate number and size of pull boxes shall be installed where required in all conduits runs to facilitate the installation of the conductors.

.31 Fish wires shall be installed in all empty conduits, including telephone conduits.

.32 Excessive lengths of flexible conduit shall not be accepted. Maximum 10'-0" of length will be acceptable.

.33 Proper metallic contacts shall be made between conduit, boxes, etc.

.34 Maximum size of conduit on which ground bushings can be used is 32mm.

.35 A separate ground wire shall be installed in all flexible conduits, EMT conduits, underground conduits, in wall or below a concrete slab, underground parking lot lighting and in all non-metallic conduits or ducts.

.36 Installation of conduit in oversize knockouts shall not be accepted.

.37 Joints in conduits installed underground, in concrete slab on grade or in a concrete duct bank shall be pitched on the outside and made completely watertight.

.38 Minimum concrete thickness over a conduit in a concrete slab where applicable shall be 50mm.

.39 Spare or unused conduits that terminate in an enclosure shall be capped.

.40 Conduits passing through concrete and/or masonry floors, walls, roof and any other such construction shall be provided with sleeves.

.41 Electrical conduit roof flashing shall be similar to National Roofing supply product code# ECP-PVCH (electrical conduit post PVCH), Gooseneck S.S.A ARPGN2 (2”)/ ARPGN3 (3”).

.42 Protect conduits from damage where they stub out of concrete. Use rigid steel conduit for stub-up and adapt to in floor rigid PVC conduit.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Access panels for walls and ceiling shall be of the flush type with concealed flanges constructed from 12 gauge minimum bonderized steel and shall be complete with anchor straps, rust resistant concealed hinges and positive locking, self-opening screwdriver operated lock. Coordinate with Division 23.

.3 Access panels in tiled walls shall be stainless steel with recessed door panel to accept wall finish and shall be of a size to suit tile pattern.

.4 Access panels installed in fire rated walls, partitions or ceilings shall have a fire resistance rating equal to the materials in which they are installed.

.5 Access panels shall be as manufactured by LeHage, SMS, Pedlar or approved equal.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 All parts of the installation including, but not limited to, pull-in, junction and outlet boxes, cabinets, gutters, etc. shall be accessible.

.3 Supply access panels as required to provide complete access to all equipment and connections. The access panels shall be installed by other Sections of the specification.

.4 Provide drawings showing size, type and location of all access panels and submit for review by the Consultant.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Electric supplementary heaters and controls shall, unless otherwise noted, be supplied by Division 23.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Install all electric heaters and remote electric thermostats supplied by Division 23.

.3 Electric duct heaters shall be installed by another Division of Specification.

.4 Provide all conduit, wiring, etc. and connect to the electric heaters, electric duct heaters and remote electric thermostats to provide a complete Electric Heating System.

.5 Install filler pieces as shown on the drawings between baseboard heaters to form a continuous length.

.6 All L.V. control wiring shall be by Division 23.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 The pipe tracing cables, and controls shall, unless otherwise noted, be provided by Division 23.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Provide all conduit, wiring, pipe tracing cables, etc., and connect to the pipe tracing cables and controls to provide a complete pipe tracing system.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 This Section is for provisions for Building Automation System only.

.3 Divisions 23 will supply and install a Computerized Building Automation System complete with the distribution boxes, control sequencing and all interfacing.

.4 Division 26 shall provide individual lighting relays and/or contactors for each individual circuit and associated relay boxes and connect to load side of relays, as shown on the drawings. All control wiring by Division 23.

.5 Contactors used in conjunction with building automation system shall be electrically operated, electrically held type. Refer to Section 26 29 01.

.6 Coordinate all work with Division 23.

Execution: NOT USED

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Drawings to include electrical detail of disconnect switch, type, quantity, voltage, ampacity, and dimension etc.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 The hand dryers shall be World Dryer; SLIMdri, surface mounted ADA compliant with universal brush type motor, die cast aluminum finished with white cover finish (#L-974) and 208v input voltage.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Provide backboxes as required complete with conduit and wiring and connect to circuits as shown on the drawings. Coordinate all associated work with Architectural drawings.

