PLUMBING UPGRADES AND SUITE RENOVATIONS AT SHERIDAN VILLA, PROJECT 24110

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1 GENERAL

1.1 Instructions

1.1.1 All sections of Division 1, General Requirements as well as the Contract between the Agency and the Vendor, apply to all trades working on the project.

1.1.2 Work is to be in accordance with Contract Documents and the Contract Drawings.

1.1.3 Comply with the requirements of GC4.1, Cash Allowances and GC4.2, Contingency Allowance of the General Conditions of the Stipulated Price Contract CCDC-2, 2008 and as amended, if applicable, in the Supplementary Conditions.

1.2 Section Includes

1.2.1 Applications for Payment.
1.2.2 Cash Allowances.
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1.3 Applications for Payment

1.3.1 The Vendor must submit the schedule of values one week after Contract award. The schedule of values is to be reviewed and approved by the Consultant and the Agency.

1.3.2 The schedule of values must drill down to level 4 of the Work Breakdown structure (WBS).

1.3.3 By the first day of the month following Work complete, submit to the Consultant a draft copy of Application for Payment. Include breakdowns as per the approved schedule of values.

1.3.4 All Application for Payment shall include:

1.3.4.1 The invoices from major trades/subcontractors and suppliers, indicating a percentage of completion (prices could be blanked out).

1.3.4.2 Monthly progress report and updated schedule showing variance in comparison to the approved baseline schedule.

1.3.4.3 Inspections, test, commissioning, and certificates related to work being included in the invoice.

1.3.5 Following review of draft and no later than the fifth of the month, submit to the Consultant one original of final “Proper Invoice” as defined in the General and Supplementary Conditions and accompanied with:

1.3.5.1 Schedule of values showing percentage of work completed

1.3.5.2 A detailed updated construction schedule Include showing the beginning and end of the approved baseline schedule and the updated beginning and end dates according to the progress of Work.

1.3.5.3 A summary of all proposed changes, change orders, and

change directives completed and invoiced.

1.3.5.4 Subtrades and Sub Consultants invoices, with values blacked out.

1.3.5.5 Bill of landing of materials.

1.3.5.6 Subtrade bonds.

1.3.5.7 Inspections and testing results.

1.3.6 The Consultant will prepare a Certificate of Payment and submit same to the Agency not later than seven (7) calendar days after the final form of application for payment has been received.

1.3.7 For components or equipment on site but not installed no more than 10% of the overall line may be claimed as executed.

1.3.8 For components or equipment installed but not yet successfully commissioned and/or pending of satisfactory acceptance of commissioning document by the Consultant and the Agency, no more than 90% of the line may be claimed as executed.

1.3.9 For components or equipment installed and commissioned with pending satisfactory completion of deficiency repairs no more than 96% of the line may be claimed as executed.

1.3.9 A separate line for project close out as part of the Schedule of Values is to be included for project close outs with a value of no less than 4.0% of the Contract value.

1. 50% of that line will be payable upon submission of the entire close out documents for review.
2. Balance will be paid upon final acceptance of the project close out documents.

1.3.10 For holdback release the invoice shall include a letter of release in accordance to the format provided by the Agency.

1.3.11 For the certification of substantial performance, the commissioning and verification of the work has to be successfully completed and all required supporting documents to demonstrate that must be provided.

1.3.12 Application for Payment of Holdbacks including the warranty security must be accompanied by a “release letter” in accordance to the Agency format.

1.4 Cash Allowances

1.4.1 Purchases from Cash Allowances must be authorized by written instructions issued by the Consultant; and the form and method of accounting for costs shall be agreed to by the Consultant and the Vendor before proceeding with the purchase.

1.4.2 The Vendor will procure, coordinate and manage the vendors that will execute work under Cash Allowances.

1.4.3 Cash Allowances will not be subjected to any Vendor mark-up.

1.4.4 Harmonized Sales Tax is not included in Cash Allowances.

1.5 Contingency Allowances

1.5.1 The use of contingency allowance must be preauthorized in writing by the Consultant and the Agency.

1.6 Contract Modification Procedures

1.6.1 The measurement of variations to the Contract Price shall be on the basis of the unit prices submitted. Where this is not possible the measurement will be on the basis of units of material and labour, estimated by the Vendor and evaluated by the Consultant. Once a Proposed Change has been issued by the Consultant, it shall be the responsibility of the Vendor to ensure that no work is carried out that may increase the cost of the variation contemplated.

1.6.2 The Consultant will assess the cost of each change before issuing a Change Order. Assist the Consultant with this task by quoting all variations in a complete manner (backup information shall be provided) listing:

- .1 Quantity of each material,
- .2 Unit cost of each material,
- .3 Man hours involved,
- .4 Cost per hour,
- .5 Subcontractor quotations,
- .6 Mark-up.

1.6.3 The Consultant may require further quotations in order to show a breakdown of costs.

1.6.4 The Agency and the Consultant will not be responsible for delays to the Work resulting from late, incomplete or inadequately broken down valuations submitted by the Vendor.

1.6.5 Minor variations may be made in the project from time to time as approved by the Consultant. Such alterations or adjustments shall not constitute a change in cost unless a request is made at the time. No extra will be contemplated except where a clear indication is made that extra payment is claimed, in which case a Proposed Change or Change Directive will be issued by the Consultant. Unless this procedure is followed, no claims for extras will be allowed.

1.6.6 Allowable mark-ups on changes in the Work will be subject to the actual cost plus a percentage covering overhead and profit.

- .1 The Vendor on work of his own forces:
  - .1 on extras: ten (10) percent (%)
  - .2 on credits: no mark-up.
- .2 The Vendor on work of the Subcontractors:
  - .1 on extras: five (5)%
  - .2 on credits: no mark-up.

1.7 Unit Prices

1.7.1 Provide unit prices for items listed in the Online Bidding System Forms.

1.7.2 Unit prices include all materials and labour, but do not include Value Added Taxes, overhead or profit. They represent the cost to the Vendor for each operation quoted.

1.7.3 The Agency reserves the right to examine the unit prices and to require modification should they appear to be unfair or inaccurate. When requested, submit additional unit prices prior to the first payment under the Contract. The Consultant reserves the right to amend these additional unit prices should they appear to be unfair or incorrect.

1.7.4 The unit prices shall be subject to the mark-up schedule described above (see 1.6.6) when used for the valuation of changes.

1.8 Separate Prices

1.8.1 Provide separate prices for items listed on the Pricing Sheet.

1.8.2 Separate prices include all materials and labour, but do not include Value Added Taxes, overhead or profit.

1.8.3 Unless incorporated by written agreement prior to the execution of the Agreement, Separate Prices are not included in the Contract Price.

2 **PRODUCTS** – NOT APPLICABLE.

3 **EXECUTION** – NOT APPLICABLE.

1 GENERAL

1.1 Instructions

1.1.1 All sections of Division 1, General Requirements as well as the Contract between the Agency and the Vendor, apply to all trades working on the project.

1.1.2 Work is to be in accordance with Contract Documents and Contract Drawings.

1.2 Definitions

1.2.1 The word "Agency", where used in these Documents, shall mean:
Regional Municipality of Peel
10 Peel Centre Drive
Brampton, ON, L6T 4B9

1.2.2 The word "Consultant", as specified in the General Conditions of the Contract, shall mean:
CIMA Canada Inc.
500- 5935 Airport Road
Mississauga, ON L4V 1W5

1.3 Summary of Work

1.3.1 Building Description and Information

.1 Sheridan Villa:
Sheridan Villa is a four-story Long Term Care Facility located at 2460 Truscott Drive in Mississauga. The 142-bed facility was constructed in 1970.

1.3.2 As the facility is occupied, the Vendor is required to hoard off the renovation spaces to prevent access to / from other parts of the building. Access to the work area will be designated by the building operations team. A construction staging plan is to be provided two weeks after pre-construction meeting for review and approval by the Consultant and the Agency

1.3.3 If building systems are to be disrupted, forty-eight (48) hours-notice must be given to the Building Facility operations team. Project Manager to coordinate with building supervisor. It may be necessary to take systems down for a short period, which may be acceptable to the ongoing use of the building. If a shutdown is required that will disrupt ongoing operations this will have to be done during nighttime hours.

1.3.4 Building critical systems may not be disrupted at any time.

1.3.5 Work producing high noise and vibration shall be avoided at residents' mealtimes as follows:

1.4 Scope of Work

1.4.1 Scope 1: Universal Washroom/Shower

This project includes the renovation and reconfiguration of one (1) universal washroom/shower.

.1 Scope Includes:

.1 New barrier free sink.

.2 New toilet with self-closing lid and flush sensor.
.3 New L shaped, horizontal, and swing up grab bars for toilet.
.4 New fold down shower bench.
.5 Handheld shower wand.
.6 Grab bars for shower.
.7 New LED mirror with blind and valance box.
.8 New towel warmer.
.9 New electric hand dryer.
.10 New millwork with barrier free sink.
.11 New PPE / linen cabinet.
.12 New fold down change table.
.13 New privacy curtain and track.
.14 New door hardware, auto door operator and push button.
.15 New push to lock, emergency call, and associated signage.
.16 Modified ceiling lift.
.17 Upgraded HVAC for improved ventilation.
.18 New acoustic ceiling suspension grid and panels.
.19 New washroom accessories.
.20 New epoxy flooring.
.21 New wall tile.
.22 New magnet board for all staff notices.
.23 Call bells as per the Ministry of Health Long Term Care.
.24 Access to the Work Area:
.25 Modification of sprinklers to suit the new acoustical ceiling
.26 New toilet flush valve
.27 New shower faucet
.28 New lavatory faucet
.29 New sanitary drain cleanout
.30 Cutting and repairing the floor to connect new adjacent barrier free washroom to the existing underground drain
.31 Access to the Work Area:
.1 As agreed upon by the Facility Manager.

1.4.2 <u>Scope 2: Barrier Free Washroom</u>

This project includes the renovation and reconfiguration of one (1) barrier free washroom.

.1 Scope Includes:
.1 New barrier free sink.
.2 New toilet with self-closing lid and flush sensor.
.3 New L shaped and horizontal grab bars.
.4 New barrier free mirror.
.5 New electric hand dryer.
.6 New toilet cabinet shelf.
.7 New auto door operator and pushbutton.
.8 Upgraded HVAC for improved ventilation.
.9 New acoustic ceiling suspension grid and panels.
.10 New washroom accessories.
.11 New epoxy flooring.
.12 New wall tile.

.13 Call bells as per the Ministry of Health Long Term Care.
.14 New fire alarm strobe
.15 New washroom accessories.
.16 New toilet flush valve
.17 New lavatory faucet
.18 New sanitary drain cleanout
.19 Cutting and repair the floor to connect new adjacent barrier free washroom to the existing underground drain
.20 New water plumbing from the corridor within the ceiling space to serve plumbing fixtures.
.21 New shutoff valves.
.22 Cutting and repairing the floor to connect new adjacent barrier free washroom to the existing underground drain
.23 New sanitary drain and vent plumbing for plumbing fixtures
.24 Access to the Work Area:
.1 As agreed upon by the Facility Manager

1.5 Examination of the Site

1.5.1 No claims for extra payments will be allowed for extra Work made necessary, or difficulties encountered due to site conditions which were visible upon or reasonably inferable from an examination of the site or existing Drawings and the Specifications as made available prior to Bid closing.

1.6 Signage

1.6.1 Individual trades may not display advertising on the site.

1.7 Shop Drawings

1.7.1 Shop Drawings by each Trade are required to take into account Work of other Trades. In the event of conflict between Shop Drawings and resulting Work by any Trades, it shall be the responsibility of the Vendor to solve the conflict at no additional cost to the Agency.
1.7.2 All Shop Drawings must be reviewed by each particular Trade and stamped before submission to the Vendor.
1.7.3 All Shop Drawings must indicate the following information:
.1 Name, Address, Phone and Fax Number of the Supplier.
.2 Name of Contact Person.
.3 Identification of Trade Section to which it applies.
1.7.4 The Vendor must in turn review and stamp all Shop Drawings before submission to the Consultant.
1.7.5 Shop Drawings that have not been reviewed and stamped by both the Trade and the Vendor prior to submission will be returned promptly without being reviewed by the Consultant.
1.7.6 Shop Drawings must be prepared in the similar measurement system as to the Contract Documents (ie. metric Shop Drawings for metric Documents and imperial Shop Drawings for imperial Documents).
1.7.7 This review is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean that the reviewer approves the detail design inherent in the Shop Drawings,

responsibility for which shall remain with the Vendor submitting same, and such review shall not relieve the Vendor of this for efforts or omissions in the Shop Drawings or of their responsibility for meeting all requirements of the Contract Documents. The Vendor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of the Work of all Trades.

1.7.8 Submittal Procedures:

.1 Submit Shop Drawings, Product Data and Samples to: submittals@cima.ca

.2 At the commencement of the Work, the Vendor and the Consultant shall prepare, for the joint review and acceptance by the Consultant and the Vendor, a schedule of the dates for the submission and return of Shop Drawings and other submittals where called for in the Specifications (which in no event will be more thanten working days following submission and ten working days following any resubmission or such other period as may mutually agreed upon by the Vendor and Consultant) in order that there is no impact on the construction schedule.

.3 The Shop Drawing and other submittals schedule shall provide for the submission of Shop Drawings and other submittals in an orderly sequence and sufficiently in advance to allow for the Consultant's proper review and so as to cause no delay to the Work. If at any time the Vendor submits an unusually large number of Shop Drawings and other submittals not contemplated by the schedule, such that the Consultant cannot process these within the time permitted in the schedule, the Consultant will, within five working days of receipt of such Drawings and other submittals, provide the Vendor with an estimate of time necessary for processing such Shop Drawings and other submittals.

.4 The Vendor shall periodically resubmit the schedule to correspond to any changes in the construction schedule for the joint review and acceptance by the Consultant and the Vendor.

.5 The Vendor will be responsible for distributing all copies to their trades and suppliers.

.6 If submissions are sent electronically, they will be returned electronically, with no hard copies.

.7 Any additional red marked copies required by the Vendor or trades will be the responsibility of the Vendor.

1.8 Sample Installation and Mock-Up

1.8.1 Procedures: Where sample installations or mock-ups are required, comply with requirements of relevant Specification Section.

1.8.2 Sample Installations

.1 Definition: A Partial Installation of Selected Materials For Consultant’s Approval Of Quality Or Work And Visual

Acceptance of Materials.

.2 Construct sample installations prior to pre-installation meetings.

.3 Maintain sample installations during construction as a standard for Work.

.4 Properly finished and maintained sample installations may be incorporated into Work.

1.8.3 Mock-Ups

.1 Definition: A Sample Panel Specially Erected Near Project Site Or, Upon the Consultant's Approval or Direction, At A Remote Location That Incorporates Several Specified Materials.

.2 Construct mock-ups prior to ordering final materials.

.3 Mock-ups display colour range, texture, bond, mortar colour and quality of Work expected of materials incorporated in Work.

.4 Mock-ups will be used by Consultant for final material selection.

.5 Maintain approved mock-ups in good condition until completion of relevant Work and use as standard for Work.

.6 Remove mock-ups from project site at completion of Project.

1.9 Alterations to Existing Work

1.9.1 Where materials are to be removed for re-use or where existing finishes are to be cut out and later made good, qualified trades people skilled in the handling of each particular material shall be employed.

1.9.2 Damage to the existing building components or contents due to construction Work shall be made good. New Work in existing building shall conform to requirements of applicable trade sections.

1.9.3 All services affected by Work shall be cut off and properly capped or diverted. Interruption of services to or within existing building shall not take place without prior consultation with Agency.

1.10 Cutting and Patching

1.10.1 Cutting, patching and provision of openings, shall be done by the trades who have training and experience with the type of construction and finishes involved, at the expense of the Trade requiring the cutting or patching. The trade requiring the cutting or patching shall be responsible for layout of the required cutting in a timely manner.

.1 Concrete Coring: Each trade requiring new penetrations of floors, walls, and ceilings is responsible to engage a Coring subcontractor under their scope of Work.

1.10.2 The expression "make good" refers to repair and restoration of new and existing Work where applicable.

1.11 Fire Protection

1.11.1 These procedures shall be followed to minimize the possibility of fire and hazards due to fire during construction.

1.11.2 Access to Fire Extinguishing Equipment and Exits

.1 Provide and maintain free access at all times from the street to fire hydrants and to outside connections for standpipes or other fire extinguishing equipment whether permanent or temporary. Do not place material or construction equipment within three (3) metres of hydrants or connection, nor between them and centre line of the street.

.2 Maintain free access at all times to control valves and hose on fire lines within building and to all portable extinguishers.

1.11.3 Rubbish

.1 Remove flammable rubbish promptly from the premises. If removal is unavoidably delayed reduce fire hazards by wetting down. Disposal of waste material by burning on or near the premises is not permitted.

.2 Clean up and remove rubbish into containers. Removal of containers and disposal off the site including all dumping fees will be the responsibility of the Vendor.

1.12 Powder Activated Fasteners

1.12.1 Powder activated fastenings shall not be used on any portion of the Work unless approval for a specific use is obtained from the Consultant.

1.13 Load Bearing Members

1.13.1 Load bearing members shall not be cut, bored or sleeved without written approval of the Consultant. All cuts shall be made with clean, true and smooth edges.

1.14 Relation to Other Trades

1.14.1 The Vendor shall ensure that all Trades leave chases, slots and reglets required by other Trades and build in frames, sleeves, anchors, bolts, etc. and provide cutting and making good as required. Trades supplying materials for installation on the project shall supply templates and information for their proper locations.

1.15 Codes, Fees, Permits and Certificates

1.15.1 All Work shall be executed, and all materials shall conform to and be inspected in strict accordance with all the laws, rules, and regulations of the local and provincial codes and all other authorities having jurisdiction.

1.15.2 In the event that material and/or systems specified do not meet these conditions, the Vendor shall bring it to the attention of the Consultant, in writing, before ordering or installing same.

1.15.3 If Vendor chooses to carry out Work in contravention of any Code or By-law, he shall be responsible for all changes required to obtain Code acceptance.

1.15.4 The Vendor shall obtain all necessary permits at no cost to the Agency (with exception of Building Permit, which will be paid by the

Agency), and all notices, pay all fees in order that the Work hereinafter specified may be carried out and he shall furnish any certificates necessary as evidence that the Work installed conforms with the laws and regulations of all authorities having jurisdiction before final certificates are issued.

1.15.5 Building permit will be obtained by the Consultant and will be provided to the Vendor.

1.15.6 All equipment supplied must have approval of Canadian Standards Association (C.S.A.), Underwriters Laboratories of Canada (U.L.C.), National Fire Protection Association (N.F.P.A.), Factory Mutual (F.M.), and any other authority having jurisdiction.

1.16 Workplace Hazardous Materials Information System (WHMIS)

1.16.1 The Vendor and all their Subcontractors shall be trained in WHMIS and be able to submit proof of training if requested by the Consultant. The Vendor shall have Material Safety Data Sheets (MSDS) in their site office for all materials of all trades being used on the site.

2 **PRODUCTS** – NOT APPLICABLE.

3 **EXECUTION** – NOT APPLICABLE.

END OF SECTION

1 GENERAL

1.1 Instructions

1.1.1 All sections of Division 1, General Requirements as well as the Contract between the Agency and the Vendor, apply to all trades working on the project.

1.1.2 Work is to be in accordance with the Contract Documents and the Contract Drawings.

1.2 Work Included

1.2.1 Provide for all requirements related to setting out, co-ordination, administration, general construction, safety and protection of the Work, workers, Agency's personnel and the public, the ongoing and final cleaning, and any other Work specified or indicated on the Drawings.

1.2.2 The Vendor shall execute the project with strict compliance to the CSA-Z317.13-17 – Infection Control During Construction, Renovation and Maintenance of Health Care Facilities standard.

1.2.3 A site supervisor competent and authorized to make decisions, address concerns, provide timely information, ensure that all construction personnel follows the safety, site security, code of conduct and infection control requirements is to be present on site at all times Work is being performed and including after hour work. The site supervisor should be accessible via email and cell phone.

1.2.4 Be aware that the breakdown of the specification into sections does not represent any actual division of the Work. Be responsible for coordination between items of Work which would be covered under separate specification sections. Coordinate and be responsible for the Work of the various trades.

1.2.5 Refer to Section 01 35 33, Infection Control Procedures, for environmental requirements during construction. Control execution of all Work to minimize interference of occupants' use of the building. Be responsible for worker's activities while on site.

1.2.6 Conform to all By-Laws and all Legislated requirements including those related to labour, noise and the environment.

1.2.7 Maintain at the job site one copy, including all amendments, of each of the following:

.1 Contract Drawings and specifications.
.2 Site Visit Reports issued by Consultant.
.3 Additional Drawings issued by Consultant.
.4 Contemplated Change Orders and Change Orders.
.5 Material Test Reports.
.6 Accurate daily records of all work performed, weather and labour force.
.7 Manufacturer's specifications for all products to be used. Proof of WHMIS training for all site personnel.
.8 Product data sheets to meet the WHMIS requirements.

.9 Occupational Health and Safety Act and Site Specific Safety Plan.

1.2.8 Notify all staff and Sub-contractors that the Vendor is entirely responsible for site safety. No actions or lack of action by the Agency or the Consultant shall be deemed to be an instruction related to safety of the workplace.

1.2.9 Drawings are, in part, diagrammatic and are intended to convey the scope of work and indicate general and approximate locations and arrangement of work. Obtain more accurate information about locations, arrangements, and sizes from actual conditions on site.

1.2.10 When site conditions require reasonable changes to the Contract Drawings, obtain the Consultant's approval prior to making such changes.

1.3 Quality Assurance

1.3.1 Make all measurements required to perform the Work. Determine site dimensions and levels so that all new Work is installed to correct sizes.

1.3.2 All Work shall meet or exceed the more stringent of the manufacturer's requirements or the requirements of this Specification.

1.4 Warranty Corrections

1.4.1 Upon notification of defects in Products or services under an Extended Warranty, remedy any defect identified by the Agency during the Extended Warranty period.

1.4.2 Remedy any damage to Agency-owned or controlled real or personal property, when such damage is the direct result of any defect of Products, workmanship, or design furnished.

1.4.3 Commence repairs and replacements within five (5) Working Days of notification of defect unless a shorter response time is specified elsewhere in the Contract Documents.

1.4.4 Supplier’s/Manufacturer’s standard disclaimers and limitations on Product and services warranties shall not relieve the warrantor of their obligations required under the specific Extended Warranty.

1.4.5 At beginning of the 12^{th} and 24^{th} month after Substantial Performance of the Contract, the Agency, Vendor and Consultant, along with key Subcontractors as designated by the Consultant, will carry out a complete inspection of the work and its systems to determine which deficiencies are to be rectified under warranty.

1.4.6 Prior to completion of the warranty period, arrange with the Consultant (minimum two weeks in advance of planned inspection) to carry out complete review of defects and deficiencies which have been observed during the warranty period to determine which are to be corrected.

1.5 Vendor Staging Area

1.5.1 The Vendor must submit a construction staging plan for review and approval by the Consultant and the Agency two weeks after pre-construction meeting. No mobilization will be permitted without approved staging plan.

1.5.2 All cutting, planning, preparation work is to be completed in the designated staging area at the loading dock. A room will be provided where the work can be carried out. No dusty work is permitted within the resident rooms.

1.6 Permits and Fees

1.6.1 Expedite obtaining all permits that are required (with the exception of the building permit).

1.7 Notice of Project

1.7.1 Submit to the Ministry of Labour a Notice of Project indicating the project start date.

1.8 Schedule

1.8.1 A schedule prepared in industry standard software program such as Microsoft 'Project' must be submitted by the Vendor to the Agency prior to the execution of the Contract.

1. The schedule shall include all details required to successfully deliver the Project. The Vendor shall make their own determination as to the sequence of the below items; the list is not intended to restrict the Vendor, but rather to be coordinated with the milestone dates listed elsewhere in these documents.
   - .1 Identification of critical path, predecessors, successors activities, lags (negative and positive) floats, merge bias, constraints (hard and preferential).
   - .2 Project Kick-off Meetings with Agency
   - .3 Preparation and submission of Documents to Agency
   - .4 Submission of Shop Drawings and samples
   - .5 Order and delivery of materials and equipment
   - .6 Mobilizing to site
   - .7 Demolition
   - .8 List relevant construction activities for scope
   - .9 Commissioning
   - .10 Substantial Completion
   - .11 Project Closeout/Demobilization
   - .12 Final Completion of Contract
2. The schedule must show a detailed breakdown of the Work indicating sequence of systems; milestones, and critical dates. The schedule must include the Vendor's reasonable expectations for delivery times and long-delivery items. The Agency will expect the Work to proceed in accordance with

the approved schedule.

1.8.2 The staging of Work shall be scheduled to minimize disruption of the facilities operation.

1.8.3 Monitor compliance with the Contract schedule on an ongoing basis.

1.8.4 At no time shall the size of the work crew be decreased from the size indicated on the project schedule.

1.8.5 Updated schedule shall be provided ahead of each construction meeting.

1.9 Submittals

1.9.1 Two (2) weeks ahead of mobilization, the Vendor is to provide the Certificate of the Site Supervisor training in Infection Prevention and Control in accordance with the CAN/CSA Z317.13.17.

1.10 Project Meetings

1.10.1 Schedule and hold pre-construction, progress and pre-installation meetings throughout construction of Work.

1.10.2 Pre-Construction Meeting

- .1 Attend pre-construction meetings, to be held prior to commencement of Work at place and time to be announced by the Consultant.
- .2 Agenda: Project co-ordination, administrative procedures, scheduling and other related subjects.

1.10.3 Progress Meetings

- .1 Schedule and administer bi-weekly progress meetings until Substantial Completion.
- .2 Make physical arrangements, prepare agenda, and distribute notice of each meeting to participants, and to the Consultant three days in advance of meeting date.
- .3 The Vendor shall preside at meetings, record minutes, and distribute copies to participants and to entities affected by decisions at meetings within five (5) working days.
- .4 Locations of meetings: Project site office or other acceptable location.
- .5 Minimum Agenda:
  - .1 Approval of minutes of previous meetings.
  - .2 Review of Work progress.
  - .3 Field observations, problems and decisions.
  - .4 Identification of problems, which impede planned progress.
  - .5 Review of Submittal Schedule and status of submittals.
  - .6 Review of off-site fabrication and delivery schedules.
  - .7 Maintenance of Progress Schedule.

.8 Corrective measures to regain projected schedules.
.9 Planned progress during succeeding Work period.
.10 Co-ordination of projected progress.
.11 Maintenance of quality and Work standards.
.12 Effect of proposed changes on Progress Schedule and co-ordination.
.13 Other business relation to the Work.

1.10.4 Pre-Installation Meetings

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

1.10.5 Attendance at Meetings

.1 The Vendor, job superintendent, trades, and suppliers as appropriate to agenda, and authorized to act on behalf of the entity each represents; Agency, Consultant, Professional consultants and others may attend as appropriate.

1.11 Parking

1.11.1 Comply with local parking regulations.

1.12 Traffic Control

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

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

1.13 Security

1.13.1 Protect and secure work area, materials and equipment from theft, vandalism and unauthorized entry.

1.14 Occupancy of Building during Construction

The building will be occupied throughout construction.

1.15 Construction Review

1.15.1 The Vendor shall notify the Consultant and inspection and testing agents not less than 48 hours prior to each part of work being ready for review or testing. Work which requires review or testing shall not be performed on weekends or holidays unless previously agreed to.

1.15.2 The Vendor shall be responsible for payment of costs if the Work is not ready when stated and if the Consultant and inspection and testing agency are not given sufficient notice of such delay.

1.15.3 The Agency reserves the right to deduct from the Vendor amounts for extra inspection and testing by the Consultant as required for certification of payment of work done to repair a deficiency.

1.16 Temporary Facilities

1.16.1 Provide a means of direct communication with the site to permit continuous contact on a daily basis.

1.16.2 Provide temporary sanitary facilities and maintain in a sanitary condition. Site facilities shall not be used by the Vendor's forces.

1.16.3 Temporary electrical power for hand held equipment will be provided free of charge by the Agency. Arrange and pay for any usage and connection costs required for all other equipment. Do not connect to the building's power supply without written permission of building management.

1.16.4 The existing water supply from existing hose bibs at the site may be used free of charge. Any water required in excess of this supply shall be metered and paid for by the Vendor. Be responsible for connecting to the existing services. Do not use fire system without written permission of building management. Advise Building Operations/Property Management of any procedures that may cause fire alarms to activate.

1.16.5 With the exception of safety/instruction signs and notices, no signs or advertising shall be permitted on the site or equipment except as authorized by the Agency. Safety/instruction signs and notices shall be posted in accordance with current Code requirements and local and municipal by-laws. Maintain approved signs and notices in good condition for duration of work.

1.17 Protection of Installed Work

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

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

1.17.3 Protect pre-finished Work, including windows, louvers, finish hardware and doors from damage by mortar and other construction materials and operations.

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

1.18 Fire Protection

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

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

1.18.3 Flammable Liquids

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

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

.3 Do not store oily rags in closets or other tight spaces.
.4 Comply with recommendations regarding fire protection made by representatives of insurance company carrying insurance on the Work or by local fire chief or fire marshal.
.5 Prohibit smoking in vicinity of hazardous operations.

1.18.4 The Vendor to prevent a false fire alarm. The Vendor will be required to pay Fire Department costs if false alarm is triggered due to their activities.

1.19 Housekeeping

1.19.1 Garbage Disposal

.1 Keep building and site free from accumulations of garbage.
.2 Remove cartons, crates, wrappings, lunch garbage and other garbage daily.
.3 Provide dumpsters for each garbage type in accordance with the local regulations.
.4 Do not burn paper, trash or other material on site.
.5 Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary sewers.
.6 Remove salvaged materials from site unless otherwise specified.

1.20 Environmental Requirements

1.20.1 Dust Control

.1 Execute Work by methods to minimize raising dust from construction operations.
.2 Provide positive means to prevent air-borne dust from dispersing into atmosphere.
.3 Wipe away all dust.
.4 Use drop cloths to protect facility belongings during door work.

1.20.2 Noise Control:

.1 All noisy activities are to be performed outside the Resident Home Areas. Should power tools need to be used, a suitable time will need to be arranged with the Agency. Such scheduling is to be accounted for in the pricing and will be discussed and agreed with the Region of Peel.

1.21 Construction Safety

1.21.1 The Vendor shall be liable for any costs, fines, penalties, etc., levied against the Agency or Consultant due to violation of the *Construction Safety Act* by the Vendor or any of their Subcontractors.

1.21.2 Pursuant to the latest amendments to *Ontario's Occupational Health and Safety Act*, include all cost for management and/or non-management representatives to attend Safety Committee meetings as often as required by legislation.

1.22 Safety Statement and Program

1.22.1 The Vendor shall post their Safety Policy Statement on the project and submit to the Consultant a copy of this Safety Program.

1.23 Infection Control Measures

1.23.1 Comply with CSA-Z317.13-17 – Infection Control During Construction, Renovation and Maintenance of Health Care Facilities.

1.24 Documentation of Work

1.24.1 The Vendor is required to take photos of before the Work (existing conditions) and photos of after the Work is completed and provide the photos as part of their payment application.

1.25 Emergencies

1.25.1 In an emergency affecting or threatening the safety of life, the Work or adjoining property, the Agency and the Consultant have authority to stop the progress of the Work.

1.25.2 Provide the Agency and the Consultant with the name and telephone number of a person that is available and may be contacted during off hours, weekends and holidays in case of emergency.

2 **PRODUCTS** – NOT APPLICABLE.

3 **EXECUTION** – NOT APPLICABLE.

.1

1 GENERAL

1.1 Instructions

1.1.1 All sections of Division 1, General Requirements as well as the Contract between the Agency and the Vendor, apply to all trades working on the project.

1.1.2 Work is to be in accordance with the Contract Documents and the Contract Drawings.

1.2 General Requirements

1.2.1 This Section describes the Health and Safety requirements.

1.3 Constructor

1.3.1 For the purposes of the Contract, the term "Constructor", as defined in the *Occupational Health and Safety Act*, shall mean the Vendor who shall be responsible for ensuring that the provisions of the statutes, regulations and by-laws pertaining to the safe performance of the Work are to be observed. The "Constructor" shall submit the Notice of Project.

1.3.2 In the event of conflict between any of the provisions of statues, regulations and by-laws, and other requirements of authorities, the most stringent provision applies.

1.3.3 The Vendor's representative shall be responsible for ensuring that the provisions of statutes, regulations and by-laws pertaining to safe performance of the Work and the Work of other Vendors and Agency's own forces working on the Site are observed and that the methods of performing the Work do not endanger the personnel employed thereon and the general public, and are in accordance with the latest edition of the *Occupational Health and Safety Act*. The Vendor to include representatives of other Vendors working on site on the Joint Health and Safety Committee.

1.3.4 Prior to the Vendor's representative being absent from the Site, the Vendor's representative will name another person, in writing to the Consultant, who is competent to assume these responsibilities. The Vendor shall advise the Consultant of any change in the individual identified as the Vendor's representative.

1.4 Project Responsibilities

The Vendor's representative shall ensure that:

1.4.1 All measures and procedures prescribed by the following Acts and Regulations are carried out on Site:

.1 The *Occupational Health and Safety Act*;

.2 The Regulations for Construction Projects;

.3 Workplace Hazardous Materials Information System WHMIS Regulations;

.4 The Environmental Protection Act and regulations;

.5 All other legislation, regulations and standards as applicable.

1.4.2 Every employer and every worker performing Work on the Site must comply with the requirements referred to above.

1.4.3 Ensure that the health and safety of workers, employees of the Agency and the general public are protected in relation to the Work performed on the Site.

1.5 Workplace Hazardous Materials Information System (WHMIS)

1.5.1 Be familiar with and comply with WHMIS regulations.

1.5.2 Properly label controlled products. Provide proper warning labels and training at the Site.

1.5.3 Maintain on site for duration of Contract a hazardous materials log containing all required Material Safety Data Sheets (MSDS). Log shall be open for inspection by Agency, Consultant and all personnel on Site.

1.5.4 Provide copies of MSDS for any controlled Products prior to delivery to the site.

1.5.5 Be responsible for all applicable requirements of the regulations.

1.5.6 Before commencing any Work on Site, attend the pre-construction meeting and provide the Consultant with a proposal as to how hazardous materials will be stored and dispensed on Site. In addition, specifically outline the measures which will be undertaken to prevent damage or injury in the event of an accidental spill.

1.5.7 Provide "Handling Procedure for Hazardous Materials".

1.6 Hazardous Substances On-Site

1.6.1 Work at the site may involve contact with hazardous substances. The Vendor must ensure compliance with regulatory requirement when coming in contact with them. The Vendor must review provided site surrey reports and report any discrepancies.

1.6.2 While performing the Work the Vendor must report any additional suspected materials to the consultant and the agency and stop work until direction is received.

1.7 Fire Protection

1.7.1 Provide and maintain temporary fire protection equipment (e.g. portable fire extinguishers) on construction work areas during performance of the Work as required by authorities having jurisdiction, governing codes, regulations and by-laws, to the satisfaction of the Agency and all local and insurance authorities in order to protect the property of the Agency and the Vendor against fire hazards during construction.

1.7.2 A fire watch shall be required during any open flame and hot work activities (e.g. soldering and welding) regardless of the number, duration or size of the activity in operation on a single floor.

1.7.3 A fire watch shall be required during any shut-down of the buildings' fire alarm, sprinkler or other suppression system.

1.7.4 Measures for alternate egress shall be in place during the

inaccessibility of any exit due to construction.

1.8 Joint Health and Safety Committee

1.8.1 The Vendor shall be responsible for the establishment and operation of the Joint Health and Safety Committee as required by the *Occupational Health and Safety Act*.

1.9 Deliverables

1.9.1 Upon request the Vendor shall deliver to the Consultant:

.1 The Vendor's Occupational Health and Safety Policy.

.2 The Vendor's safety program to implement the Occupational Health and Safety Policy for the Contract, which will effectively prevent and control accidents for the Contract.

.3 A copy of all communications with, and including all orders by, the Ministry of Labour or other occupational health and safety enforcement authority.

.4 A copy of all accident/injury investigation reports, not just the WSIB Form 7. Each report must contain a statement of actions that will be taken to prevent a recurrence.

.5 A copy of all inspection reports made by the Vendor in compliance with the employer's responsibility under the *Occupational Health and Safety Act*.

.6 A copy of all safety information pertaining to the Contract made and furnished by the Vendor's own "Safety Personnel" or outside the Consultants/advisers engaged for the purpose of inspecting the workplace for occupational health and safety.

.7 A verification that all workers in the employ of the Vendor on Site, have had a WHMIS training or refresher course within the last 12 months.

.8 A verification that all workers in the employ of the Vendor have had "Explosive Activated Tool Training" on the type of tools being used.

.9 A verification that the instruction manuals are on Site for all tools and equipment being used.

.10 A copy of the most recent workers compensation experience rating account, i.e. CAD-7, NEER, and/or an insurance carrier's experience rating account.

.11 The immediate reporting to the Consultant and Agency of all instances that are defined in the *Occupational Health and Safety Act* as "Notices of Injuries" and "Occurrences" and any occasion that a worker exercises their "Right to Refuse Unsafe Work".

1.9.2 The Vendor shall submit a site-specific Health and Safety Plan within one week after the pre-construction meeting and prior to mobilization on site. The site-specific Health and Safety Plan must address the requirements of the Occupational Health and Safety Act, include but not limited to: hazards identification, safety measurements to address them, emergency procedure response

specific for the site and the Work, etc.

1.9.3 During the course of the project, the Vendor is to provide additional safety plan prior to special construction operations such as exit closures, electrical power shutdowns, etc.

1.9.4 One week after pre-construction meeting the Vendor is to provide a staging plan indicating the access routes, storage areas, hording enclosure, and garbage disposal.

1.9.5 The Agency and Consultant reserves the right to require additional or amended deliverables pertaining to safety during the duration of the Work at no additional cost to the Agency.

1.9.6 The Vendor shall submit a phasing plan for areas required to be operational during construction.

1.9.7 Items specified above shall be delivered to the Consultant prior to the Vendor commencing Work on the Site.

1.10 Due Diligence

1.10.1 The Vendor acknowledges that it has read and understands the measures and procedures relating to occupational health and safety as prescribed above. The Vendor acknowledges and understands its duties as therein set out and hereby expressly undertakes and agrees to comply with all such requirements and standards in their entirety and at the Vendor's expense.

1.10.2 The Vendor further agrees to fully cooperate with all health and safety requirements, rules, regulations, standards and criteria set out in the Contract Documents, which agreement is in furtherance of the Vendor's duties and responsibilities under Occupational Health and Safety legislation.