.3 Hand dryers shall be installed in accordance with manufacturer's recommendations.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Submit the following to the Consultant for review:
.1 Drawings to include electrical detail of lighting control devices including occupancy sensor complete with associated power pack etc., quantity, control schematic wiring diagram and coverage area etc.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Provide lighting control device(s) including occupancy sensors, room controllers, daylight sensors, dimmers, etc. as specified on the drawings:
.1 Provide associated power and relay packs.
.2 Provide all associated mounting accessories.

.3 Electrical Contractor shall include in tender price for installation, testing, time adjustment, functional testing and commissioning of occupancy sensors, room controllers, daylight sensors, and programming of Auto-On sequence of all lighting control devices for light fixtures on a room-by-room basis in entire building by manufacturer. Submit verification/commissioning report after completion of work.

.4 Lighting Control Devices Commissioning:
.1 Functional testing: Lighting control devices and control systems shall be tested to ensure that control hardware and software are calibrated, adjusted, programmed, and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. Where occupancy sensors, time switches, programmable schedule controls, or photo sensors are installed, the following procedures shall be performed.

Occupancy sensors:

.1 Certify that the sensor has been located and aimed in accordance with manufacturer recommendations.
.2 For each sensor to be tested, verify the following:

.1 Status indicator (as applicable) operates correctly.
.2 Controlled lights turn `off' or down to the permitted level within the required time.
.3 For auto-on occupancy sensors, the lights turn `on' to the permitted level when someone enters the space.
.4 For manual-on sensors, the lights turn `on' only when manually activated.
.5 The lights are not incorrectly turned `on' by movement in nearby areas or by HVAC operation.

.6 Simulate occupied condition. Verify and document the following:

.1 All lights can be turned `on' and `off' by their respective area control switch.
.2 The switch only operates lighting in the enclosed space in which the switch is located.

.7 Simulate unoccupied condition. Verify and document the following:

.1 All non-exempt lighting turns `off'.
.2 Manual override switch (where applicable) allows only the lights in enclosed space where the override switch is located to turn `on' or remain `on' until the next scheduled shut off occurs.

.8 Daylight controls

.1 All control devices (photocontrols) have been properly located, field-calibrated, and set for appropriate setpoints and threshold light levels.
.2 Daylight controlled lighting loads adjust to appropriate light levels in response to available daylight.
.3 The location where calibration adjustments are made is readily accessible only to authorized personnel.

.2 Functional testing report/documentation shall certify that the installed lighting control of each respective space in entire building meets all requirements as specified in the contract documents.

.5 All occupancy sensors must be installed as per manufacturer’s recommended location and wiring diagram.

.6 Occupancy sensors time delay settings must be adjusted and co-ordinated to suit the Owner requirements.

.7 Cooper lighting, Current lighting, Acuity (Sensor Switch/ nLight) and Wattstopper shall be considered equivalent for lighting control system.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Install all lighting control devices as shown on electrical drawings. Provide all components to suit.

.3 Exact location of occupancy sensors shall be co-ordinated on site and shall comply with the manufacturer’s recommendations.

.4 Occupancy sensors shall turn off the corresponding light fixture when light switches are in the “On” position and the space is not occupied.

.5 Adjust occupancy detection sensitivity to match the level of activity for each space.

.6 Install power packs and associated relays to suit the number of circuits in the respective spaces. Installation shall comply with the manufacturer’s recommendations. Coordinate all work with manufacturer.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CSA C22.2 No. 29, Panel boards and enclosed Panel boards.

1.3 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Drawings to include electrical detail of panel board, branch breaker type, quantity, ampacity, KAIC rating and enclosure dimensions etc.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Panel boards shall be of the size, capacity and type as shown on the drawings. Series or integrated ratings shall not be an acceptable method of achieving specified interrupting levels for breakers, panels, or electrical equipment in general. Where an interrupting rating is specified, it shall be on a breaker, panel, or switchboard. Each breaker associated shall be fully rated to interrupt that magnitude of current. If there is a conflict between drawings and specifications, the higher rated value associated with that particular equipment shall be deemed to be correct.

.3 Panel boards shall be of the sprinkler-proof, dead front type enclosed in code gauge steel equipped with door, gasket, lock, and directory and shall be suitable for surface or flush mounting as required.