1.10.3 The Vendor agrees that if, in the opinion of the Consultant or Agency, the health and safety of a person or persons is endangered or the effective operation of the system put in place to ensure the health and safety of workers on the Site is not being implemented, the Consultant or Agency may take such action as it deems necessary and appropriate in the circumstances, including, without limitation, the following:

.1 Require the Vendor to remedy the condition forthwith at its own expense;

.2 Require that the Site be shut down in whole or in part until such time as the condition has been remedied;

.3 Remedy the problem and the Agency shall back-charge the Vendor for the cost of such remedial work, together with an appropriate overhead factor as determined by the Agency in its sole and absolute discretion; and

.4 Terminate the Contract without further liability in the event the Vendor fails to comply with these provisions.

If a lien is registered, in respect to any monies held back, back-charged or assessed in accordance with these paragraphs, the Vendor shall consent to an order vacating such registration and

shall indemnify the Agency for any and all loss, whereby direct or consequential which the Agency may sustain as a consequence of such registration.

1.11 Site Safety Personnel

1.11.1 In the event the Consultant deems it necessary, because of the Work, the Vendor shall assign a “Competent Safety Person” to assist the Vendor's representative in the discharging of safety responsibility, at no additional cost to the Agency.

1.12 Special Requirement For Health Care Facilities

1.12.1 Comply with CSA-Z317.13-17 – Infection Control During Construction, Renovation and Maintenance of Health Care Facilities.

2 **PRODUCTS** – NOT APPLICABLE

3 **EXECUTION** – NOT APPLICABLE

END OF SECTION

1 GENERAL

1.1 Instructions

1.1.1 All sections of Division 1, General Requirements as well as the Contract between the Agency and the Vendor, apply to all trades working on the project.

1.1.2 Work is to be in accordance with the Contract Documents and the Contract Drawings.

1.2 References

1.2.1 CSA Z317.13-17 – Infection control during construction, renovation and maintenance of health care facilities.

1.3 Infection Prevention and Control

1.3.1 The Vendors working at the Long-Term Care (LTC) facilities in the Region of Peel are obliged to comply with the infection prevention and control guidelines and are required to attend a meeting with representatives from the Agency's Occupational Safety and Facilities Development and Infection Prevention and Control Department prior to start of construction activities.

1.3.2 The Vendor shall notify and seek the review and approval of the infection control measurements implemented prior to start of any construction activities.

1.3.3 Construction activities in health care facilities present a risk for patients of these facilities. Take measures to prevent and control construction related infections. Plan with the Agency and implement preventive measures throughout duration of the Contract. Educate all construction personnel on-site regarding planned construction activity, location and duration, population risk group to ensure preventive measures are identified, initiated and maintained. Ensure appropriate preventive measures are in place and establish clear line of communication among those involved in this Project.

1.3.4 The Vendor shall be aware at all times that ongoing operation and activities of the existing LTC facility will continue. The Agency staff may at any given time request that any Work be temporarily ceased without additional cost to the Agency if work is performed in a manner that poses a risk for the residents and staff.

1.3.5 Normal concentrations of Aspergillus and other related spores are present in the natural environment and thus are not a risk to healthy construction workers or LTC staff.

1.3.6 Aspergillus and related nosocomial (LTC acquired) fungal infections are caused by inhalation by immunocompromised persons of Aspergillus spores or other related spores. The spores are known to be prolifically present in construction dust and debris. Control of construction dust, debris as required in this Section is imperative to help prevent outbreaks of Aspergillus or related nosocomial fungal infections in immunocompromised persons.

1.3.7 Inhalation of Aspergillus spores or other fungal spores by

immunocompromised persons can lead to serious complications and even death. Infections are caused by inhalation of Aspergillus spores or related spores by immunocompromised persons.

1.3.8 Construction activity types are defined by CSA Z317.13-17 (refer to Table 3). Contact the Agency if any issue is questionable under this Standard.

.1 1 and 2 are type C construction activity.

1.3.9 Infection Prevention and Control Measures:

.1 Initiate, perform and adhere to "Preventive Measure I, II, III and IV" as applicable for the Work in accordance with Article 7 of CSA Z317.13-17.

.2 Any deviation/changes to this classification must be approved by the Agency in conjunction with Infection Control and/or Occupational Health and Safety staff.

.3 Any other Work required to be performed off site shall be coordinated and evaluated for "Preventive Measure" level with the Agency prior to the Work being performed.

1.4. Temporary Measures

1.4.1 In addition to the above requirements, provide:

.1 Temporary Ventilation:

.1 Provide temporary ventilation system within construction area and adjacent areas to ensure it is functioning properly, before commencing the Work, throughout construction period and at completion. Where possible disable ventilation system in Work area until construction is complete.

.2 Assess air flow, air pressure, and air exchange rates as well as examining, cleaning and evaluating integrity of filters and ducts.

.3 Cap and seal existing supply, return and exhaust duct openings at construction areas. Cap duct during construction. Immediately seal new ducts added and installed with plastic sheeting (re-seal as required) to minimize entry of dust and/or contaminants into ductwork.

.4 Ensure provision for exhaust fan to maintain space under negative pressure. Direct exhaust discharge without interruption to outside as designated by the Agency away from intake vents or filtered through a High Efficiency Particulate Air (HEPA) filter before being re-circulated. The existing window glazing may be removed and reinstated to allow for direct exhaust to the exterior.

.5 As an alternative, provide portable fan/filter unit to maintain space under negative pressure. Unit shall be complete with three stage filtration: ninety nine point ninety nine (99.99) per cent HEPA, 40 per cent pre-filter and 25mm thick fibreglass media prefilter. Fan shall

discharge to suitable location outside the construction zone. Be responsible for replacing filters as required to ensure proper operation. Replace fiberglass pre-filter on daily basis.

.2 Dust Control:

.1 Dust-Down Vestibules: Provide dust down vestibule having a minimum size to suit, sealed to floor and structure above (may be tarped to ceiling if ceiling is tarped), equipped with vacuum, walk-off mats, clothing hooks and lighting, and electricity. Ensure construction side of vestibule is provided with double flap inner end with minimum 0.762mm thick polythene sheet. Provide magnetic doors to suit unless noted otherwise. Provide two 914mm x 2032mm hollow metal doors with pressed steel frame, closer and lock on outer end.

.3 Temporary Dust Partitions and Dust Barrier Partition Wall between existing building and the Work:

.1 Provide temporary dust barrier partitions in work areas and dust barrier partition walls with studs and fully sealed poly tarps or dust barrier system to prevent dust infiltration into adjacent areas during alteration, repairs, and construction.

.2 Conform to the Occupational Health and Safety Act and all other pertaining regulations.

.3 Conform to infection prevention and control requirements for designated population risk group, geographical area, construction activity type and preventive measures.

.4 Conform to Class III & IV, Infection Control Dust Barrier Partition Enclosure as indicated on CSA Z317.13-17, figure A4.

.5 Seal edges and joints to achieve positive protection.

.6 Remove temporary dust partition and dust barriers promptly when no longer required and make good adjacent surfaces. Hoarding/temporary dust tight partitions are to remain in place unless noted otherwise.

.7 Provide temporary dust partitions beyond those required where risk of falling objects exists, to protect the public and the Agency's personnel.

.8 Block off supply and return to prevent dust infiltration into adjacent areas during construction.

.9 Conform to suit site conditions and subject to review and approval by the Consultant, erect impermeable temporary dust proof partitions from structure including plenum above ceiling to floor using temporary dust partitions and dust barrier partition wall.

.10 Ensure windows, doors, plumbing penetrations, electrical outlets, and intake and exhaust vents are properly sealed

with plastic and taped within construction areas. Vacuum Work area with HEPA filtered vacuums daily or more frequently if needed. Vacuum air ducts and spaces above ceiling if necessary.

.11 Ensure workers wear protective clothing that is removed each time they leave the construction area before going into patient care areas. Ensure all personnel entering construction areas is wearing shoe covers and remove at exit.

.12 Execute the Work by methods that minimize dust generation from construction activities; wet mop and vacuum as necessary. Provide means to minimize dust migration into atmosphere by using drop sheets, by water misting Work surface before cutting and by placing dust mat at entrance to and exit from Work areas.

.13 Do not remove temporary dust proof partitions until section of scope is complete and area has been cleaned thoroughly and inspected by the Agency.

.14 Remove dust barrier carefully to minimize spreading dust and other debris particles associated with construction.

.15 Maintain construction areas clean and clear of debris throughout Work. Remove debris at end of each day. Erect external chute if construction is not taking place on ground floor level.

1.5 Infectious Disease Screening

1.5.1 To prevent and control the transmission of infection (particularly communicable diseases) from the Vendors to the population within the LTC facility, the Vendor shall follow the Ministry of Health and Long-Term Care's compliance standards and visitor policy as outlined below:

.1 The Vendor will self-screen for symptoms of Febrile Respiratory Illness (FRI) using the infection control screening tool available at the reception desk.

.2 The Vendor will sign in and out of the building and record their contact information by using the sign in book so the centre can monitor individuals who have entered the building. To stop the spread of infection, the Vendor must use the hand sanitizer when signing in and out as indicated on the sign-in sheet.

.3 If FRI symptoms have been identified, the receptionist will contact the Infection Control Practitioner/Program Support Nurse or the Director of Care or the Charge Registered Nurse. The person will be required to leave the premises and not visit the centre until symptom free.

.4 If FRI symptoms are not identified, the Vendor can enter the centre for their intend purpose.

.5 The Infection Control Practitioner/Program Support Nursewill be advised of all occurrences of FRI symptoms.

2 **PRODUCTS** – NOT APPLICABLE

3 EXECUTION

3.1 Disposal of Demolition Waste

3.1.1 Demolition materials will be disposed of directly to the exterior of the facility.

3.1.2 Dust control must be maintained to prevent dust from entering the occupied areas of the building.

3.2 Materials Handling

3.2.1 Construction materials to be delivered to the Vendor staging area at the loading dock ramp, in a way that ensures that they are not exposed to contaminants or moisture.

3.2.2 All materials entering the construction Work area will be clean and dry.

3.2.3 Materials that become damaged due to moisture or water infiltration shall be removed, disposed of and replaced with dry and good materials.

END OF SECTION

1 GENERAL

1.1 Summary

1.1.1 This Section lists construction terms and related abbreviations and acronyms that may be used in the Contract Documents.

1.2 Abbreviations

ANSI	American Nation Standards Institute ASTM American Society for Testing and Materials
AWMAC	Architectural Woodwork Manufacturers Association of Canada
B.U.R.	Built-Up Roofing
CSA	Canadian Standards Association
CGSB	Canadian General Standards Board
CPVC	Chlorinated Polyvinyl Chloride
CSDFMA	Canadian Steel Door and Frame Manufacturers Association
EIFS	Exterior Insulation and Finish System
EIMA	EIFS Industry Members Association
EPDM	Ethylene Propylene Diene Terpolymer
EPS	Expanded Polystyrene
FAT	Factory Applied Tape
F.M.	Factory Mutual
HVAC	Heating, Ventilation and Air Conditioning
LTC	Long Term Care
MSDS	Material Safety Data Sheet
N.F.P.A.	National Fire Protection Association
N.L.G.A.	National Lumber Grades Authority
NRCA	National Roofing Contractors Association
OBC	Ontario Building Code
O.I.R.C.A.	Ontario Industrial Roofing Contractors Association
PVC	Polyvinyl Chloride
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
ULC	Underwriters Laboratories of Canada
VOC	Volatile Organic Compounds

2 **PRODUCTS** – NOT APPLICABLE.

3 **EXECUTION** – NOT APPLICABLE.

END OF SECTION

1 GENERAL

1.1 Work Included

1.1.1 Work of this Section includes selection and substitution procedures for materials and equipment.

1.1.2 Requirements and conditions for substitutions specified in this Section are in addition to provisions in front end sections (Instructions to Bidders and Supplementary Conditions).

1.2 Submittals

1.2.1 Submit specified documentation for substitution requests.

1.2.2 Substitution requests must be approved by Consultant and Agency before making submittals required by Section 01 30 00, Instructions to All Trades.

1.2.3 Bid prices shall account for specified and approved acceptable products in this Document.

1.2.4 No substitution request will be processed before Contract award.

1.3 Quality Control

1.3.1 To greatest extent possible, provide products of same generic kind, from single source, for each unit of Work.

1.3.2 If Vendor proposes to use material which, while suitable for the intended use, deviates from requirements of the Contract Documents, Vendor shall inform Consultant in writing of the nature of such deviations when material is submitted for approval and shall request written approval of deviation from Contract Documents.

1.3.3 Intent of Contract Documents:

.1 Contract Documents are intended to produce Work of consistent character and quality of design.

.2 Consultant will judge design and appearance of proposed substitutes on the basis of their suitability in relation to overall design of the Project, as well as for intrinsic merits.

.3 Consultant will not approve as equal to materials specified proposed substitutes which, in Consultant's opinion, would be out of character, obtrusive or otherwise inconsistent with character or quality of design of Project.

.4 In order to permit coordinated design of color and finishes, Vendor shall, if required by the Consultant, furnish substituted material in color, finish, texture or pattern specified for original material, at no additional cost to the Agency.

1.3.4 Compatibility of Products: If option of selecting between two or more products exists, provide product compatible with other products previously selected.

2 PRODUCTS

2.1 Selection Criteria

2.1.1 Proprietary Products:

.1 Products specified by trade or brand name are part of the Contract.
.2 Provide specific materials, equipment, fixtures, apparatus, appliances or other manufactured articles of types and makes specified or indicated, except for substitutions or changes specifically approved in writing by Consultant.
.3 When several named products are listed, use any product listed.

2.1.2 "Equivalent to" or "Approved Equal": Where one or more products, materials or pieces of equipment are specified by reference to trade or brand name or catalog number and the phrase "equivalent to" or "approved equal" accompanies listing, comply with provisions pertaining to substitutions to obtain acceptance from the Consultant for use of unnamed products.

2.1.3 Performance Specifications:
.1 Where products require compliance with indicated performance requirements, and list of acceptable manufacturers is included in Contract Documents, provide products that comply with specific performance requirements indicated from manufacturer listed.
.2 If the Vendor proposes another product, comply with provisions pertaining to substitutions to obtain Consultant's acceptance of unnamed manufacturer's product.
.3 When products are specified only by reference standard, performance criteria or descriptive requirements, without trade names, submit products by any reputable manufacturer meeting or surpassing specified requirements or standard.

2.1.4 Visual Matching: Where matching an established sample is required, the Consultant has the final judgment of whether proposed product matches sample.

2.1.5 The Agency reserves the right to decline a substitution or equivalence request. The Vendor shall include product named in the document bid price.

2.2 Substitution Proposals

2.2.1 After Contract award, submit substitution proposals to the Consultant if it is shown that the substitution is proposed for one of the following reasons:
.1 Directly related to an "equivalent to" clause or similar language in Contract Documents.
.2 Specified product or method cannot be provided within Contract Time.
.3 Specified materials cannot receive approval of local governing authority.
.4 Substitute material will offer the Agency substantial advantages in terms of cost, time, energy conservation or other consideration.
.5 Specified materials cannot be properly coordinated with other

materials in Work.

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

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

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

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

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

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

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

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

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

2.2.4 Substitutions for major building elements must be submitted for consideration within a week of Contract execution. Proposals for substitutions of major building elements after that time will not be considered.

2.2.5 Consultant will be the judge of equality or superiority for proposed substitutions. Do not purchase or install proposed substitute products without written acceptance of the Consultant and by the Agency. Allow minimum of twenty calendar days for Consultant's review of substitution proposals.

2.3 <u>Substitution Request Submittals</u>

2.3.1 After Contract award, submit separate request for each substitute proposal, supported by complete data, with Drawings and samples as appropriate, including:

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

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

.3 Effect on construction schedule and Contract Time.

.4 Change in cost, if any, and amount of net change to Contract Sum.
.5 Availability of maintenance service, and source of replacement materials, where applicable.
.6 Reason for substitution request.

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

2.4 Installation of Substitute Products or Materials

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

2.5 Changes Due to Substitutions

2.5.1 Any additional cost, loss or damage arising from substitutions is the Vendor's responsibility, notwithstanding approval or acceptance of such substitution by Agency or Consultant, unless such substitution was made at written request or direction by the Agency or the Consultant.

2.5.2 Any schedule delays due to the processing of substitutions proposals is the Vendor's responsibility.

2.5.3 Modifications to Contract Sum Due to Substitutions:
.1 Agency will receive full credit for cost differential between specified item and proposed substitution.
.2 Substitution proposals that increase Contract Sum will be rejected, unless proposed substitution was made at written request or direction by the Agency or Consultant.

3 **EXECUTION** – NOT APPLICABLE.

END OF SECTION

1 GENERAL

1.1 Instructions

1.1.1 All sections of Division 1, General Requirements as well as the Contract between the Agency and the Vendor, apply to all trades working on the project.

1.1.2 Work is to be in accordance with the Contract Documents and the Contract Drawings.

1.2 Work Included

1.2.1 Submittals and procedures required for closeout.

1.3 Take-Over Procedures

1.3.1 The Vendor to notify Consultant, in writing, when he feels he meets the requirements for Occupancy.

1.3.2 The Consultant, the Vendor and the required Subcontractors shall prepare a list of incomplete and unsatisfactory Work.

1.3.3 The Vendor shall make written application to the Consultant for Occupancy which must include all of the following:

.1 Statement that the Contract is substantially performed in compliance with the Contract Documents.

.2 Submission of closeout requirements.

1.3.4 A lump sum amount of the Contract will be left uncertified by the Consultant until all applicable certificates, warranties (including extended warranties), tax rebates, balancing report, demonstrations of systems, final cleaning and deficiencies have been received or completed to the satisfaction of the Consultant. The amount of the Warranty Holdback shall be determined based on the contract price and adjusted from time to time to account for changes to the contract price as a result of approved Change Orders and Change Directives.

1.3.5 When all deficiencies have been completed and verified by the Vendor, he must notify the Consultant for further review. Upon becoming satisfied that all deficiencies have been corrected and upon receiving all certificates, warranties, balancing reports and tax rebates and upon verifying completeness of all final cleaning and demonstrations and upon receiving the Vendor's final invoice, a Final Payment Certificate" will be issued by the Consultant.

1.3.6 If the Vendor notifies the Consultant to re-review deficiencies, and upon visiting the project, the Consultant finds less than 75 percent (%) completion of the outstanding listed deficiency items, it will be judged that the Vendor has not verified the deficiencies prior to notifying the Consultant.

1.3.7 If all deficiencies are not completed within a reasonable period of time, the Consultant will invoke the Agency’s right to perform Work or stop the Work or terminate Contract.

1.3.8 Assemble warranties, affidavits and certificates required by Contract Documents for various materials, systems and equipment. Include

copies of permits and certificates of inspection obtained by the Vendor. Place Documents in order and list each Document on transmittal letter or form.

1.4 Closeout Requirements

1.4.1 Project As-Built Documents

.1 General: The Project As-Built Documents consist of As-Built Drawings, Shop Drawings, and Specifications. As-Built Drawings are to be provided in Auto CAD soft copy and Maintenance Manuals provided in PDF soft copy. Maintain Documents and Samples at Project site. As-Builts and all close-out Documents to be provided on a USB.

.2 Record the actual "as-built" details of the project on the white prints throughout the duration of the project. Keep Project As-Built Drawings current and do not record irrelevant information.

.3 Modify the electronic Drawing files (dwg) and specifications and accurately record all significant deviations from the Contract Documents in the Work, caused by site conditions and changes originated from all Consultants, the Vendor/Subcontractor originated changes, Change Orders, Site Instructions, Supplementary Instructions, Addenda, instructions by correspondence and Jurisdictional Authority approvals.

.4 Record location of concealed elements which are required for maintenance, alteration Work and building additions.

.5 Eradicate all obsolete information.

.6 Clearly mark project As-Built Drawings, "Project As- Built Copy" in the title block. Maintain in good condition, available at all times for inspection by the Consultant’s site representatives, and do not use for construction purposes.