.4 Bussing in each panel shall be copper and shall extend the full length of the panel. Multi-section panels shall have full capacity rated horizontal bussing between each section.

.5 Breakers shall be ambient compensated type, calibrated at 40 degrees C and be of the bolt-on type. Multi-pole breakers shall have common trip.

.6 Panel boards for use on 240-volt or 208-volt system shall, unless otherwise noted be of the "NQ" panel or I-line panel as indicated on drawings.

.7 Panel boards for use on 600-volt system shall, unless otherwise noted be of the "NF" panel as indicated on drawings.

.8 Panels, including tubs, shall have two coats of primer paint and two coats of ASA 61 grey paint.

.9 Panel boards shall be of the same manufacturer as the switchboard.

.10 All circuit breakers shall be installed in panel boards before shipment.

.11 Panel boards shall be provided with mains, number of circuits, KAIC rating and branch circuit breaker sizes as indicated in contract documents.

.12 Lock-on devices shall be provided for fire alarm, emergency and exit lighting circuits and other circuits as indicated in contract documents.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Locate panel boards where indicated; and mount securely and plumb true and square to adjoining surfaces.

.3 Panels are to be mounted so that the top of the panels are 1800mm above finished floor.

.4 Provide 2 - 32mm empty conduits from each flush mounted panel to the ceiling spaces above and below for future installation.

.5 Provide wire-ways above multi-section panels to avoid cross-wiring.

.6 Numbering of breakers in multi-panel assemblies shall be consecutive. If necessary, provide narrow Dymomite strips with the required numberings.

.7 Prior to energizing or commissioning the panels, they shall be fully inspected, tested, checked, and adjusted to include, but not limited to, the following:
.1 Grounding.
.2 Breaker settings.
.3 Breaker operation.
.4 Continuity of feeder cables.
.5 Phase resistance of feeder cables.
.6 Insulation resistance of feeder cables.
.7 Proper phasing of incoming and feeder cables.
.8 Equal division of load between parallel conductors.
.9 Bus torque, supports, clearance, general mechanical conditions, and insulation resistance.

.8 30% of all breakers in panels shall be equipped with locking devices. These locking devices shall be installed as directed by the Consultant on completion of work and the unused units shall be handed over to the Owners.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CSA-C22.2 No.55, Special Use Switches.
.2 CSA-C22.2 No.111, General-Use Snap Switches.
.3 CSA-C22.2 No.42.1, Cover Plates for Flush-Mounted Wiring Devices.
.4 CSA-C22.2 No.42, General Use Receptacles, Attachment Plugs and Similar Devices.

1.3 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Provide manufacturer’s printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish, and limitations.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Light switches on 120-volt circuits under 1200 watts shall be 15 amp. and above 1800 watts shall be 20 amp.

.3 Light switches shall be premium specification grade, A.C., Toggle type switches.

.4 Receptacles shall be of the type shown on the drawings with the standard C.S.A. configurations and shall be specification grade. Hubbell #5262.

.5 Light switches and receptacles on normal power shall be white unless noted otherwise.

.6 Isolated ground receptacles shall be orange. Hubbell #1G-5262.

.7 Wall plates for flush mounted devices shall be multiple gangs’ super stainless-steel type 302.

.8 Wall plates for surface mounted devices in unfinished areas shall be metal covers for F.S. type boxes.

.9 The weatherproof plates shall be cast aluminium with lift cover for F.S. type boxes.

.10 For T.V. and computer outlets provide blank cover plates unless work is complete.

.11 For telephone outlets provide blank cover plates unless work is complete.

.12 Receptacle mounted on the exterior walls of the building shall be with ground fault protection mounted in an F.S. type box with a Hubbell #5206WO and MX3200 weatherproof in-use cover plate.

.13 50A/208V 1 phase 3W receptacle, range receptacle Smith & Stone #1-8450 complete with plug and cord set.

.14 30A, 120/208V receptacle Smith & Stone #1-8430 dryer receptacle complete with plug and cord set.

.15 Wiring devices shall, unless otherwise noted, be of Pass & Seymour, Hubbell, Leviton, or Cooper manufacture.

.16 All service receptacles on roof shall be 15/20A combination GFI type receptacles complete with weatherproof in-use cover (Similar to Hubbell Cat. #MX3200).

.17 Receptacle controlled by occupancy sensor shall be Similar to Hubbell Cat. #BR15C2GRY.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Symbols on drawings show approximate locations. Care shall be taken to locate each device to ensure that it is in the appropriate location to suit the Architectural finishes.

.3 Mounting heights are referred to finished floor or finished ceiling unless related to benchmark elevations.

.4 Provide cover plates for flush mounted manual starters.

.5 Receptacle, telephone, etc. outlets shall, unless otherwise noted, be mounted vertically 400mm above finished floor in the finished areas and 1200mm in all unfinished areas. Thermostats shall be mounted 1400mm, unless otherwise noted.

.6 Telephone, P.A., etc. wall outlets shall be spaced 100mm from power outlet.

.7 All wiring devices cover plates shall be labelled using clear adhesive strips with black type identifying, panel and circuit number(s) for each device.

.8 Single throw switch(es) shall be installed with handle in "UP" position when switch closed.

.9 Switches shall be installed in gang type outlet box(es) when more than one switch is required in one location.

.10 Receptacles shall be installed in gang type outlet box(es) when more than one receptacle is required in one location.

.11 Suitable common cover plates shall be installed where wiring devices are grouped.

.12 Cover plates meant for flush mount outlet boxes shall not be use for surface mounted outlet boxes.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CSA C22.2 No. 248.12, Low Voltage Fuses

1.3 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Drawings to include electrical detail of fuse type, quantity, ampacity, voltage rating and dimension etc.

.3 Submit fuse performance data characteristics for each fuse type and size. Performance data to include average melting time-current characteristics.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Fuses protecting motor circuits shall be Form I Class `J' time delay.

.3 Other fuses up to 600A shall be Form I Class `J'.

.4 Other fuses above 600A shall be Form I Class `L'.

.5 All fuses shall be of Ferraz, Shawmut or Bussman.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Provide fuses for the complete electrical installation.

.3 Supply six (6) spare fuses of each size and type installed.

.4 Provide in the main electrical room a wall mounted metal cabinet complete with doors and lock, and an adequate quantity of pigeonholes to accommodate the spare fuses.

.5 To avoid confusion and possible loss the fuses shall not be stored in the cabinets until they are physically counted by the Owner's representative and a written receipt obtained for them. A copy of the receipt shall be included in the manuals.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Drawings to include electrical detail of disconnect switch, type, quantity, voltage, ampacity, and dimension etc.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Disconnect switch(es) shall have the operating handle interlocked with the switch cover so that it can only be opened when the switch is in the "Off" position, and the handle cannot be put in the "On" position unless the cover is closed.

.3 Fused disconnect switch(es) shall have steel reinforced clips and fuses shall be easily removable when the switch is in the "Off" position.

.4 Switches shall have ample gutter space for top or bottom wiring and shall have fully visible blades when in the "Off" position, quick-make, quick-break mechanism and be horsepower rated.

.5 Disconnect switch(es) shall be provided with ON-OFF switch position indication on switch enclosure cover.

.6 Switches used outdoors shall be in a weatherproof enclosure.

.7 Switches shall have provision for padlocking in the "Off" position and interlock defeat.

.8 All motors shall be provided with a disconnect switch by this Division unless otherwise noted.

.9 The disconnect switches shall be as manufactured by Eaton, Siemens, or Square `D’.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Disconnect switch(es) shall be installed complete with fuses as indicated on drawings and in contract documents.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CSA C22.2 No.14, Industrial Control Equipment.

1.3 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Drawings to include electrical detail of contactor, quantity, ampacity, voltage, control schematic wiring diagram and enclosure dimension etc.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Contactors controlling panel boards or branch circuits shall be tungsten rated, electrically operated, electrically held of the size and rating specified, complete with control transformer, control circuit fuses, pilot light warning label, NO/NC contacts and On/Off/Auto selector switch.

.3 Contactors shall be in sprinkler proof enclosure unless otherwise noted.

.4 The contactors ampere rating shown on the drawings is the minimum continuous enclosed de-rated rating of the contactors. Contactors shall be designed and manufactured in accordance with NEMA Standards.