.7 Keep Project As-Built Drawings current and do not record irrelevant information.

.8 Do not permanently conceal any Work until the required information has been recorded.

.9 Proof that the Project As-Built Drawings are current will consist of the Consultant’s site representatives making a visual check of the Project As-Built Drawings at the project site.

.10 Completion of the Project As-Built Drawings to current stage of construction shall be considered a requirement for validation of any application for payment made by Vendor.

.11 Date all entries with proper reference to the appropriate Change Order or approval number. Call attention to the entryby a "cloud" around the area or areas affected.

.12 Submit one complete set of final "Reviewed" or "Reviewed-As-Modified" Shop Drawings, on which corrections have been recorded of changes made during fabrication and installation

of unforeseen conditions. Do not include Drawings which were "Returned and Resubmit."

1.4.2 Certificates

.1 Provide to the Consultant any certificates required by all local authorities and all certificates of compliance or verification required throughout the specification. Any certificates obtained prior to the maintenance manual submission should be included in the manual. Any certificates obtained after the maintenance manual submission shall be sent to the Consultant prior to Final Payment Certification.

.2 The Vendor must provide proof of that permit has been successfully closed by the City.

1.4.3 Warranties

.1 Provide to the Consultant, all specified warranties, extended warranties and free manufacturer extended warranties as applies to each individual section. The warranty period(s) shall commence the date of Substantial Performance and be valid for 2 Years. Warranties are to be sent to the Consultant prior to Final Payment Certification.

.2 Prior to the end of the one-year and two-year warranty periods following the date of Substantial Performance of the Work, perform with the Agency inspections of the Work and review any defects or deficiencies which have been observed and reported during that period. Perform appropriate repairs to the Work in accordance with the Construction Contract Documents.

1.5 Demonstration of Systems

1.5.1 Provide instruction to the Agency's operating and maintenance personnel, during regular work hours, on the care, operation and maintenance of all equipment and systems as specified in the applicable sections. Refer to the various sections of the specifications for the specific instructional requirements.

1.5.2 All instructional periods shall be prior to the acceptance and handover of systems to the Agency for operation responsibility and also prior to Final Payment Certification.

1.5.3 For equipment requiring seasonal operation, perform instructions for other seasons within six months.

1.5.4 Use Information Manual for basis of instruction. Review contents of Manual with personnel in detail to explain operation and maintenance.

1.5.5 Prepare and insert additional data in the Information Manual when need for such data becomes apparent during instruction.

1.5.6 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance and shutdown of each item of equipment at equipment location.

1.6 Acceptance of Systems

1.6.1 On completion of each trade's scope of work, and during the deficiency review by the Consultant, the Consultant shall review the materials and installation for acceptance. Any unfinished or unacceptable work will be noted. The Vendor shall arrange for the work to be repaired, replaced, or added, as required. This review does not relieve the Vendor of any responsibility related to warranty of the work.

2 **PRODUCTS** – NOT APPLICABLE.

3 **EXECUTION** – NOT APPLICABLE.

END OF SECTION

1 GENERAL

1.1 Instructions

1.1.1 All sections of Division 1, General Requirements as well as the Contract between the Agency and the Vendor, apply to all trades working on the project.

1.1.2 Work is to be in accordance with Contract Documents and Contract Drawings.

1.2 Work Included

1.2.1 General cleaning during construction and final cleaning prior to inspection for final inspection of work.

1.2.2 Requirements for cleaning specified in this Section are in addition to specific cleaning requirements specified in various technical Specification Sections.

2 PRODUCTS

2.1 Refer to Infection Control Procedures, Section 01 35 33.

2.2 Cleaning Materials

2.2.1 Use materials which will not create hazards to health or property and which will not damage surfaces.

2.2.2 Use materials and methods which comply with requirements of local authorities having jurisdiction over Work and are recommended by manufacturer or fabricator of material being cleaned.

3 EXECUTION

3.1 Cleaning During Construction

3.1.1 Maintain the work, at least on a daily basis, free from accumulations of waste material and debris.

3.1.2 Provide on-site dump containers for collection of waste materials, and debris. All waste to be sorted on site to maximize recyclability.

3.1.3 Remove waste materials and debris from site.

3.1.4 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

3.1.5 Vacuum clean interior building areas prior to start of finish painting and continue vacuum cleaning in each area on "as needed" basis until that area is ready for occupancy.

3.1.6 Vacuum clean and damp mop work areas within resident rooms immediately after doors installation. Co-ordinate acceptance by staff directly with building operations. This must be done prior to each resident room being re-occupied.

3.2 Final Cleaning

3.2.1 Exterior Cleaning:

.1 Remove debris, waste and surplus materials from site, and from drainage systems.

.2 Remove temporary protection and temporary construction.
.3 Remove stains, spills and foreign substances.
.4 Sweep and hose down exterior walks where Work has been undertaken.

3.2.2 Interior Cleaning:
.1 Remove temporary protection, tags, labels and markings from materials, fixtures, accessories and equipment.
.2 Clean transparent and glossy materials to polished condition; remove foreign substances.
.3 Polish reflective surfaces to clear shine.
.4 Clean switch and outlet plates, finish hardware, handrails and metal trim of smudges, paint and soiling.
.5 Clean aluminum, stainless steel, bronze and similar metals according to instructions of metal manufacturer.
.6 Clean resilient floors thoroughly with well-rinsed mop containing only enough moisture to remove surface dirt and dust; then buff dry by machine, bringing surfaces to sheen.
.7 Broom clean and vacuum floors.
.8 Clean under and behind convectors and other equipment.
.9 Clean inside cabinets and other concealed areas.
.10 Repaint surfaces and items that cannot be cleaned.
.11 Do not remove ‘ULC’ labels or ‘CSA Approved’ labels.

3.3 Damaged Materials

3.3.1 Any materials damaged during final cleaning operation shall be replaced by the Vendor. Extra stock, as supplied under Contract, will not be used for this replacement purpose.

END OF SECTION

1 GENERAL

1.1 Instructions

1.1.1 Comply with the requirements of all Sections. Work is to be in accordance with the Contract Documents and the Contract Drawings.

1.1.2 Report in writing to the Vendor any defects of surfaces or Work prepared by other trades which affect the quality or dimensions of this Subcontractor's Work. Commencement of this Subcontractor's Work shall imply complete acceptance of all Work by other trades.

1.2 Intent

1.2.1 Precautions must be taken to avoid any intrusion on or into neighboring property with equipment and/or materials and/or dust.

1.2.2 Provide all articles, labour, materials, equipment, transportation, hosting and incidentals notes, specified and required to complete the Work of this Section.

1.3 Occupancy of Existing Building

1.3.1 Due to the ongoing occupancy of the building, the Vendor is required to notify the Agency of any safety precautions, which the Agency must take in order to ensure the safety of the building occupants. Vacating of certain areas of building will be arranged by the Agency, according to phasing plan. Any additional requested changes to occupancy must be negotiated with the Agency. A minimum of two weeks lead time will be required for the Agency to adjust occupancy of any occupied areas.

1.4 Phasing

1.4.1 The demolition work must be undertaken in phases, to suit the construction/renovation progress and occupancy of the building. This Subcontractor is to coordinate activities with the Vendor.

1.5 Access

1.5.1 Access for the public to the building will be via the existing main entrance.

1.5.2 Staff entrance will be at existing entrances.

1.5.3 The Vendor’s entrance to be determined.

1.6 Reports

1.6.1 The Agency and Consultants assume no responsibility for any interpretation or deduction that the Vendor may make from the report. The Vendor shall establish the nature of site conditions to their own satisfaction.

1.7 Work Included

1.7.1 The Vendor shall complete all removal and demolition work as

indicated on the Drawings or specifically mentioned in these Specifications, including but not limited to the following:

.1 Flooring and adhesive from designated areas.
.2 Equipment.
.3 Millwork as indicated.
.4 Drywall ceiling.
.5 Existing finishes.
.6 Mechanical and electrical.

1.8 Examination

1.8.1 It shall be the responsibility of the Vendor to visit the site and note all characteristics and features affecting the Work of this Section.

1.8.2 No allowance will be made for any difficulties encountered or any expenses incurred by this Trade on account of any conditions of this site or any item existing thereon which is visible, implied, or known to exist at the time of Proposal.

1.9 Permits and Regulations

1.9.1 Arrange and pay for all permits, landfill fees, notices, and inspections necessary for the proper execution and completion of the demolition.

1.10 Protection

1.10.1 The Vendor shall be entirely responsible for, and make good all damage to adjoining properties and buildings, adjacent walks, curbs, etc.

1.10.2 The Vendor shall be entirely responsible for the safety of all persons lawfully engaged in the Work when such injury is caused by negligence or any act of the Vendor or any person or persons engaged in the Work of this Trade.

1.10.3 It shall be the responsibility of the Vendor to protect the public and building occupants from injury during the course of demolition by providing suitable barriers, fences, coverings, guardrails, etc., that may be required by the Agency and/or Municipal Authorities.

1.11 Existing Services

1.11.1 Locate and disconnect, cap and plug all gas, water, sewer, hydro, telephone and other services, which are to be removed as required. In each case the Utility Company involved shall be notified in advance and it approval obtained before commencing that portion of the Work. Approximate locations of existing utilities have been indicated on the accompanying Drawings, No responsibility is assumed by the Consultant for the exact locations as shown. Not all locations of services are known.

1.11.2 The Vendor must ensure that services to the occupied building are maintained, and if disturbed by the demolition activity that they are restored immediately.

1.12 Clean-up

1.12.1 Leave the site in a clean and orderly condition to the satisfaction of the Vendor. If this Subcontractor fails to do so the Vendor may order excess debris to be removed at the Subcontractor's expense.

2 PRODUCTS

2.1 Salvage Material

2.1.1 All material from the demolition that is not scheduled for re-use shall become the property of the Vendor unless noted, who shall remove all material and debris from the site as quickly as possible. Burning of debris on the site will not be permitted.

2.1.2 Confirm with the Agency if any material is required to be re-used in this Contract.

2.1.3 The following items should be separated for recycling:

.1 Copper piping.
.2 Galvanized steel piping and conduit.
.3 Sheet metal ductwork.
.4 Steel studs.
.5 Drywall and acoustic tile.

3 EXECUTION

3.1 General

3.1.1 Carry out all demolition, removal and disposal in accordance with applicable provincial and local regulations.

3.1.2 Execute demolition in an orderly and careful manner with due consideration for adjacent structures and finishes.

3.1.3 Keep work wetted down thoroughly to prevent dust and dirt from rising during demolition operations. Water shall be provided for this purpose by the Vendor. Upon completion of Work, any temporary water and power lines shall be removed.

3.1.4 All necessary precautions to guard against movement or settlement of the remaining structure shall be taken including all necessary bracing or shoring that is required.

3.2 Concrete Slabs

3.2.1 Where required for new construction, new under floor piping, connections to existing services, electrical conduits, etc., neatly saw-cut out areas of slabs are required. This scope should be co-ordinated by reviewing Mechanical, Electrical, and Architectural Drawings.

3.3 PCB Ballasts

3.3.1 The Vendor, in conjunction with the Inspection and Testing Company, shall determine the ballasts containing PCB's. These shall be stored in the designated storage facility. Handling and storage shall be undertaken in accordance with Ontario Regulation 11/82 as amended and any other Provincial and Municipal

requirements. Non-PCB contaminated ballasts shall be disposed of at a licensed landfill.

END OF SECTION

1 GENERAL

1.1 Instructions

1.1.1 Comply with the requirements of all Sections. Work is to be in accordance with the Contract Documents and the Contract Drawings.

1.1.2 Report in writing to the Vendor any defects of surfaces or Work prepared by other trades which affect the quality or dimensions of this Subcontractor's Work. Commencement of this Subcontractor's Work shall imply complete acceptance of all Work by other trades.

1.2 Intent

1.2.1 Provide all articles, labour, materials, equipment, transportation, hoisting and incidentals noted, specified or required to complete the Work of this Section.

1.3 Guarantee

1.3.1 Provide a written guarantee of Work of this Section against defects in material and quality of Work for a period of one (1) year from the date of publication of the Certificate of Substantial Performance.

1.4 Section Includes

1.4.1 Provide all of the rough and finished carpentry indicated on the Working Drawings or specified herein, including but not limited to the following:

.1 Accept delivery, store and install the following:

.1 Hollow Metal Frame and Door.

.2 Finishing Hardware.

1.4.2 General Trades – Provide the following:

.1 Wood nailers and blocking.

.2 Wood furring.

.3 Blocking for Mechanical and Electrical equipment.

.4 Installation of all materials required for a finished project that are not installed by suppliers.

1.4.3 Installation of all hardware specified.

1.4.4 Supply and installation of all materials and labour required for a finished project.

1.4.5 Supply and install wood blocking.

1.5 Related Sections

1.5.1 Section 06 40 00, Architectural Woodwork and Solid Surfaces.

1.5.2 Section 08 70 00, Hardware.

1.5.3 Section 09 90 00, Painting.

1.6 By-laws

1.6.1 The design, fabrication and erection shall conform to the requirements of the Ontario Building Code and any other applicable local building by-law.

1.7 Reference Publications

1.7.1 This Specification makes reference to the latest edition of the following publications listed below.

1.7.2 C.S.A. Standards

.1	CAN3-086-M84	Engineering Design in Wood (Working Stress Design)
.2	CAN3-086.1-M84	Engineering Design In Wood
.3	CAN3-086S1/086.1S1.87	Supplement No. 1
.4	0121-M1978	Douglas Fir Plywood
.5	0141-1970	Softwood Lumber

1.7.3 Associations:

.1 National Hardwood Lumber Association Standards

.2 Architectural Woodwork Manufacturers Association of Canada Standards. (A.W.M.A.C.)

1.7.4 Publications:

.1 National Lumber Grades Authority (N.L.G.A.) - Standard Grading Rules for Canadian Lumber.

1.8 Submittals

1.8.1 Submit all Shop Drawings for the Consultant's review before any Work is commenced. Drawings to bear stamp and seal of a Professional Engineer licensed to practice in the Province of Ontario for all connection and designed items.

1.8.2 Erection Drawings shall show sizes and locations of all members and give complete location and details for setting anchor bolts and leveling plates. The elevations of all bearing plates shall be clearly shown.

1.8.3 Do not commence fabrication until final approval of Shop Drawings is received.

1.9 Delivery, Storage and Handling

1.9.1 Store all materials under waterproof cover both in transit and on the site in such a manner as to cause no damage to other materials, to any existing building or property or to the new structure.

1.9.2 Co-ordinate delivery schedule of material with the suppliers.

1.9.3 Pile doors flat on level supports to prevent damage. Protect face of first door by placing plywood or cardboard between supports and door. Cover the top door and edges in a similar manner.

1.9.4 Store doors in a dry, well ventilated area. Doors stored for an extensive period of time shall have top and bottom edges sealed.

1.9.5 Lift doors on and off piles; never drag across each other to prevent surface damage and scratching. Do not stand doors on ends for storage.

1.10 Rejections

1.10.1 Defective materials or quality of Work whenever found, at any time prior to final acceptance of the Work, shall be rejected. Inspection

will not relieve the Vendor of responsibility, but is a precaution against oversight or errors. Defective materials shall be removed and replaced by the Vendor at their own expense, and they shall be responsible for the cost of the Work of other trades affected by this replacement.

1.11 Co-operation with Other Trades

1.11.1 Give sufficient notice to the Painting Vendor so that untreated or unprimed carpentry items or material can be primed immediately upon delivery to the site.

1.11.2 Supply fastenings with installation locations and necessary templates to other trades to which wood is to be secured.

1.12 Clean-up

1.12.1 Upon completion of the Work of this Section, remove all surplus material and debris caused by the Work of this Trade from the site to the satisfaction of the Consultant.

1.13 Guarantee

1.13.1 Provide a written guarantee of Work of this Section against defects in material and quality of Work for a period of one (1) year from the date of publication of the Certificate of Substantial Performance.

2 PRODUCTS

2.1 Materials

2.1.1 All lumber for rough carpentry shall be well seasoned stock, free from shakes, splits, dry rot, mildew or other defects which would impair its strength or durability. For exterior applications and for parapets, use pressure treated lumber.

2.1.2 Unless otherwise specified, all rough lumber shall be well seasoned No. 1 Eastern Spruce conforming to N.L.G.A. grading rules.

2.1.3 Douglas Fir plywood: To C.S.A. 0121-M1978 (sanded G2S Grade "A" veneer). (Un-sanded SAG Grade "C" veneer).

3 EXECUTION

3.1 Quality of Work

3.1.1 Machine sand all exposed surfaces of finished woodwork to an even smooth surface ready for finishing; fit all joints and mitres accurately with nail heads set and ready for finishing.

3.1.2 Back out flat members of trim to prevent warping.

3.1.3 Hand sand all finished materials, after erection to remove roughness, machine marks or other blemishes.

3.1.4 Apply plastic laminate to Architectural Wood Manufacturers Association Standards. Use lengths adequate for longest dimension of surface to be covered. Splices within lengths of 2.4384m (8'-0") will be rejected.

3.1.5 Protect all exposed and finished woodwork after installation against damage during the progress of the Work.

3.2 Fastenings

3.2.1 Fastenings to solid masonry or concrete surfaces shall be with expansion shields and lag screws, unless otherwise specified, and to steel with bolts and nuts. Wood or inorganic fibre plugs shall not be permitted. Powder activated fasteners and staples shall not be used unless permitted by the Consultant.

3.3 Wood Blocking

3.3.1

3.3.2 Accurately fit all Work to sit level and true and securely fastened.

3.7 Finishing Hardware

3.7.1 Finishing hardware shall be supplied by the Hardware Supplier under the Work of Section 08 70 00 Hardware and installed by this Sub-Contractor.

3.7.2 Mortise and neatly fit finishing hardware. Cut mortises straight and sharp without ragged edges and size accurately to accommodate the hardware. Where mortising and application have not been done in a first-class professional manner such Work shall be replaced.

3.7.2 Install hardware in accordance with the manufacturer's recommendations and in conformance with Drawings.

3.7.3 Examine and adjust as required all doors and other moveable parts prior to completion of the building.

END OF SECTION

1 GENERAL

1.1 Instructions

1.1.1 Comply with the requirements of all Sections. Work is to be in accordance with Contract Documents and Contract Drawings.

1.1.2 Report in writing to the Vendor any defects of surfaces or Work prepared by other trades which affect the quality or dimensions of this Sub-contractor's Work. Commencement of this Sub-contractor's Work shall imply complete acceptance of all Work by other trades.

1.2 Section Includes

1.2.1 Provide all millwork and casework as shown on the Drawings. These items include:

.1 Architectural Casework
.2 Solid Surface Countertops
.3 Finishing Hardware for Millwork

1.3 Related Sections

1.3.1 Section 06 10 00, General Trades.
1.3.2 Electrical – Installation of Receptacles and Wiring.
1.3.3 Mechanical – Supply & Install of Faucets, Sinks.

1.4 Quality Assurance

1.4.1 For fabrication and installation of architectural woodwork, use only personnel who are completely trained and experienced in this field.

1.4.2 If there is a conflict between specification and Drawings, the specification takes precedence.
Produce the Work according to millwork standards of the Architectural Woodwork Manufacturer's Association of Canada (AWMAC) Quality Standards Illustrated.