.5 Contactors controlling branch circuits shall be mounted above the panel board from which they are fed, unless otherwise noted.

.6 Contactors shall be of Allen-Bradley, Eaton, Siemens or Square `D' manufacture.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Field designed and assembled contactor assemblies will not be acceptable.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 International Electrotechnical Commission (IEC).
.1 IEC 947-4-1, Part 4: Contactors and Motor-Starters.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 The motors shall be provided and adjusted by Division 23, Mechanical.

.3 The starters shall be supplied by Division 23, Mechanical.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Provide and connect conduit and power wiring to the motors.

.3 Conduit and wiring for low voltage thermostats shall, unless otherwise noted, be provided by another Division of the Specification.

.4 Wiring and conduit for line voltage thermostats shall be by this Division. Coordinate with Division 23, Mechanical drawings.

.5 Take delivery of and install the starters and provide and connect conduit and power wiring to the starters. Control wiring and conduit shall, unless otherwise noted, be provided by Division 23, Mechanical.

.6 Fuses for the fused combination magnetic starters shall be supplied and installed by Division 23, Mechanical.

.7 Prepare schedule of each motor connected which shall include the following:
.1 Phase
.2 Voltage
.3 Horsepower
.4 Full load current
.5 Motor Purpose
.6 Fuse size and type
.7 Overload heater size and type

.8 Submit the motor schedule for review by the Consultant and include the schedule in the manuals.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

.3 Refer to section 26 50 10, Lighting Fixtures Schedule

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Light fixtures finish and construction shall meet ULC listings and CSA certifications related to intended installation.

.3 Light Emitting Diodes (LED) shall comply with the following:
.1 Light emitting diodes shall be manufactured by “Cree” or equal.
.2 Junction temperature at 25°C ambient shall not exceed 60°-70°C.
.3 LED light fixture(s) shall follow LM-79 and LM-80 Standards. Luminaire photometric shall be performed by an independent company.
.4 Lumens per watt output (LPW) shall be not less than 100 LPW.
.5 The lifetime rating of driver, LEDs and all electrical components of complete fixture shall be 60,000 hours (minimum) at full load.
.6 Colour temperature shall range from 3500K to 5100k as called for in the Lighting Fixtures Schedule.
.7 All electrical components shall have a 5-year replacement (parts and labour) warranty.
.8 LED light fixture(s) shall be DLC certified.
.9 LED light fixture(s) shall be complete with 0-10V dimming driver.

.4 The louvres for light coves in washrooms and display cases and where shown shall be 1/2"x1/2"x1/2" (13x13x13mm) continuous aluminium and shall be of American Louvre manufacture.

.5 Lenses shall be acrylic (minimum of 0.175mm) with a maximum flame spread rating of 250 and smoke development classification of 600 and shall be of KSH, American Louvre or Orcons manufacture.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Remove from the site all empty cartons, crates, etc. in which the fixtures and associated components are delivered.

.3 Install lighting fixtures at locations as indicated on drawings and in contract documents.

.4 The chain supports required for mounting and installation of recessed lighting fixtures shall be supplied and installed by this Division. The supports shall be attached to the structure with minimum 2 supports per fixture. <u>The ceiling system shall not be used as a supporting means.</u> Prior to installation of lighting fixtures, Electrical Contractor shall coordinate with consultant and get approval.

.5 Surface mounted fixtures shall be independently supported from the structure above.

.6 Fixtures connected to the circuits exceeding 150 volts to ground shall be mounted at least 8 feet above floor level.

.7 Fixtures mounted in continuous rows shall be equipped with aligning clips to form straight uninterrupted line.

.8 Align light fixtures mounted individually parallel or perpendicular to building grid lines.

.9 The location of lighting fixtures in Service Areas, Electrical and Mechanical Rooms, etc. shall be determined after the equipment is installed.

.10 Refer to the Architectural reflected ceiling drawings for the exact location of the lighting fixtures.

.11 Cooperate with the other Divisions to establish proper clearances from sprinkler heads, diffusers, ducts, etc.

.12 Surface mounted fixtures shall have minimum clearance of 2'-0" (600mm) from adjacent sprinkler heads.