1.4.3 Any items of millwork not given a specific quality grade shall be built to AWMAC "Custom Grade" standards.

1.4.4 Use only No added Formaldehyde products in all cases where such products are available.

1.5 Reference Standard

1.5.1 AWMAC Quality Standards Illustrated
1.X.X ANSI-A208.1-99
1.5.3 NEMA
1.5.4 CSA 0121 Douglas Fir Plywood
1.5.5 CSA 0141 Softwood Lumber
1.5.6 CAN3 CSA 0188.1 M78 Interior Mat Formed Wood Particle Board

1.6 Submittals

1.6.1 Shop Drawings

.1 Requirements for Shop Drawings submission are described in Section 01 30 00, Instructions to All Trades, specifically provide the following:

.1 General arrangement in plan and elevation.
.2 Locations of required blocking (which will be provided by Section 06 10 00, General Trades).
.3 Location of all related service outlets.
.4 Details of connections, attachments, anchors as applicable.
.5 Where surfaces require splicing of finish surface material, submit Drawing showing locations of splices.
.6 Direction of wood grain to be shown in all cases where wood is used.

1.6.2 Samples

.1 For casework submit two samples of door material (cut through to show core), countertop profile, nosing, edge banding, for the Consultant's review.
.2 Submit cut sheets of all hardware including product name and specifications for the Consultant's review:
.3 Do not commence Work until reviewed samples have been returned.

1.7 Rejections

1.7.1 Defective materials or poor quality of Work, whenever found at any time prior to final acceptance of the Work, shall be rejected regardless of previous inspection. Inspection will not relieve responsibility but is a precaution against oversight and error.

1.7.2 Remove and replace defective materials and make good Work of other trades affected by this replacement, at no additional cost to the Agency.

1.8 Examination

1.8.1 Report to the Consultant, in writing, all defects of surfaces or Work prepared by other trades and/or unsatisfactory site conditions.

1.8.2 Thoroughly examine all surfaces scheduled to receive Architectural Woodwork to see that they are secure, rigid, true and not liable to impair performance or appearance.

1.8.3 Commencement of Work implies total acceptance of surface and site conditions.

1.8.4 Prior to fabrication, verify any field measurements necessary to ensure a perfect fit.

1.9 Delivery, Storage and Handling

1.9.1 Deliver and store all millwork and casework under waterproof cover, both in transit and on the site.

1.9.2 Store in a dry well ventilated area that does not hinder the Work of other trades.

1.9.3 This Sub-contractor and the Vendor shall be jointly responsible to ensure that millwork is not delivered to the site until areas achieve a maximum air moisture content of 15 per cent, or such moisture level to ensure that the woodwork will not be damaged due to excessive

moisture and/or changes in moisture content.

1.9.4 Any items which are chipped, bent, scratched or otherwise damaged at the time of installation are to be removed and replaced with new materials.

1.10 Job Conditions

1.10.1 Co-operate in coordinating Work of related Sections in order that The Work may proceed in an orderly and effective manner.

1.11.2 Environmental Requirements: Ensure appropriate acclimatization between plastic laminate and substrate prior to fabrication. Condition plastic laminate and substrate surfaces in the same environment for 48 hours prior to fabrication. Condition at approximately 75 deg F (24 deg C) and 45 percent to 55 percent relative humidity.

1. Adhesive: For best results, apply adhesives at temperatures at or above 65 deg F (18 deg F).

1.11.3 Field Measurements: Verify actual measurements and openings by field measurements before fabrication; show recorded measurements on Shop Drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.11 Warranty

1.11.1 The Vendor warrants that all materials and workmanship shall be of the quality, quantity specified and shown, and that any defect due to improper workmanship or material discovered and made known to them by the Agency, within two years from the date of substantial performance, shall be repaired or replaced by the Vendor, to the Designer's and Agency's satisfaction, without additional expense to the Agency.

1.12 Clean-up

1.12.1 Promptly as the Work proceeds, and upon completion, clean-up and remove from the premises all rubbish and surplus materials resulting from the foregoing Work.

2 PRODUCTS

2.1 General

2.1.1 Provide new materials only, free from defects impairing physical or appearance performance.

2.1.2 Obtain the Consultant's approval before attempting to substitute materials. Only materials that are shown by the Vendor to be as good as or better than the products specified will be accepted. Review Division 1 specification requirements regarding substitution. The Consultant will not conduct research to determine equivalence - if a substitute is requested, it must be accompanied by supporting documentation to show its equivalence. Acceptance is the prerogative of the Consultant.

2.2 Materials

2.2.1 Hardwood plywood: to CSA 0115-1991 and AWMAC Standards. Plywood shall be G1S or G2S when both faces are exposed. Face veneer shall be flich matched.
Type of veneer: rotary cut, birch, paint grade.

2.2.2 Canadian softwood plywood: to CSA 0151-M1978 Pine species, Type II bond, veneer core, G2S grade "A".
.1 Douglas fir plywood: To CSA 0121-M1978 sanded, G1S; or G2S grade where plywood is exposed on 2-sides.
.2 Composition board core plywood.

2.2.3 Phenolic Panels.

2.2 **Casework**

2.3.1 Custom Grade Phenolic Cabinets: Basis of Design: Wilsonart.
.1 Surface finish – Wilsonart Compact Laminate. "Wilsonart Classic Grade": Self-supporting homogenous panels finished with melamine surface. Impact-resistant design.
.2 Substrates: Wilsonart Classic Grade": Self-supporting homogenous panels finished with melamine surface. Impact-resistant design.
.3 Material thickness:
.1 Door fronts: 19mm
.2 Gables (end, exposed): 19mm (Type 575)
.3 Gables (interior stiffeners): 19mm (Type 575)
.4 Shelves (interior of case): 19mm (Type 575)
.5 Back panel: 12mm (Type 568)
.6 Case: 19mm (Type 575)
.7 Toe Kick: Integrated epoxy cove
.4 Laminate Conformance Standard: NEMA LD 3, Grade CGS.
.5 Finish: Matte -60.
.6 Color and Pattern:
.1 Same colour both sides of all surfaces.
.2 Universal Washroom / Shower: Formica, Pecan Woodline, 5883-58 (CL-1)
.3 Barrier Free Washroom: Wilsonart, Phantom Charcoal, 8214K-28 (CL-2)

2.4 Countertops

2.4.1 Counters:
.1 Pencil edge.
.2 Nosing depth: 38mm.
.3 Material thickness: 13mm fully supported on 19mm plywood.
.4 Surface: Corian solid surfacing, or equivalent.
.6 Colour: Universal Washroom / Shower: Corian Deep Night Sky (SS-1). Barrier Free Washroom: Corian, Ash Concrete (SS-2).

2.5 Drawers

2.5.1 Drawers: Medabox with Bluemotion soft close by Blum.

3 EXECUTION

3.1 Preparation and Protection

3.3.1 Protect Work of other trades from damage.

3.3.2 Make good any resulting damage, to the satisfaction of the Consultant, at no additional cost to the Agency.

3.2 Fabrication

3.2.1 All casework to be constructed using concealed fasteners.

3.2.2 Fabrication Cabinet Carcass:

.1 Flush frameless construction and exposed edges.

.2 Factory install all hardware firmly into position for long life under hard use. Install two (2) hinges on doors up to one (1) meter in height, three (3) hinges to 1.5 meter in height and four (4) hinges for doors greater than 1.5 meters in height or shown otherwise.

.3 Install neoprene or rubber bumpers, at all cabinet doors and drawers.

3.2.3 Counter Tops:

.1 Counter tops apply Tremco Tremsil 200 silicone sealant at junction of tops when tops are joined. All joints to be over a gable or supported otherwise.

.2 Apply a small bead of mildew-resistant paintable silicone sealant at junction of counter back and adjacent wall finish.

3.2.4 Frame materials with tight joints held in place by tight joint fasteners.

3.2.5 Do not exceed 610mm maximum width of cabinet without a divider or as specified otherwise.

3.2.6 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings. Design units to fit together if site assembly is required.

3.2.7 Conceal joints and connections where possible. Joints made on site shall be equal in quality of work to joints made in the shop.

3.2.13 Install finishing hardware to manufacturer's specifications. All casework drawers shall be installed with drawer slides.

3.3 Installation

3.3.1 Site measure all locations where millwork / casework is to be installed.

Determine any rough-ins (examples are receptacles, thermostats, data outlets, etc.) which will cause interference with the millwork items as designed, and make adjustments for them in the millwork construction.

3.3.2 Set and secure all materials and components in place, rigid plumb and square.

3.3.3 Provide all furring strips and strapping required to fix millwork and casework to walls, etc.

3.3.4 Except for economy grade cabinets, filler pieces may NOT be used: all cabinets must be built to fit the site measured openings.

3.3.5 Ensure that millwork items fit accurately into the built spaces. Where joints greater than 6mm occur between cabinets and adjacent

construction, provide new elements to produce an accurate fit.

3.3.6 After installation, fit and adjust operating hardware for cabinetdoors, drawers and shelves.

3.3.7 Install materials according to referenced Specification Sections and the following conformance standards as applicable:

1. AWI AWS.
2. KCMA A161.1.

3.3.8 To avoid stress cracking, do not use square-cut inside corners. All inside corners to have a minimum 1/8 inch radius and all edges routed smooth.

3.3.9 Drill oversized holes for screws, bolts, and similar fasteners. Slightly countersink fasteners into face side of laminate-clad substrate.

3.3.10 Use carbide-tipped saw and router blades for cutting, with high tool speed and low feed speed. Keep cutting blades sharp. Use appropriate hold-downs to prevent vibration.

END OF SECTION

1 GENERAL

1.1 Instructions

1.1.1 Comply with the requirements of all Sections. Work is to be in accordance with Contract Documents and Contract Drawings.

1.1.2 Report in writing to the Vendor any defects of surfaces or Work prepared by other trades which affect the quality or dimensions of this Sub-contractor's Work. Commencement of this Sub-contractor's Work shall imply complete acceptance of all Work by other trades.

1.2 Section Includes

1.2.1 Fire stopping and smoke seals through penetrations at wall and floor openings.

1.3 Related Sections

1.3.1 Section 07 90 00 – Joint Sealers: non-rated joint sealants.

1.3.2 Section 09 29 00 – Gypsum Board: penetrations in rated gypsum board assemblies.

1.3.3 Division 22, 23 – Refer to Mechanical Drawings.

1.3.4 Division 26 – Refer to Electrical Drawings.

1.4 References

1.4.1 CAN/CGSB-19.13-M87: sealing Compound, One Component, Elastomeric, Chemical Curing.

1.4.2 CAN/CGSB-19.24-M90: Multicomponent, Chemical Curing Sealing Compound.

1.4.3 CAN/ULC-S102-M88: Surface Burning Characteristics of Building Materials and Assemblies.

1.4.4 can4-s115-m85: Fire Tests of Fire Stops.

1.4.5 ASTM E84: Surface Burning Characteristics of Building Materials.

1.4.6 ASTM E119: Fire Tests of Building Construction and Materials.

1.4.7 ASTM E814: Fire Tests of Through-Penetration Fire Stops.

1.4.8 Underwriters' Laboratories of Canada: List of Equipment & Materials.

1.5 System Description

1.5.1 Seal empty holes and penetrations at floors, fire rated walls and smoke barrier walls.

1.5.2 Seal holes accommodating penetrating items such as cables, cable trays, pipes, ducts and conduits.

1.5.3 Seal penetration system used to maintain the integrity of time rated construction by providing a sealant against the spread of heat, flame and smoke.

1.5.4 Systems shall be UL classified or listed by Warnock-Hersey International for the appropriate required time rating.

1.6 Submittals

1.6.1 Submit Shop Drawings and product data to requirements of Section

01 30 00, Instructions to All Trades.

1.6.2 Product Data: sealant manufacturer's installation instructions and standard Drawings, indicating ULC or WHI test designations.

1.6.3 Shop Drawings: Indicate sizes of openings, nature of penetrations, and tested methods of firestop and smoke seal protection being proposed.

.1 Shop Drawings are to be sealed, signed and dated by a registered Professional Engineer licensed to practice in the Place of the Work and having a minimum of 10 years documented experience designing firestop and smoke seal systems.

.2 Submit Shop Drawings to Consultant and to the authority having jurisdiction for their review and approval.

1.6.4 Submit the sealant manufacturer's letter of certification, to requirements of Section 01 30 00 – Instructions to All Trades, Verifying that Products meet or exceed specified requirements.

1.6.5 Submit a certified laboratory report, to requirements of Section 01 30 00, Instructions to All Trades, indicating that Products Proposed for use conform to the requirements of ASTM E814 and CAN4-S115-M, and are classified by the Underwriter's Laboratories of Canada or Warnock-Hersey International.

1.7 Quality Insurance

1.7.1 Use only an approved applicator acceptable to sealant material manufacturer.

1.7.2 Fire stopping compounds shall not contain volatile solvents or require special application to protect Plastic pipe from fire stopping compound.

1.8 Mock-Ups

1.8.1 Construct job site mock-up to requirements of Section 01 30 00 - Instructions to All Trades.

1.8.2 Apply one sample seal on representative substrates on each site for each fire rating required at each type of wall, floor or roof construction.

1.8.3 Comply with project requirements as to thickness and density of application to achieve fire rating.

1.8.4 Proceed with installation only after the Consultant has reviewed and accepted mock-up.

1.8.5 Acceptable mock-up may remain as part of the complete work as standard.

1.9 Delivery, Storage and Handling

1.9.1 Deliver all materials to the Site in their original unopened packages.

1.9.2 Store materials in an enclosed shelter, preventing damage to containers.

1.10 Project Conditions

1.10.1 Do not apply sealants when temperature of substrate material and surrounding air is below 5 degrees Celsius.
1.10.2 Maintain sealant at a minimum 18 degrees Celsius for best workability.

1.11 Pre-Installation Conference

1.11.1 Prior to commencement of fire stopping, arrange and conduct a pre-installation meeting to discuss proposed methods and materials to be used.
1.11.2 Representatives of the Agency, Consultant, Vendor, Installer, Manufacturer and the authority having jurisdiction are to be in attendance. Do not conduct meeting unless all identified parties are present.

2 PRODUCTS

2.1 Manufacturers

2.1.1 Manufacturers of firestop sealants having Product considered acceptable for use:
- .1 3M.
- .2 AD Fire Protection.
- .3 Hilti Canada.
- .4 Tremco.
- .5 The Rectorseal Corporation.
- .6 Agency Approved Equivalent

2.2 Materials

2.2.1 Firestop Sealant Type A: non-sag; asbestos-free; single component sealant composed of high temperature ceramic fibers and organic silica binders; ULC labeled; to CAN4-S115-M and CAN/ULC- S102-M.
2.2.2 Firestop Sealant Type B: three component; epoxidized polyurethane terpolymer; accommodating joint movement of +40/-25 percent (%); ULC labeled; to CAN/CGSB-19.24-M and CAN4-S115-M.
2.2.3 Firestop Sealant Type C: three component; self-levelling; chemically curing polyurethane sealant; ULC labeled; to CAN4-S115-M.
2.2.4 Firestop Sealant Type D: single component; low modulus; silicone rubber; moisture curing; ULC labelled; to CAN/CGSB-19.13-M and CAN4-S115-M.
2.2.5 Firestop Sealant Type E: single component; modified polyurethane; moisture curing; ULC labeled; to CAN/CGSB-19.13-M and CAN4-S115-M.
2.2.6 Primer: as recommended by sealant manufacturer for specific material, substrate and end use.
2.2.7 Firestop Insulation: to CAN/ULC-S702, Type 2; mineral fiber manufactured from rock or slag, suitable for manual application:
- .1 Density: 72 kg/m³ when tested to ASTM C303.
- .2 Combustibility: Noncombustible to CAN/ULC-S114.

.3 Melt Temperature: >1175 degrees C.
.4 Surface Burning Characteristics: to CAN/ULC-S102, maximum flame spread of 0, smoke developed of 0.
.5 Moisture Sorption: 0.04 percent when tested to ASTM C1104.
.6 Smoulder Resistance: 0.01 percent when tested to CAN/ULC-S129.

2.3 Components

2.3.1 Provide firestopping and smoke sealing systems to requirements of CAN4-S115-M and described below:
.1 Asbestos free materials and systems fully capable of maintaining an effective barrier against gases, flame and smoke in compliance with CAN4-S115-M, not exceeding opening sizes stated.
.2 Service Penetration Assemblies: certified by CAN4-S115-M and used by ULC Guide 40 U19. Service components listed as certified in this guide are noted under Label Service of ULC.

2.3.2 Fire resistance rating of fire stopping material assembly must meet or exceed the fire resistance rating of the floor and wall section being penetrated.

2.3.3 Firestopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal; do not use a cementitious or rigid seal at such locations.

2.3.4 Damming and back up materials, supports and anchoring devices shall be to manufacturer's recommendations, and in strict accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

2.3.5 Sealants: for vertical joints shall be non-sagging type.

3 EXECUTION

3.1 Examination

3.1.1 Confirm compatibility of surfaces to receive sealant materials.

3.1.2 Verify that surfaces of openings are sound, clean, dry and ready to receive application of sealant.

3.1.3 Verify that penetration elements are securely fixed and properly located.

3.1.4 Commencement of installation means acceptance of existing conditions.

3.2 Preparation

3.2.1 Protect adjacent surfaces and equipment from damage.

3.2.2 Clean contact surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect bond of sealant.

3.2.3 Remove incompatible materials which affect bond by scraping, brushing, water or solvent cleaning, or sandblasting.

3.3 Application

3.3.1 Install mineral fiber insulation in compacted thicknesses required by

ULC design. Compress insulation approximately 33 percent.

3.3.2 Apply sealant in strict accordance with manufacturer's instructions and ULC certification.

3.3.3 Coordinate and cooperate with adjacent, contiguous and related materials trades, such as concrete, drywall, plumbing, conduit, electrical wiring, communication systems, etc., to ensure a proper and timely installation.

3.3.4 Seal holes or voids made by penetrating items to ensure an effective fire and smoke barrier.

3.3.5 Seal all intersections and all penetrations of floors, ceilings, walls and columns.

3.3.6 Seal around all cutouts for lights, cabinets, pipes and plumbing, ducts, electrical boxes, etc.

3.3.7 Wrap non-insulated heated pipes that may be subject to movement with a non-combustible smooth material to permit the pipe to move without damaging the firestopping and smoke seal.

3.3.8 Maintain the integrity of any insulation and vapour retarders on insulated pipes and ducts at the fire separation.

3.3.9 Where floor openings exceed 100mm in width and may be subjected to traffic or loading, install cover late systems capable of supporting same loading as floor.

3.4 Field Quality Control

3.4.1 Perform field testing and inspection.

3.4.2 Examine finished penetrations to ensure proper installation before concealing or enclosing any areas of Work.

3.4.3 Keep areas of Work accessible until inspection has been completed.

3.4.4 Manufacturer's Field Service: inspect to verify and confirm that systems installation is in strict accordance with manufacturer's and ULC requirements.

3.4.5 Correct unacceptable work and provide further inspection to verify compliance with requirements.

3.5 Cleaning

3.5.1 Immediately remove all spots, smears, stains, residues, adhesives, etc., from the Work of this Section and from upon adjacent areas or surfaces which resulted from the Work of this Section.

3.5.2 Upon completion of the Work of this Section, remove from site all debris, trash, containers, residue, remnants and scraps which result from the Work of this Section.

3.5.3 Cleaning to be free of volatile solvents. Leave the Work in a clean and satisfactory condition.

3.6 Protection

3.6.1 After installation, and until Agency occupancy, protect the rated firestop systems from damage.

3.6.2 Make Good damaged firestop assemblies.

END OF SECTION

1 GENERAL

1.1 Instructions

1.1.1 Comply with the requirements of all Sections. Work is to be in accordance with Contract Documents and Contract Drawings.

1.1.2 Report in writing to the Vendor any defects of surfaces or Work prepared by other trades which affect the quality or dimensions of this Sub-contractor's Work. Commencement of this Sub-contractor's Work shall imply complete acceptance of all Work by other trades.