.13 Provide additional supports, hangers etc. required to support fixtures mounted under ductwork and the fixture supports shall not be attached to either the ductwork or the ductwork supports.

.14 Provide and connect all branch circuit conduit and wiring to the signs (if required).

.15 Angles required for support of 1/2"x1/2"x1/2" (13x13x13mm) louvre shall be by Ceiling Division.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Submit the following to the Consultant for review:
.1 Manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish, and limitations.
.2 Samples of materials and any other items as specified in succeeding Sections of this Division of the Specification.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 The lighting fixtures with the letter shown, shall be of the types as described below:

Type ‘A1’ Shall be Lithonia Lighting CPX LED panel fully switchable configurable with drywall recessed mount Kit. Cat. #CPX-1x4-AL07-80CRI-SWW7-SWL-120V-1X4SMKSH. The light fixture shall be complete with all necessary accessories, components and kit suitable for surface mounted installation.

Type ‘C’ Shall be Lithonia Lighting Cat. #ZL1N-L48-SMR-3000LM-FST-120-40K-80CRI-WH-WGZ48, 4’-0” long channel strip LED light fixture complete with snap on/off diffuse lens, 120-volt integral driver and wire guard.

Type ‘D’ Shall Gotham Lighting EVO 4” General Illumination Round Downlight Cat. #EV04-40-15-AR-LSS-MD-120-GZ10-TRW. The light fixture shall be complete with all necessary accessories and components for recessed installation in drywall ceiling.

.3 LED light fixtures, unless otherwise noted, Salex, Signify, Cooper, Acuity and Current Lighting shall be considered equal provided they meet the specifications, designed lighting calculations based on absolute IES files of the respective light fixtures.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CSA C22.2 No. 141 (latest edition), Unit Equipment for Emergency Lighting.

1.3 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Drawings to include electrical detail of system components, mounting method, source of power and special attachment etc.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 Emergency Battery Unit:

Type "L" Shall be as manufactured by Lumacell and shall be CSA C22.2.141 performance approved and shall be connected to a 120volt A.C. 60 cycle, single phase power source and shall provide automatically and instantaneously emergency lighting upon failure or interruption of normal electric power. Batteries shall be sealed lead, 12volt, 360 watts complete with emergency heads as shown on drawings. Charger shall be completely automatic solid-state type, with inverse temperature compensation. The control panel shall contain the following:

.1 AC pilot light.
.2 Test switch.
.3 On-Off switch.
.4 Burn-out protection.
.5 Provision for conduit connection.

.3 The battery units shall be Lumacell "RG12S-360", Emergi-Lite, Beghelli or Aimlite.

.4 Battery Cabinet shall be suitable for direct or shelf mounting to wall and complete with knockouts for conduit. Removable or hinged front panel for easy access to batteries.

.5 The complete system shall have a one-year unconditional guarantee, and a 5-year pro-rata guarantee on workmanship and parts and 10 years pro-rata on batteries.

.6 Emergency Remote Heads Schedule:

Type 'LA' Shall be Beghelli #SR1-LED MR16 remote emergency lighting fixture complete with 1-7watt, 24volt LED-MR16 lamp.

Type 'LB' Shall be Beghelli #SR2-LED MR16 remote emergency lighting fixture complete with 2-7watt, 24volt LED-MR16 lamps.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Install units where; shown on the drawings and provide all necessary mounting platforms and mounting hardware.

.3 Electrical Contractor shall provide report with on-site readings to show lighting levels in all areas with emergency lighting fixtures.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

2. Products

.1 Except for those items as may be specified in Part 3, of this Section, refer to Part 2 of the various Sections of Specification, Division 26 Electrical.

.2 The existing P.A. system shall remain and shall be operational at all times.

.3 Provide associated outlet boxes, back boxes, P.A. system wiring, P.A. system devices, testing, conduits terminated in corridor and provide extension to the existing system as shown on drawings and indicated in specification and in accordance with manufacturer recommendation. Provide all associated components to suit.

.4 In classrooms, and washrooms/ Universal/ B.F. washrooms speakers shall be two-way and shall be an 8" dual cone design with a minimum frequency response of 30Hz-18kHz. It shall have a minimum voice coil diameter of 3/4", a 5-ounce magnet and be capable of handling 10 watts of program power. Any system requiring a line matching transformer for each staff station location will use a transformer of such quality that a minimum frequency response of 60Hz-12kHz will be provided.