1.2 Section Includes

1.2.1 Remove sealant from existing joints indicated and clean joints.

1.2.2 Seal all areas indicated on Drawings, in list following, and where required to seal penetrations:

.1 Both sides of hollow metal frames.
.2 All pipes, grilles and equipment passing through walls.
.3 Joint where two different materials abut.
.4 Plumbing fixtures.
.5 Fire Stopping at all penetrations through fire rated walls and floor assemblies with ULC approved systems.

1.3 Related Sections

1.3.1 Sealant related to:

.1 Section 09 67 00, Fluid Applied Flooring.
.2 Section 07 84 00, Fire Stopping.

1.4 Quality Assurance

1.4.1 Installation of sealant and caulking work shall be carried out by a recognized specialized applicator having skilled mechanics, thoroughly trained and competent in all phases of caulking work, and a member in good standing of the Caulking Vendor's Association of Ontario.

1.4.2 Submit product data and samples of sealant and backing, for Consultant's approval.

1.4.3 Submit manufacturer's data, tests and information.

1.4.4 A representative of the sealant material manufacturer shall be present when sample is applied and visit the site during application to ensure that all Work is carried out according to the manufacturer's printed instruction. Manufacturer representative shall attend meeting with Sub-Vendor, consultant and installer.

1.4.5 Submit written statement of products to be used for each application from the selected sealant manufacturer prior to commencing the application.

1.5 Reference Standards

1.5.1 CGSB Specification CAN/CGSB-19.13-M87 ASTM C.920 Type S Grade NS, Class 25, use NT, M, A, O one component, elastomeric,

chemical curing.

1.5.2 CGSB Specification CAN/CGSB-19.24-M90 Type 2 Class B and ASTM C920 Type M Grade NS, Class 25, use NT, M, A and 0.

1.6 Rejections

1.6.1 Defective materials or quality of Work whenever found at any time prior to final acceptance of the Work, shall be rejected regardless of previous inspection. Inspection will not relieve responsibility but is a precaution against oversight and error. Remove and replace defective materials, and the Work of other trades affected by this replacement, at no additional cost.

1.7 Examination

1.7.1 Report to the Consultant, in writing, defects of surfaces or Work prepared by other trades and unsatisfactory site conditions.

1.7.2 Commencement of Work implies total acceptance of surface and site conditions.

1.7.3 Thoroughly examine surfaces scheduled to receive sealants to ensure that they are dry, clean, level; free from cracks, ridges, dusting, scaling, carbonation, mortar droppings, parging, curing compounds, rust, grease, oil, paint or other foreign material likely to impair adhesion, performance or appearance.

1.7.4 Test substrate for adhesion and staining if any doubt exists.

1.8 Delivery, Storage and Handling

1.8.1 Deliver and store materials in undamaged and original containers, with labels intact and showing the manufacturer's name, brand, colour, etc.

1.8.2 Ensure material at time of use is still within recommended shelf life.

1.8.3 Maintain storage area at a temperature in accordance with manufacturer's recommendations.

1.9 Guarantee

1.9.1 Provide written guarantee of Work of this Section against delamination, cracking, running, loss of adhesion, blistering, peeling, colour change and staining for a period of two (2) years from the date of Completion.

1.9.2 Provide Manufacturer Warranty for a period of ten (10) years from date of Completion.

2 PRODUCTS

2.1 General

2.1.1 Use 600ml sausage packs instead of cartridge tubes whenever possible.

2.1.2 Materials shall be new and in perfect condition, free from defects impairing physical or appearance performance, and shall meet requirements of applicable C.G.S.B. specifications. Surfaces to

receive sealants to be dry, clean and free of contaminants.

2.2 Materials

Refer to Suggested Sealant Selection chart that follows at end of this Section.

2.2.1 Sealing Around Piping, Ductwork, Conduit, Etc. Passing Through Fire Rated Walls & Floors:
- .1 Sealant: One-part silicone elastomer.
- .2 Pensil 851 by General Electric Silicones.
- .3 Fire stop No. 2000 by Dow Corning.
- .4 Tremstop Fyre - Sil by Tremco.
- .5 Fire stop by Hilti – specific to each application.
- .6 Agency Approved Equivalent

2.2.2 Sealing Around Multiple Cables & Conduits Passing Through Fire Rated Walls & Floors:
- .1 Sealant: Two-part silicone elastomer.
- .2 Fire stop foam No. 2001 manufactured by Dow Corning.
- .3 CS-SL-SA and sealant by Hilti.
- .4 Agency Approved Equivalent

2.2.3 Acoustical Caulking:
- .1 Sealant: Blend of synthetic rubbers.
- .2 Use: Acoustical caulking around perimeter of partitions and electrical boxes, panels, etc. & openings in partition systems requiring acoustical treatment in locations as follows:
- .3 Non-hardening acoustical sealant by Tremco.

2.2.4 Thinners and Primers: Type compatible with appropriate sealant and substrate as recommended by manufacturer.

2.2.5 Cleaning material: As recommended by manufacturer.

2.2.6 Joint backing material: Preformed, compressible, resilient, non-staining foam compatible with primers, sealants, outsize 30 percent (%), polyethylene, extruded closed cell foam, Shore "A" hardness 20, tensile strength 20-30 psi, such as PRC Backer Rod or equal. Outsize 50%, polyethylene, extruded open cell foam, Shore "A" hardness 10, tensile strength 140-150 psi, such as PRC open cell.

2.2.7 Bond breaker: Where joint configuration does not allow for proper depth/width ratio with the use of backer rod (see Section 3.2.5 in Execution.) - a pressure sensitive plastic tape such as 3M #226 or #481 which will not bond to the sealant shall be placed at the back of the joint.

2.2.8 Sealant colours shall be selected by the Consultant from manufacturer's standard selection.

3 EXECUTION

3.1 Examination and Protection

3.1.1 Verify at the site that joints and surfaces have been provided as specified under the Work of other sections; and that joint conditions will not adversely affect execution, performance or quality of completed work; and that they can put into acceptable condition by

means of preparation specified in this section.

3.1.1 Ascertain that sealers and coatings applied to sealant substrates are compatible with sealant used and that full bond between the sealant and substrate is attained.

3.1.2 Request samples of the sealed or coated substrate from their fabricators for testing of compatibility and bond if necessary.

3.1.3 Verify that specified environmental conditions are ensured before commencing Work.

3.1.4 Ensure that releasing agents, coating or other treatments have either not been applied to joint surfaces or that they are entirely removed.

3.1.5 Defective work resulting from application to unsatisfactory joint conditions will be considered the responsibility of those performing the Work of this section.

3.1.6 Protect the Work of other trades from damage resulting from Work of this trade; make good any resulting damage, to the satisfaction of the Consultant, at no additional cost.

3.2 Preparation

3.2.1 Remove dust, paint, loose mortar and other foreign matter and dry joint surfaces.

3.2.2 Remove dust, silt, scale and coating from ferrous metals by wire brush, grinding or sandblasting.

3.2.3 Remove oil, grease and other coating from non-ferrous metals.

3.2.4 Prepare concrete, masonry, glazed and vitreous surfaces as recommended by sealant manufacturer.

3.2.5 Examine joint sizes and correct to achieve proper width/depth ratio.

3.2.6 For joints wider than 50.8mm (2"), the sealant manufacturer's representative shall be contacted.

3.2.7 Install backer rod or apply bond breaker tape to achieve correct joint configuration.

3.2.8 Where necessary to prevent staining, mask adjacent surfaces with tape prior to priming and/or caulking.

3.2.9 Prime sides of joint in accordance with manufacturer's directions, immediately prior to sealing.

3.2.10 Before any caulking or sealing is commenced, a test of the material shall be made for indications of staining or poor adhesion.

3.2.11 At locations where another surface will cover the sealed joint (e.g. cove base) ensure the sealant is finished flush with adjacent surfaces.

3.3 Quality of Work

3.3.1 Quality of work shall be in accordance with good practice and in strict compliance with the recommendations of the manufacturer of materials being used.

3.3.2 Check work area for adequate light and heat.

3.3.3 Carefully mask adjacent surfaces, materials and items not

scheduled to receive sealant, taking care to see that masking remains intact until application is complete. Remove masking immediately upon completion of caulking.

3.3.4 Do not apply sealant to substrate until thoroughly cured and dried.

3.4 Application

3.4.1 Prime sides of joints before placing joint backing. Use bond breaker where joint backing not required.

3.4.2 Sealant Application: Refer to Suggested Sealant Selection chart at end of Section.

3.4.3 Mix and apply sealant in strict accordance with manufacturer's directions and under supervision of manufacturer's field representative.

3.4.4 Sealants shall be of gun grade or knife grade consistency to suit joint condition.

3.4.5 Apply sealants in accordance with manufacturer's directions, using a gun with proper size nozzle. Use sufficient pressure to fill voids and joints solid.

3.4.6 Form surface of the sealant with full bead, smooth, free from ridges, wrinkles, sags, and embedded impurities. Neatly tool surface to a slight concave joint.

3.4.7 Clean adjacent surfaces immediately and leave work neat and clean. Remove excess and droppings using recommended cleaners as Work progresses. Remove masking tape immediately after tooling of joints.

3.4.8 In masonry cavity construction with an air seal, vent sealed joints from cavity to beyond external face of wall.

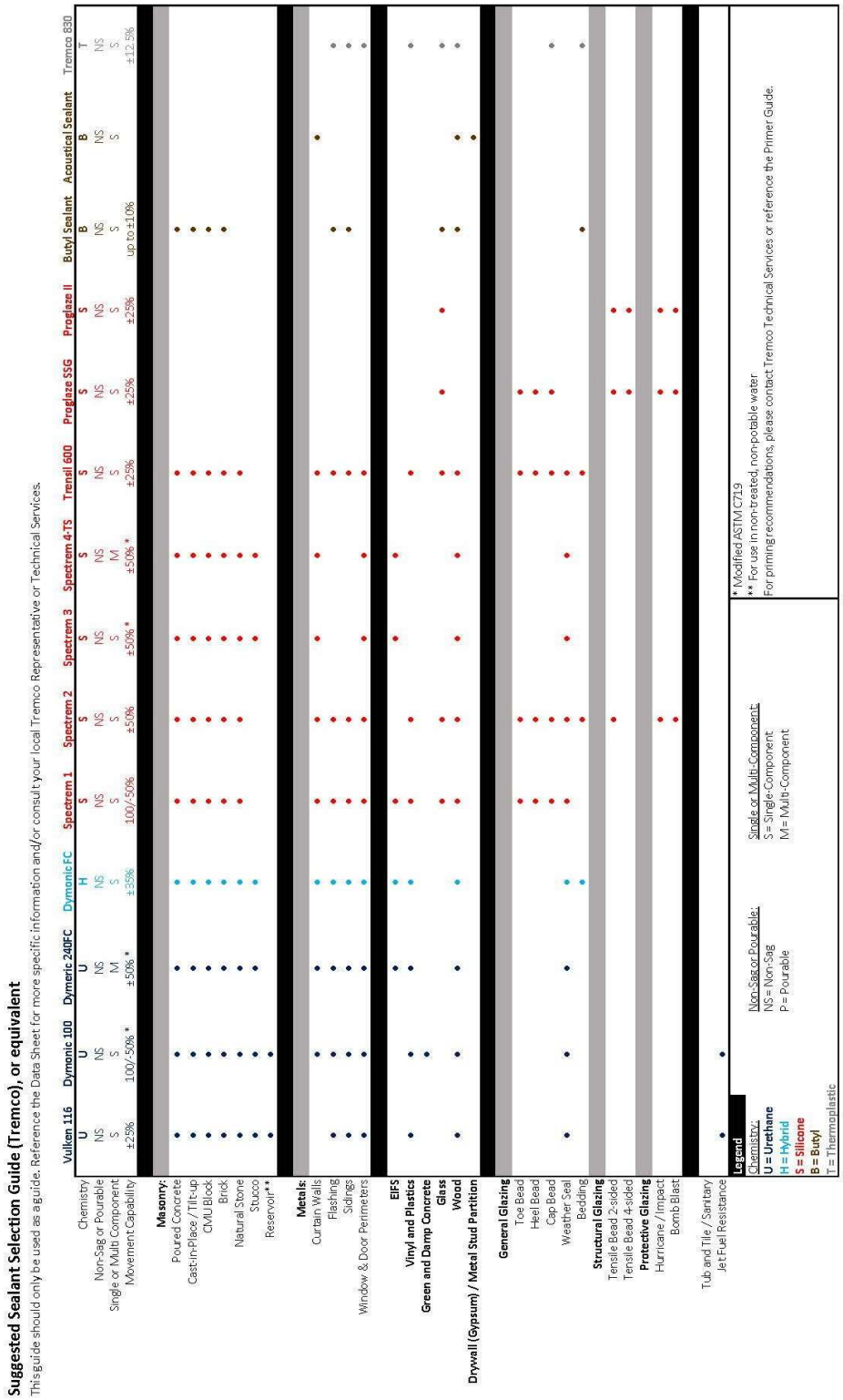
3.4.9 Superficial pointing with the skin bead is not acceptable.

3.4.10 Provide test results of pull test performed by the manufacturer representative before completion of sealant work.

3.4.11 Promptly, as the Work proceeds and upon completion, clean-up and remove from the site all masking tapes, rubbish and surplus material resulting from Work of this trade to the satisfaction of the Consultant.

3.4.12 Apply when in conformance with manufacturer’s recommended temperature and humidity.

3.4.13 Ensure adequate ventilation during installation.



Suggested Sealant Selection Guide (Tremco), or equivalent

This guide should only be used as a guide. Reference the Data Sheet for more specific information and/or consult your local Tremco Representative or Technical Services.

	Vulken 116	Dymonic 100	Dymeric 240FC	Dymonic FC	Spectrem 1	Spectrem 2	Spectrem 3	Spectrem 4-TS	Trensil 600	Proglaze SSG	Proglaze II	Butyl Sealant	Acoustical Sealant	Tremco 830
Chemistry	U	U	U	H	S	S	S	S	S	S	S	B	B	T
Non-Sag or Pourable	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Single or Multi Component	S	S	M	S	S	S	S	M	S	S	S	S	S	S
Movement Capability	±25%	100/-50% *	±50% *	±35%	100/-50%	±50%	±50% *	±50% *	±25%	±25%	±25%	up to ±10%		±12.5%
Masonry:														
Poured Concrete	•	•	•	•	•	•	•	•	•	•	•	•		
Cast-in-Place / Tilt-up	•	•	•	•	•	•	•	•	•	•	•	•		
CMU Block	•	•	•	•	•	•	•	•	•	•	•	•		
Brick	•	•	•	•	•	•	•	•	•	•	•	•		
Natural Stone	•	•	•	•	•	•	•	•	•	•	•	•		
Stucco	•	•	•	•	•	•	•	•	•	•	•	•		
Reservoir**	•	•	•	•	•	•	•	•	•	•	•	•		
Metals:														
Curtain Walls		•	•	•	•	•	•	•	•	•	•		•	
Flashing	•	•	•	•	•	•	•	•	•	•	•	•		•
Sidings	•	•	•	•	•	•	•	•	•	•	•	•		•
Window & Door Perimeters	•	•	•	•	•	•	•	•	•	•	•	•		•
EIFS														
Vinyl and Plastics	•	•	•	•	•		•	•	•					
Green and Damp Concrete		•	•	•	•	•	•		•	•	•	•		•
Glass					•	•	•	•	•	•	•	•		•
Wood	•	•	•	•	•	•	•	•	•				•	
Drywall (Gypsum) / Metal Stud Partition													•	
General Glazing														
Toe Bead					•	•			•	•	•			
Heel Bead					•	•			•	•	•			
Cap Bead					•	•			•	•	•			•
Weather Seal					•	•			•					
Bedding	•	•	•	•	•	•	•	•	•			•		•
Structural Glazing														
Tensile Bead 2-sided						•				•	•			
Tensile Bead 4-sided										•	•			
Protective Glazing														
Hurricane / Impact						•				•	•			
Bomb Blast						•				•	•			
Tub and Tile / Sanitary														
Jet Fuel Resistance	•	•												

Legend

Chemistry:
U = Urethane
H = Hybrid
S = Silicone
B = Butyl
T = Thermoplastic

Non-Sag or Pourable:
NS = Non-Sag
P = Pourable

Single or Multi-Component:
S = Single-Component
M = Multi-Component

* Modified ASTM C719
** For use in non-treated, non-potable water
For priming recommendations, please contact Tremco Technical Services or reference the Primer Guide.

END OF SECTION

1 GENERAL

1.1 Instructions

1.1.1 Comply with the requirements of all Sections. Work is to be in accordance with Contract Documents and Contract Drawings.

1.1.2 Report in writing to the Vendor any defects of surfaces or Work prepared by other trades which affect the quality or dimensions of this Sub-contractor's Work. Commencement of this Sub-contractor's Work shall imply complete acceptance of all Work by other trades.

1.2 Section Includes

1.2.1 Supply of finishing hardware. The Vendor to include for installation of the list below in the bid price.

1.2.2 Indicate unit prices and separate prices on bid form as described.

1.3 Related Work

1.3.1 Installation of Hardware – Section - 06 10 00 - General Trades.

1.3.2 Door Schedule – see Architectural Drawings.

1.4 Submittals

1.4.1 Hardware Schedule

.1 Requirements for Shop Drawings submission are described in Section 01 30 00 - Instructions to All Trades, specifically provide the following:

Submit three hard copies of the hardware schedule for the Consultant’s review, indicating each door and all items associated therewith.

1.5 Warranty

1.5.1 Materials and quality of Work shall be warranted by Manufacturer in accordance with the Canadian Steel Door and Frame Manufacturers Association (CSDFMA) member’s standard warranty for steel doors and frames.

1.6 Rejections

1.6.1 Defective materials whenever found at any time prior to final acceptance of the Work shall be rejected regardless of previous site review. Site review will not relieve the Vendor from responsibility but is a precaution against oversight and error.

1.6.2 Remove and replace defective materials and Work of other trades affected by this replacement at no additional cost to the Agency.

2 PRODUCTS

2.1 Hardware Group No. 01 – Tub/Shower Room

2.1.1 One per door:

.1 Hardware Group #171

.3 For use on Door #(s): at Rooms 101 and 102 Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	RE-USE EXISTING			UNK
1	EA	STOREROOM LOCK	ND80LD RHO		626	SCH
1	EA	K/L CYLINDER	BY AGENCY		626	UNK
1	EA	ELECTRIC STRIKE	6400 FSE 12/24 VAC/VDC		630	VON
1	EA	SURF. AUTO OPERATOR	4631 WMS 120 VAC		689	LCN
2	EA	ACTUATOR, TOUCHLESS	8310-8310-813WH		WH	LCN
2	EA	RECEIVER	8310-8310-880			LCN
1	EA	RELAY CONTROLLER	CX-33			CAM
1	EA	KICK PLATE	RE-USE EXISTING			UNK
1	EA	WALL STOP	RE-USE EXISTING			UNK
1	EA	SMOKE SEAL	188SBK PSA		BK	ZER
1	EA	CARD READER	BY OTHERS			UNK

2.2 Materials

2.2.1 Provide new materials in perfect condition, free from defects impairing strength, durability or performance.

2.2.2 Refer to the Architectural plans for location and required quantity of items specified.

3 EXECUTION

3.1 Installation

3.1.1 Refer Section - 06 10 00 - General Trades.

END OF SECTION

4

1 GENERAL

1.1 Instructions

1.1.1 Comply with the requirements of all Sections. Work is to be in accordance with Contract Documents and Contract Drawings.