.5 All new P.A. system devices i.e., P.A. system speaker(s), call button, handset, horn(s) etc. shall match existing and shall be compatible with existing P.A. system panel.

.6 Relocate existing P.A. system devices as shown on drawings. Extend associated conduit, wiring and adjust all components to suit.

.7 New P.A. system wiring shall be plenum rate FT-6 type, 24 AWG, four (4) twisted pair to match existing wiring. Install new wiring in new outlet/back boxes, conduits, and "free run" in corridor ceiling space. Provide associated "J-hooks" as required for proper support.

.8 Install wiring in new conduits/outlet boxes.

.9 Terminate new wiring in existing P.A. system panel.

.10 Terminate all conduits in corridor ceiling.

.11 The fish wire shall be installed in each conduit.

.12 All distribution conduits shall be complete with slip sleeves to permit the installation of the distribution cables.

.13 Installations of equipment and wiring shall be done in accordance with manufacturer’s recommendations and school board requirements.

.14 After completion of the system provides verification report by system manufacturer/installer.

.15 P.A. system installer shall be “Surefoot” or any other Simplex/ Valcom system certified installer approved by the School Board.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 Provide conduits, outlet boxes and other materials as required and/or shown on the drawings for installation of P.A. system devices and equipment.

.3 Conduits for P.A. devices shall be terminated as shown on the drawings. Coordinate all work with the P.A. system supplier/installer.

.4 The installation shall be in accordance with the Board's requirements.

.5 All distribution conduits shall be complete with slip sleeves to permit the installation of the distribution cables.

END OF SECTION

1. General

1.1 APPLICATION

.1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section and is to be read accordingly.

.2 Refer to section 26 05 01, Electrical Work General Instructions.

1.2 REFERENCES

.1 Underwriter's Laboratories of Canada (ULC)
.1 CAN/ULC-S524 - Standard for the Installation of Fire Alarm Systems.
.2 CAN/ULC-S525 - Audible Signal Device for Fire Alarm Systems.
.3 CAN/ULC-S526 - Visual Signal Devices for Fire Alarm Systems.
.4 CAN/ULC-S527 - Control Units.
.5 CAN/ULC-S528 - Manual Pull Stations for Fire Alarm Systems.
.6 CAN/ULC-S529 - Smoke Detectors for Fire Alarm Systems.
.7 CAN/ULC-S530 - Heat Actuated Fire Detectors for Fire Alarm Systems.
.8 CAN/ULC-S531 - Standard for Smoke Alarms.
.9 CAN/ULC-S536-S537 - Burglar and Fire Alarm Systems and Components.
.10 CAN/ULC-S548 - Water flow Indicators for Fire Protective Signalling Systems.

.2 National Fire Protection Agency (NFPA)
.1 NFPA 72 - National Fire Alarm Code.
.2 NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

1.3 SUBMITTALS

.1 Submit shop drawings for all products specified in Part 2.

.2 Submit manufacturer's printed product literature, specifications and data sheets as required and specified in specification.

.3 Submit equipment and zoning layout complete with wiring diagram.

2. Products

.1 The fire alarm system is existing and must be operational at all times. <u>All new devices must match existing</u>.

.2 <u>Provide extension to the existing system fire alarm system as shown complete with F.A. devices and all necessary alarm, supervisory, and shut-down, modules as required for proper installation and operation. F.A. panel shall support existing and new zones. Adjust all components to suit.</u>

.3 <u>All new devices shall match existing F.A. manufacturer (F.A. pull stations, smoke, and heat detectors, F.A. speakers/ horns, duct detectors, etc.).</u>

.4 Where indicated on the drawings; remove or relocate existing fire alarm speaker/strobe, F.A. pull stations, F.A. detectors etc. as shown.

.5 Before re-installation, the F.A. speakers, F.A. pull stations or F.A. detectors shall be cleaned, tested, and restored to a sound and operating condition. Coordinate with drawings.

.6 Provide new F.A. devices i.e.: F.A. speakers/ horns, pull stations, heat and smoke detectors, duct detectors, etc. as shown on the drawings.