1.1.2 Report in writing to the Vendor any defects of surfaces or Work prepared by other trades which affect the quality or dimensions of this Sub-contractor's Work. Commencement of this Sub-contractor's Work shall imply complete acceptance of all Work by other trades.

1.2 Section Includes

1.2.1 Supply and install automatic swing door operators as detailed on Drawings. Co-ordinate installation and operation of new work with existing doors, frames, and controls such as card access system, to suit Agency's requirements and maintain continued public access to premises during work.

1.3 Related Sections

1.3.1 Section 06 10 00 - Installation of Hardware for Hollow Metal Doors and Frames.

1.3.2 Section 08 70 00 - Supply of Door Hardware.

1.3.3 Electrical connections to automatic swing door (refer to the Contact Drawings).

1.3.4 Operators and low voltage wiring between activation (refer to the Contract Drawings).

1.3.5 Button locations and power door operation (refer to the Contract Drawings).

1.4 Quality Assurance

1.4.1 Door operators shall be installed by manufacturer's authorized and trained personnel. The work shall be done in strict compliance with the manufacturer's recommendations.

1.4.2 Products will comply with UL listed standard 325, CSA standards and all OBC standards.

1.5 Submittals

1.5.1 Submit Shop Drawings in accordance with Section 01 30 00, Instructions to All Trades, showing assembly and installation details, methods and location of fastenings, and co-ordination with electrical connections, and other door finishing hardware.

1.6 Product Handling

1.6.1 Deliver materials undamaged, in original wrappings or containers with manufacturer's labels and seals intact.

1.6.2 Clearly label cartons and packages designating contents and locations for which each item is intended. Indicate on packing memos carton in which each item is packed.

1.7 Rejections

1.7.1 Defective materials or quality of work whenever found at any time prior to final acceptance of the work shall be rejected regardless of previous inspection. Inspection will not relieve responsibility but is a precaution against oversight and error.

1.7.2 Remove and replace defective materials and work of other trades affected by this replacement, at no additional cost to the Agency.

1.8 Performance

1.8.1 Design Products to meet or exceed the performance criteria of the applicable C.G.S.B. 69-GP-IM to 69-GP-14M Specifications.

1.9 Guarantee

1.9.1 Provide a written guarantee of work of this Section against defects in material and quality of work for a period of one (1) year from the date of publication of the Certificate of Substantial Performance.

2 PRODUCTS

2.1 Automatic Swing Door Operators

2.1.1 Automatic swing door operators shall be “SW100”, self-contained, surface mounted system, as manufactured by Besam Inc. and distributed by Enex Door West of Guelph, Ontario, (519) 824-5331.

2.1.2 Operator Housing: The operator shall be completely contained in a 150 mm x 150 mm extruded aluminum housing. The housing shall extend across entire door opening. Where located on a leaf of a double door, it shall extend over both doors. All aluminum sections shall be of 6006-T6 alloy and shall have a minimum wall thickness of 0.156”. All exposed surfaces shall be finished to match existing door frames. The operator housing shall provide a seal against dust, dirt and moisture. Operator housing shall extend the full width of the door frames. Finish: anodized aluminum.

2.1.3 Electrical Motor: Electric motor shall be minimum 1/8 horsepower, 120 V and shall be equipped standard with a built in thermal overload protection and shall not exceed 5 amps.

2.1.4 Operator Assembly: Operator shall be non-handed and the power transmission shall be servo unit type with one moving part. Helical/mesh or chain driven system will not be accepted.

2.1.5 Electric Control: A self-contained, 100% solid-state integrated circuit shall control the operation and switching of the swing door power operator. The electronic control shall provide low voltage power supply for all means of operation. No external or auxiliary low voltage source shall be allowed. The control shall include time delay (adjustable between 1 to 60 seconds) for normal cycle. Plug- in relays, resistors, contracts, etc., will not be accepted.

2.1.6 Push buttons shall be “Ingress’r” with 36 x 6 x 1 ½” activator by Wikk Industries.

2.2 Operation

2.2.1 Power Open: The automatic door operator shall be powered by a force transmitted by the electric motor to the servo unit and shall be connected by way of an adjustable arm linkage to the door. A constant opening pressure shall be maintained at all times. Both opening speed and back-check must be individually adjustable. External/manual stops will not be accepted. The automatic door system shall function as a manual door closer in the event of a power failure, and allow for manual operation at all times, requiring no more than 5 – 7 pounds force on opening manual.

2.2.2 Spring Close: The automatic door operator shall be spring-closed action. The spring shall be non-handed and designed to counter-act wind and stack conditions, and return the door to its fully closed position. Both closing speed and latching shall be individually adjustable, without the need to change resistors or any other components.

2.2.3 The automatic door system shall be self-contained, requiring no remote pumps or compressors. Pneumatic tubing will not be accepted.

2.2.4 Operator must be adjusted with sufficient back-check to prevent wind from damaging the door.

2.2.5 Push and go feature will not be accepted.

2.2.6 Manual reset buttons will not be accepted.

2.2.7 Operator must be electra-hydraulic technology to ensure longer life with lower maintenance.

2.3 Materials

2.3.1 Provide new materials in perfect condition, free from defects impairing durability or appearance. In every case hardware shall be of quality design and finish suitable for the purpose for which it is intended.

2.4 Finishes

2.4.1 Provide hardware of type and finish in accordance with, and equal in all respects to the samples of hardware and finishes approved by the Consultant.

2.4.2 Metal finishes shall be free from defects, clean and unstained, and of a uniform colour and finish for each type of finish required.

2.5 Fastenings

2.5.1 Provide hardware complete with screws, bolts, expansion shields and other fastening devices as required for the satisfactory installation and operating of the hardware

2.5.2 Provide fastening devices of the same finish as the hardware, which is to be fastened.

3 EXECUTION

3.1 Examination

3.1.1 Verify that the openings are plumb and are dimensioned properly.

Insure adequate support has been provided for the operator header. Proceed with the installation only after conditions have been deemed satisfactory.

3.2 Installation and Adjustment

3.2.1 Install equipment in accordance with Besam instructions. Adjust equipment per instructions and ANSI 156.10-1991.

3.3 Electrical Connection

3.3.1 Wiring and connections as per manufacturer's specification by Division 16. Refer to Division 16 (Drawings) for installation standards. Provide wiring diagrams and schematics.

3.4 Final Adjustment

3.4.1 The services of a competent mechanic shall be provided without additional cost to the Agency, and this Mechanic shall inspect the installation of all hardware furnished under this Section and shall supervise all adjustments (by the trades responsible for fixing) which are necessary to leave hardware in perfect working order.

3.5 Maintenance

3.5.1 At the completion of the work, provide the building maintenance staff with the following:
.1 Two (2) sets of wrenches.
.2 Two (2) sets of manufacturer's instructions.

3.5.2 Brief the maintenance staff regarding the proper care of all hardware such as lubrication, adjustments, cleaning and general maintenance.

END OF SECTION

1 GENERAL

1.1 Instructions

1.1.1 Comply with the requirements of all Sections. Work is to be in accordance with Contract Documents and Contract Drawings.

1.1.2 Report in writing to the Vendor any defects of surfaces or Work prepared by other trades which affect the quality or dimensions of this Sub-contractor's Work. Commencement of this Sub-contractor's Work shall imply complete acceptance of all Work by other trades.

1.2 Section Includes

1.2.1 Metal stud wall framing and channel ceiling framing, and wall furring.

1.2.2 Gypsum board, including moisture-resistant, fire-rated and non-rated types.

1.2.3 Resilient channel.

1.3 Related Sections

1.3.1 Section 06 10 00, General Trades: wood blocking.

1.3.2 Section 09 90 00, Painting & Finishing: site finishing.

1.4 References

1.4.1 ASTM C36/C36M-01: Standard Specification for Gypsum Wallboard.

1.4.2 ASTM C442/C442M-01: Standard Specification for Gypsum Backing Board, Gypsum Coreboard, and gypsum Shaftliner Board.

1.4.3 ASTM C475-01: Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

1.4.4 ASTM C514-01: Standard Specification for Nails for the Application of Gypsum Board.

1.4.5 ASTM C630/C630M-01: Standard Specification for Water-Resistant Gypsum Backing Board.

1.4.6 ASTM C645-00: Standard specification for Nonstructural Steel Framing Members.

1.4.7 ASTM C840-01: Standard Specification for Application and Finishing of Gypsum Board.

1.4.8 ASTM C954-00: Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in thickness.

1.4.9 ASTM C1047-99: Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

1.4.10 ASTM C1178/C1178M-01: Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel.

1.4.11 ASTM C1278/C1278M-01: Standard Specification for Fiber-Reinforced Gypsum Panel.

1.4.12 ASTM C1280-99: Standard Specification for Application of Gypsum Sheathing.

1.4.13 Canadian Gypsum Company: Handbook of Drywall Construction.
1.4.14 CAN/CGSB-71.25-M88: Adhesive, for bonding Drywall to Wood Framing and Metal Studs.
1.4.15 Underwriters Laboratories of Canada: List of Equipment and Materials.

1.5 Quality Assurance

1.5.1 Applicators: company specializing in applying the Work of this Section with a minimum of five years documented experience.

2 PRODUCTS

2.1 Manufacturers

2.1.1 Manufacturers of gypsum board having Product considered acceptable for use:
.1 BPB.
.2 Canada Gypsum Company.
.3 G-P Gypsum Corporation.
.4 Agency Approved Equivalent

2.2 Framing Materials

2.2.1 Studs and Tracks: to ASTM C645, 0.55 mm thick galvanized sheet steel, 'C' shape, with serrated faces. Provide knock-outs for electrical trades.
2.2.2 Furring, Framing and Accessories: to ASTM C645, galvanized steel channel sections designed to perform their intended function.

2.3 Gypsum Board Materials

2.3.1 Gypsum Board: to ASTM C36; tapered edges, ivory faced.
2.3.2 Fire Rated Gypsum Board: to ASTM C36, Type X; tapered edges, ivory faced, ULC labeled.

2.4 Accessories

2.4.1 Nail Fasteners: galvanized steel; to ASTM C514.
2.4.2 Steel Drill Screws: galvanized steel: to ASTM C954.
2.4.3 Adhesive: to CAN/CGSB-71.25-M.
2.4.4 Joint Materials: to ASTM C475; reinforcing tape, joint compound, adhesive, water, fasteners.
2.4.5 Corner Beads, Casing Beads and Edge Trim: to ASTM C1047; PVC type.

2.5 Access Panel

2.5.1 Install 300mm x 300mm 16-gauge access panel where required for plumbing shut-offs and electrical junction boxes.

3 EXECUTION

3.1 Examination

3.1.1 Verify that site conditions are ready to receive Work.
3.1.2 Commencement of installation implies acceptance of site

conditions.

3.2 Metal Stud and Furring Installation

3.2.1 Install studding to requirements of ASTM C840, and manufacturer's instructions.
3.2.2 Metal Stud Spacing: 400mm on centre (OC).
3.2.3 Partition Heights: Full height to floor or roof construction above.
3.2.4 Erect furring for direct attachment to concrete block walls and concrete walls, ceilings and soffits.

3.3. Ceiling Framing Installation

3.3.1 Install to ASTM C840, and manufacturer's instructions.
3.3.2 Install ceiling framing independent of walls, columns, and above ceiling work.
3.3.3 Laterally brace entire suspension system.

3.4 Board Installation

3.4.1 Coordinate board installation with hollow metal frame installation. Grinding welded steel frames is not permitted.
3.4.2 Install gypsum board sheathing to ASTM C1280.
3.4.3 Install gypsum board to ASTM C840.
3.4.4 Screw fasten boards to furring or framing.
3.4.5 Double Layer Applications: Use gypsum backing board for first layer, place perpendicular to framing or furring members. Place second layer perpendicular to first layer.
3.4.6 Place corner beads at external corners. Place edge trim where gypsum board abuts dissimilar materials. Fasten with nail attachment, unless specified otherwise.
3.4.7 Finished Work shall be plane and free from all depressions, ready to receive paint finish by others.

3.4.8 Provide bulkheads where changes of ceiling or height occur. Include all necessary channel framing, etc.
3.4.9 Provide all furring required by the Drawings or any furring necessary to conceal exposed pipes or ducts. Refer to mechanical and electrical Drawings to determine extent of Work necessary.

3.5 Joint Treatment

3.5.1 Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
3.5.2 Provide skim coat over entire wall surface and sand lightly ready for paint.

3.6 Control Joints

3.6.1 Provide control joints where indicated on the Contract Drawings and where gypsum board assemblies abut dissimilar construction.
3.6.2 Break continuity of gypsum board and framing system at control joints. Provide continuous metal control joint profile.

3.7 Relief Joints

3.7.1 Provide relief joints where indicated on the Drawings and where gypsum board assemblies abut dissimilar construction.

3.7.2 Stop gypsum board six (6) millimetres from abutting construction at dissimilar building elements, unless indicated otherwise. Fill 6mm joint with non-hardening sealant.

3.7.3 Provide a thermal break where gypsum board comes into contact with window frames. Adhere self-adhering tape to casing bead and compress during installation of gypsum board.

END OF SECTION

1 GENERAL

1.1 Instructions

1.1.1 Comply with the requirements of all Sections. Work is to be in accordance with Contract Documents and Contract Drawings.

1.1.2 Report in writing to the Vendor any defects of surfaces or Work prepared by other trades which affect the quality or dimensions of this Sub-contractor's Work. Commencement of this Sub-contractor's Work shall imply complete acceptance of all Work by other trades.

1.2 Intent

1.2.1 Provide all articles, labour, materials, equipment, transportation, hoisting and incidentals noted, specified or required, to complete the Work of this Section.

1.3 Related Sections

1.3.1 Section 09 29 00, Gypsum Board

1.3.2 Divisions 22, 23 Mechanical – Refer to Mechanical Drawings.

1.4 Section Includes

1.4.1 Provide all Ceramic Tile and required accessories as indicated on the Drawings, room finish schedule, and colour schedule.

1.4.2 Provide floor leveler as necessary to achieve smooth transitions in areas where new slab meets existing.

1.4.3 Provide mortar bed as necessary to achieve slopes to floor drains in all locations where tile is to be installed; regardless of existing or new substrate.

1.5 Samples

1.5.1 Submit samples of all tiles in colours and/or types specified for review by the Consultant.

1.6 Rejections

1.6.1 Defective materials or quality of Work whenever found at any time prior to acceptance of the Work shall be rejected regardless of previous inspection. Inspection will not relieve responsibility, but is a precaution against oversight and error.

1.6.2 Remove and replace defective materials and Work of other trades affected by this replacement, at no additional cost to the Agency.

1.7 Performance

1.7.1 Install tiles to comply with ANSI A 108.5 (80 percent (%) uniform bonding mortar contact between the tile and the substrate. 95 percent (%) uniform bonding mortar contact for exterior application).

1.7.2 Provide only those products that meet or exceed the performance standard of CAN/C.G.S.B 75.1 – M88, as follows:

.1 Factor of sliding friction on a dry surface using a leather test surface to be 0.50.

.2 Factor of sliding friction on a wet surface using a leather test surface to be 0.60.
.3 Factor of sliding friction on a dry surface using a rubber test surface to be 0.70.
.4 Factor of sliding friction on a wet surface using a rubber test surface to be 0.65.

1.7.3 Provide only those products that meet or exceed the performance standards of the following ASTM designations:
.1 C370-56 (1981): Standard Test Method for Moisture Expansion of Fired Whiteware Products.
.2 C372-61: Standard Test Method for Linear Thermal Expansion of Porcelain Enamel And Glaze Frits and Fired Ceramic Whiteware Products by the Dilatometer Method.
.3 C373-72 (1982): Standard Test Method for Water Absorption, Bulk Density, Apparent Forosity, And Apparent Specific Gravity of Fired Porous Whiteware Products.
.4 C424-80 (1985): Standard Test Method for Crazing Resistance of Fired Glazed Whitewares By Autoclave Treatment.
.5 C483-66 (1981): Standard Test Method for Electrical Resistance of Conductive Ceramic Tile.
.6 C484-68 (1981): Standard Test Method for Thermal Shock Resistance of Glazed Ceramic Tile.
.7 C485-83: Standard Test Method for Measuring Warpage of Ceramic Tile.
.8 C499-78 (1984): Standard Test Method for Determining Facial Dimensions and Thickness of Flat, Rectangular Wall and Floor Tile.
.9 C501-84: Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser.
.10 C502-78 (1983): Standard Test Method for Wedging of Flat, Rectangular Ceramic Wall And Floor Tile.
.11 C609-81: Standard Test Method for Measurement of Small Colour Differences Between Ceramic Wall or Floor Tile.
.12 C648-84: Standard Test Method for Breaking Strength of Ceramic Tile.
.13 C1026-84: Standard Test Method for Measuring Frost Resistance of Ceramic Tile To Freeze Thaw Cycling.
.14 C1027-84: Standard Test Method for Determining Visible Abrasion Resistance of Glazed Ceramic Tile.
.15 C1028-84: Standard Test Method for Evaluating the Static Coefficient of Friction of Ceramic Tile, and Other Like Surfaces by the Horizontal Dynamometer Pull Meter Method.

1.8 Material, Storage and Handling

1.8.1 Deliver and store all tile and required installation materials in original cartons, clearly marked as to type, colour and manufacturer.
1.8.2 Store materials in a warm, dry area.

1.8.3 The Vendor will be responsible to ensure the timely arrival of installation materials on site and he will order the appropriate approved materials with sufficient lead time to ensure that no delays are incurred due to later material procurement.

1.9 Guarantee

1.9.1 The installer will guarantee installation of all ceramic tiles and floor assembly against defective material, discolouration, cracking, spalling and quality of work detrimental to the physical and aesthetic performance of this installation. Guarantee shall be for a period of one (1) year from the date of publication of the Certificate of Substantial Performance.

1.9.2 The manufacturer of the materials chosen for each “assembly” will provide a written guarantee that the products used on each assembly will be free from manufacturing defects so that these products will not breakdown or deteriorate for a period of five years from the date of the installation when installed in accordance with the manufacturers written specifications and guide lines.

1.10 Cleaning and Protection

1.10.1 Protect the ceramic tile work during the period of construction.

1.10.2 Remove all excess material and debris from the site and thoroughly wash and clean the tile work upon completion of the ceramic tile installation.

1.10.3 Protect the finish floor installation with a suitable and durable material or by keeping traffic off the floor until the area is ready for occupancy.

1.11 Maintenance

1.11.1 Submit three (3) copies of the manufacturer’s maintenance instructions, for ceramic floor and wall tile, to the Consultant upon completion of the ceramic installation.

1.11.2 Do not use muriatic acid for cleanup.

1.12 Submittals

1.12.1 Submit copies of manufacturer test and performance data for all tiles specified for the Consultant’s review. Do not commence Work until data sheets are reviewed.

1.13 Schedule

1.13.1 Ceramic tile as indicated on Drawings.

2 PRODUCTS

2.1 Materials

2.1.1 Provide new materials in perfect condition free from defects impairing performance and appearance.

2.1.2 Ceramic Wall Tile:
Size: 400mm x 800mm (16” x 32”)

Type: Ceragres Bold, Mat-rect line
Colour: CT-1: White, CT-2: Mustard (yellow), CT-3 Sage (green)
As manufactured by Ceragres or Agency approved equivalent.
Samples to be provided to the Agency for review and approval.

2.1.3 Wall Grout: Latex Grout ANSI 118.6 for Latex Portland Cement Grout. Colours to be selected by the Consultant at later time.

2.1.4 Adhesives: Wall, Blockwall, Cement Backer Board, Drywall Laticrete 4237 Latex thin-set. Mortar additive mixed with Laticrete 211 Crete Filler power. (ANSI A118.4 for Latex Thinset Mortars).