.7 The existing fire alarm control panel shall be modified/expanded to suit F.A. zones as shown on the drawings. Adjust and add all components to suit.

.8 The existing F.A. graphic shall be replaced with new multi-colour passive graphic to suit existing and new F.A. zones as required.

.9 Existing F.A. annunciator(s) shall be modified to suit existing and new F.A. zones as required.

.10 Combustion detectors shall operate on the ionization principle and shall be activated by the presence of combustion products. The detector shall be listed by Underwriters' Laboratories of Canada. The detector shall be a plug-in unit containing two ionization chambers, an amplifier-switching circuit and indicator lamp. The unit shall contain no moving parts. One chamber shall be for detection and the second chamber shall function as a reference, to stabilize the detector for changes in temperature, humidity, and pressure. It shall be possible to electrically check the detector's sensitivity and re-adjust the detector's sensitivity as required. The detector shall have incorporated a pilot light.

.11 The duct detectors shall be the same as the area detectors but shall include a duct mounting assembly, sampling tubes and remote indicating unit.

.12 End-of-line resistors shall be provided by this Division for the complete system.

3. Execution

.1 Except for those items as may be specified in Part 2 of this Section refer to Part 3 of the various sections of Specification Division 26 Electrical.

.2 The equipment shall be installed strictly in accordance with the manufacturer's requirements and recommendations and the requirements of the Authorities having jurisdiction.
.1 Canadian Electrical Code.
.2 Canadian, Provincial and Local Building codes.
.3 Local Authorities Having Jurisdiction.
.4 Underwriters Laboratories Canada Inc.
.5 ULC, BSA.

.3 Install wiring to conform with the requirements of the Canadian Electrical Code. Size wiring in accordance with Class 2 requirements, except for A.C. Signal Circuits where the wiring shall be sized in accordance with Class 1 requirements but be protected from mechanical injury or other injurious conditions such as moisture, excessive heat, or corrosive action in conduit. Connect wiring to the screw terminals in the devices.

.4 Install fire alarm systems in accordance with the latest Standards as identified in Section 1.2.1 above.

.5 Install end-of-line resistors in a separate outlet box with grille.

.6 Provide a complete system of relays for the auxiliary functions.

.7 Mechanical connectors are not acceptable. Solder and insulate all joints if wire cannot be continuous.

.8 Wire with colour coded conductors.

.9 Supervise all wiring.

.10 All wiring shall have copper conductors.

.11 Prior to energizing or commissioning the system, the F.A. system shall be fully inspected, tested, checked, and adjusted to include, but not limited to, the following:
- .1 That the type of equipment installed is that designated by the specifications.
- .2 That the wiring connections to all equipment components show that the installer has complied with ULC and CSA requirements.
- .3 That the equipment has been installed in accordance with the manufacturer's recommendations and that all devices have been operated and tested to verify their operation, and that the system operates in accordance with the requirements of the Specification.
- .4 That the supervisory wiring of those items of equipment connected to a supervisory circuit is operated as specified.
- .5 Those Governmental regulations will be met to the satisfaction of inspection office.

.12 The inspection and testing reports and certification of fire alarm system prepared by the fire alarm vendor shall be submitted for review by the Consultant. This work shall be complete 3 weeks prior to occupancy date.

.13 The "dB" readings shall be provided by the fire alarm system vendor in each area/room where audible devices are installed (part of this Contract). The testing report shall be prepared and submitted for review by the Consultant. This work shall be complete 3 weeks prior to occupancy.

.14 System changes shall be verified by the manufacturer's representative, and a verification certificate presented upon completion in accordance with CAN/ULC-S537 (Latest Edition) - Standard for Verification of Fire Alarm Systems.

.15 Warranties all materials, installation, and workmanship for one (1) year from date of acceptance, unless otherwise specified.

.16 System installation and operations shall be verified by the manufacturer's representative, and a verification certificate presented upon completion. The manufacturer's representative shall be responsible for an on-site demonstration of the system operation and initial staff training as required by the Owner and/or Consulting Engineer.

.17 When the fire alarm system has been commissioned and verified it shall be fully demonstrated by this Division to the authorities having jurisdiction.

END OF SECTION