2.1.5 Mortar bed: Use cementituous mortar bed laticrete 3701 wherever required to achieve slopes to floor drains.

3 EXECUTION

3.1 Examinations

3.1.1 Before starting the Work, examine existing surfaces to be covered and report to the Consultant, in writing, all defects of Work prepared by other trades and unsatisfactory existing conditions.

3.1.2 Do not commence until surfaces specified to receive tile are dry, clean, level: free from cracks, ridges, dusting, scaling, carbonation, mortar droppings, parging, curing compounds, grease, oil, or other foreign material liable to impair adhesion, performance or appearance.

3.1.3 Commencement of Work implies total acceptance of all surface conditions by the Vendor.

3.1.4 Dry or dusty concrete or masonry surfaces shall be wet down or washed and excess water removed just prior to the application of finish.

3.1.5 Waive the right to any after claims by failure to comply with the above procedure of examination.

3.2 Breakage

3.2.1 Make good any and all breakage resulting from faulty materials or installation.

3.3 Quality of Work

3.3.1 Ceramic tile application shall comply with Manual No. 200-1979 prepared by the Terrazzo, Tile and Marble Association of Canada, the Tile Council of America Handbook for Ceramic Tile Installation and ANSI Standards.

3.3.2 Provide 80 percent (%) uniform bonding mortar contact between the tile and the substrate for interior applications and 95% uniform bonding mortar for exterior application.

3.3.3 Install ceramic tiles over a “crack-free” substrate. All concrete joints or cracks should be in direct alignment with the tile expansion joints (“direct” being off 6.35mm (¼”) is not direct) ANSI Standards.

3.3.4 Control Joints:

.1 For interior ceramic tile the control joint should be placed every 4.8768 metres (16’) – 6.096 metres (20’) apart.

.2 All control joints should also be placed around perimeter, around columns and where tile abuts other hard materials. Control joints must always be placed directly over all slabe control and expansion joints.

3.3.5 Slopes:

.1 Create slopes to drain in all areas to receive tile; remove existing mortar bed as necessary and reinstall to new drain locations.

3.3.6 The ambient air temperature and structural base temperature should be no less than 13.33 degrees Celsius (56 Deg. F) during application of ceramic tile and during curing period. Epoxy mortars and grouts require temperature between 10 degrees Celsius (50 °F) and 32.2 degrees Celsius (90 8F).

3.3.7 Neatly cut tile around fitments, fixtures and drains. Form intersections, corners and returns accurately.

3.3.8 Make joints in tile uniform in width, subject to normal variance in tolerance allowed in tile size. Joints shall be watertight without voids, cracks, excess mortar, or grout. Joints between sheets to be of same width as joints between individual tiles.

3.3.9 All internal angles of base to be square. External angles to be bullnose. Bullnose to be from full size tile.

3.3.10 Where floor tile is required to be laid so floor slopes to drains it will be this Sub-Contractor's responsibility to ensure that the slopes are achieved and that no water ponds or lodges behind ridges. Use Laticrete 3701 Latex (or equal by Mapie) with 226 thick bed mortar mix for a five year warranty mortar bed. A site mix must be fortified with a latex admix.

3.3.11 Sound tile after setting; remove and replace hollow backed tile.

3.3.12 Allow minimum 24 hours after setting prior to grouting. Do not permit foot traffic for a minimum of 48 hours.

3.3.13 Completed Work shall be free of broken, damaged or faulty tile.

3.3.14 Carry out layout of tile in accordance with the Consultant's approved tile colour percentages and patterns.

3.3.15 Pattern to be uninterrupted through doorways.

3.3.16 All tiles should be fully embedded with at least 95% coverage of mortar on the back of tiles. 203.2mm x 203.2mm (8" x 8") tiles or larger will be installed with "back buttering to provide good adhesion".

3.4 Specific Installations

3.4.1 Refer to Drawings.

END OF SECTION

1. GENERAL

1.1 **Section Includes**

1.1.1 Design, labour, Products, equipment, and services required for acoustical ceilings Work in accordance with Contract Documents.

1.2 **References**

1.2.1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.2.2 ASTM C423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

1.2.3 ASTM C635/C635M, Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

1.2.4 ASTM C636/C636M, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

1.2.5 ASTM C645, Standard Specification for Nonstructural Steel Framing Members.

1.2.6 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.

1.2.7 ASTM E1264, Standard Classification for Acoustical Ceiling Products.

1.2.8 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.2.9 ULC, Underwriters Laboratories of Canada.

1.3 **Design Requirements**

1.3.1 Acoustical ceiling suspension system in accordance with ASTM C636/C636M and manufacturer's printed instructions.

1.3.2 Hanger anchor and entire acoustical ceiling suspension system static loading not to exceed 25% of their ultimate capacity, including lighting fixture dead loads.

1.3.3 Acoustical ceiling 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 or relocation of light fixtures.

1.3.4 Subframing as required to avoid conflicts and interferences where ducts or other equipment may prevent regular spacing of hangers.

1.4 **Submittals**

1.4.1 Submit in accordance with Section 01 30 00 – Instruction to All Trades.

1.5 **Shop Drawing(s):**

1.5.1 Submit in accordance with Section 01 30 00 indicating:

.1 Suspension system layout, including hangers and acoustical panels.

.2 Conditions at abutting, intersecting, and penetrating construction.
.3 Dimensioned locations of lighting fixtures, diffusers, sprinkler heads, and other items piercing the acoustical ceiling.

1.6 **Sample(s):**
1.6.1 Submit duplicate 300 mm x 300 mm (12" x 12") samples of each type of specified acoustical units including suspension systems.

1.7 **Quality Assurance Submittal(s):**
1.7.1 Submit test results for suspension anchor inserts. Include data on design loading per anchor and tensile strength of hangers.

1.8 **Site Conditions**
1.8.1 Do not install Work of this Section until:
.1 Wet Work including concrete, masonry, plaster finishes are complete.
.2 Mechanical, electrical, telephone, and other Work above acoustical ceiling are complete.
.3 Relative humidity is below 80%.
.4 Ventilation is adequate to remove excess moisture.
.5 Install temporary protection and facilities to maintain Product manufacturer's and environmental requirements noted above, 24 hours before, during, and after installation.

1.9 **Quality Assurance**
1.9.1 Retain an independent testing company to perform the following services:
.1 Ten random Site load tests on anchor inserts at locations selected by the Agency at commencement of Work.
.2 Additional required tests if pull-out strength is not acceptable to the Agency at no extra cost.

1.10 **Extra Stock Materials**
1.10.1 Supply extra stock materials in accordance with Section 01 78 32 – Warranty Work.

2. PRODUCTS

2.1 **Materials**
2.1.1 Suspension system Type 1: In accordance with ASTM C635/C635M, intermediate duty, non-fire-rated, two-directional exposed tee bar grid.
.1 Product(s) and Manufacturer(s): Prelude ML 15/16" Exposed Tee by Armstrong or Agency approved equivalent.
.2 Acoustical panel ACT-1: In accordance with ASTM E1264.

.3 Product(s) and Manufacturer(s): Calla Health Zone Airassure 2' x 4' Lay-in 15/16" by Armstrong or Agency approved equivalent.

2.2 **Suspension System**

2.2.1 Install ceiling suspension system in accordance with manufacturer's printed installation instructions and ASTM C636/C636M.

2.2.2 If cast-in hangers and inserts are used to support the acoustical ceiling grid, supply them in time to be installed in cast-in-place concrete. Assist in locating hangers and inserts in the field.

2.2.3 Coordinate the following for the services running above acoustical ceilings:

.1 Locations, openings, supports, and penetrations through acoustical ceilings.

.2 Field conditions, clearances, and measurements.

.3 Testing and commissioning.

2.2.4 Install hanger wires plumb and anchor it secured to building structure. Support suspension system independently of walls, columns, metal decks, ducts, pipes, and conduits. Where required, provide additional framing and hangers to bridge interference items. Crimping of hangers is not permitted.

2.2.5 Where required, provide new steel supports perpendicular to existing structural steel and joist framing.

2.2.6 Install acoustical ceiling suspension system in accordance with manufacturer's written instructions, reviewed Shop Drawings, and ASTM C636/C636M.

2.2.7 Install hanger wires at maximum 1200 mm centres along carrying channels not less than 25 mm and not more than 150 mm from channel ends.

2.2.8 Provide additional hangers at lighting fixture and air distribution ductwork locations. Do not attach hanger wires to mechanical or electrical equipment. Do not support mechanical and electrical fixtures and fittings on acoustical ceiling without ceiling manufacturer's written acceptance.

2.2.9 Install acoustical ceiling suspension system to tolerance of 1:1200 of span and maximum 0.4 mm between adjacent metal members. Tolerances to be non-cumulative. Refer to mechanical and electrical Contract Drawings for fixture layout.

2.2.10 Do not bend or twist hangers as means of levelling. Form double loops tightly and lock to prevent vertical movement or rotation within loop.

2.2.11 Install perimeter moulding at intersection of acoustical ceiling and vertical surfaces. Butt joints neatly, square, and true in alignment.

2.2.12 Centre acoustical ceiling suspension system on room axis. Install equal border pieces. Install hangers onto ends of main tee runners at no more than 150 mm from ends of runners, adjacent, and perpendicular to walls.

2.2.13 Install main runners in maximum available lengths. Lay out joints in suspension members to avoid perimeters of recessed fixtures. Lock grid members to form rigid assembly. Install additional tee suspension system framing around recessed fixtures, diffusers, grilles, and other items as required for a complete assembly.

2.2.14 Ensure that lighting fixtures within each suspension system module is capable of being reinstalled at a future date at right angles to the installed direction without the use of additional hangers.

2.3 **Acoustical Panels**

2.3.1 Carefully cut and trim acoustical panels to accommodate Work of Divisions 22, 23, and 26.

2.3.2 Fit acoustical panels carefully into place. Remove and replace acoustical panels which have broken edges, or are damaged, marked, discoloured, soiled, or stained.

2.3.3 Accurately scribe and cut acoustical panels to fit irregular spaces, recessed items, and adjacent Work. Butt joints tight and terminate edges with moulding.

2.3.4 Secure lay-in panels with hold-down clips at locations within 6 m of an exterior door or an operable window.

2.3.5 Install acoustical panels directly below valves and controls to be easily removable. Mark such units inconspicuously.

2.4 **Field Quality Control**

2.4.1 Arrange and execute Site load tests in accordance with Article 1.9. Conduct additional tests as required at no additional cost to the Agency.

END OF SECTION

1 GENERAL

1.1 Instructions

1.1.1 Comply with the requirements of all Sections. Work is to be in accordance with Contract Documents and Contract Drawings.

1.1.2 Report in writing to the Vendor any defects of surfaces or Work prepared by other trades which affect the quality or dimensions of this Sub-contractor's Work. Commencement of this Sub-contractor's Work shall imply complete acceptance of all Work by other trades.

1.2 Section Includes

1.2.1 Epoxy Floor Coating – troweled base.

1.3 Related Sections

1.3.1 Section 07 90 00, Joint Sealers.

1.4 Quality Assurance

1.4.1 The application of fluid applied flooring shall be carried out by approved applicators of Niagara Protective Coatings in accordance with manufacturer's current printed instructions.

1.4.2 Employ fully trained workers who are regularly employed in this field.

1.4.3 Arrange for testing of paint/coatings by product manufacturer. Obtain in writing from manufacturer representative, approval of surface preparation methods, and obtain reports that materials and application methods conform to specification.

1.5 Samples

1.5.1 Samples of standard colours and grit will be required, as directed by the Consultant.

1.5.2 Do not proceed with general application until approval is given.

1.5.3 Mock-Up:

.1 At site, Consultant will locate testing area to establish standard of workmanship, texture, gloss and coverage. Apply 300mm x 300mm (12" x 12") samples of each finish on each type of surface to be coated with correct material, number of coats, colour, texture and degree of gloss required or apply full size test samples in areas designated by the Consultant of each finish on each type of surface to be coated with correct material, number of coats, colour, texture and degree of gloss required. Provide additional samples, if required, to obtain approval. Do not continue painting until samples have been approved. Approved panels shall become standard of comparison for painting work on site.

1.6 Rejections

1.6.1 Defective materials or quality of work, whenever found, at any time prior to acceptance of the Work, shall be rejected regardless of previous inspection. Inspection will not relieve responsibility, but is a precaution against oversight or errors.

1.6.2 Remove and replace defective materials and work of other trades affected by this replacement, at no additional cost to the Agency.

1.7 Examination

1.7.1 Report to the Consultant, in writing, all defects of surfaces or work prepared by other trades and on unsatisfactory site conditions.

1.7.2 Thoroughly examine all surfaces scheduled to receive paint to see that they are dry, clean, free from cracks, scaling, grease, oil, or other foreign materials liable to impair adhesion, performance or appearance. Take moisture readings.

1.7.3 Commencement of Work implies total acceptance of all surface conditions.

1.8 Product Delivery, Storage, and Handling

1.8.1 Deliver and store materials undamaged, in original containers, with Niagara Protective Coatings labels and seals intact.

1.8.2 Store materials in a single designated area having ambient temperature of a minimum of 15 degrees Celsius (59˚F).

1.9 Job Conditions

1.9.1 Maintain minimum interior temperature of 18˚C during application and drying of paint and maintain until handover to Agency.

1.9.2 Do not paint when ambient air and surface temperatures are less than 15 degrees Celsius for 24 hours before or during painting application.

1.9.3 Adequately ventilate areas where coating is being applied. Maintain a reasonable dust-free atmosphere for duration of work.

1.9.4 Protect adjacent surfaces not scheduled to receive coating from damage.

1.9.5 Post “Wet Coating” signs and “No Smoking” signs while work is in progress and while coating is curing.

1.9.6 Erect suitable barriers to prevent traffic and other trades from working in areas during installation of coating.

1.9.7 Concrete must be cured for a minimum of 30 days prior to coating application.

1.9.8 Protect floor drains and block prior to application.

1.10 Clean-Up

1.10.1 Upon completion of the Work of this Section, remove from the site all surplus material and debris caused by the Work of this trade to the satisfaction of the Consultant.

1.11 Guarantee

1.11.1 Provide a written guarantee of Work of this Section against defects in material and quality of Work for a period of one (1) year from the date of publication of the Certificate of Substantial Performance.

2 PRODUCTS

2.1 General

2.1.1 Provide new materials in perfect condition, free from defects impairing physical performance and appearance.

2.1.2 No claim as to unsuitability or unavailability of any material specified, or unwillingness to use same, or inability to produce first class work with same will be entertained unless such claims are made in writing and submitted with proposal.

2.2 Materials

2.2.1 Epoxy Flooring (Refer to Drawings for locations):

.1 KROMOQUARTZ BROADCAST by Niagara Protective Coatings, consisting of a 100% solids epoxy primer, epoxy base coat, multi-coloured quartz aggregate, clear epoxy grout coat and a clear epoxy topcoat, Kromoquartz cove bases.

.2 All epoxy liquids shall be EPOXAL 100HP, 100% solids two component epoxy as manufactured by Niagara Protective Coatings.

.3 Troweled epoxy coves at all walls and millwork pedestals.

.4 Primers, thinners, fillers, patching kits, cleaning agents and equipment as per Niagara Protective Coatings.

2.2.3 Primers, thinners, fillers, patching kits, cleaning agents and equipment as per respective manufacturer's recommendations.

2.2.4 Colour and texture to be selected by the Consultant.

2.2.5 Provide three colour samples.

3 EXECUTION

3.1 Examination

3.1.1 Surfaces to be coated shall be sound, clean, non-dusting, cured, free from oil and efflorescence or any other contaminants.

3.1.2 Report to the Vendor in writing all defects and unsatisfactory conditions. Commencement of Work shall imply the acceptance of the existing conditions.

3.1.3 Moisture content should not be excess of three percent and the surface temperature shall be a minimum of 15 degrees Celsius (59˚F).

3.1.4 Concrete must be cured for a minimum of 28 days.

3.2 Preparation

3.2.1 Remove all previously applied flooring materials including adhesives.

3.2.2 Grind and scarify top surface of concrete to remove all flaking, and all concrete containing previously applied materials.

3.2.3 Apply self-levelling filler on all prepared substrates.

3.2.4 Mechanical abrasion of the concrete surface is required to remove any loose, poorly bonded finishes and also create surface profile for a mechanical bond. This will require the use of shot-blast machinery, sand blasting, scarifiers or diamond grinders.

3.2.5 Previously coated concrete and other surfaces: consult manufacturer for appropriate surface preparation.

3.3 Application

3.3.1 Cove Base:

.1 Prepare and mix materials and apply each component of coating system in accordance with manufacturer's directions to produce a uniform monolithic surface. Total thickness to be 6mm uninterrupted.

.2 Prime Coat: Apply 100% solids epoxy prime coat over prepared substrate at a spread rate of 8 mils. Allow to cure.

.3 Zinc Cove Strip: Attach at 100mm height to every vertical surface.

.4 Trowel Layer: Apply 100% solids epoxy prime coat over prepared substrate as per manufacturer's directions, to a finished thickness of 6mm. Trowel to form cove base using cove trowel.

.5 Grout Coat: Apply grout coat at thickness of 6 mils as per manufacturer's directions.

.6 Finish with coat clear, with patterns as indicated on Drawings.

3.3.2 Membrane Flooring:

.1 BASF membrane System prior to epoxy application, 4" coves.

3.3.3 Epoxy Flooring:

.1 Prepare and mix materials and apply each component of coating system in accordance with manufacturer's directions to produce a uniform monolithic surface. Total dry film thickness to be 120 mils (3mm).

.2 Prime Coat: Apply 100% solids epoxy prime coat over prepared substrate at a spread rate of 6-8 mils. Allow coating to cure.

.3 Base Coat: Apply 100% solids epoxy intermediate coat over primed substrate at a spread rate of 10-12 mils. Back roll material wait 5 minutes and complete First aggregate (step 4).

.4 First Aggregate: Broadcast Coloured Quartz aggregate into wet epoxy intermediate coat until refusal at a rate of 50 pounds per 100 square feet. Maintain a one to two-foot wet edge without any aggregate to allow for a smooth transition to the next pass of epoxy. Allow epoxy to cure. Remove excess aggregate and lightly sand with a circular floor sander to remove any rough spots. Sweep and vacuum all excess quartz from the cured floor.

.5 Intermediate Coat: Apply 100% solids epoxy clear intermediate coat over prepared substrate at a spread rate of 20 mils. Back roll material wait 5 minutes and complete

Second aggregate (step 6).

.6 Second Aggregate: Broadcast Coloured Quartz aggregate into wet epoxy intermediate coat until refusal at a rate of 40 pounds per 100 square feet. Maintain a one to two foot wet edge without any aggregate to allow for a smooth transition to the next pass of epoxy. Allow epoxy to cure. Remove excess aggregate and lightly sand with a circular floor sander to remove any rough spots. Sweep and vacuum all excess quartz from the cured floor.

.7 Grout Coat: Apply 100% solids epoxy clear finish coat over the entire floor at a spread rate of 10-12 mils. Allow coating to cure.

.8 Finish Coat: Apply 100% solids epoxy finish coat over the primed substrate and cove base at a spread rate of 6-8 mils. Allow coating to cure.

.9 Anti-skid Top Coat: Apply 100% solids epoxy topcoat over entire floor at a spread rate of 6 mils. Broadcast a very small amount of 55 mesh aggregate into the wet coating and back roll. Allow coating to cure

.10 Finished colour and texture to meet approval of the consultant. Patterns as shown on the Contract Drawings.

.11 Allow final coat to cure before exposing to normal traffic. Consult manufacturer for curing times at different temperatures.

END OF SECTION

1 GENERAL

1.1 Instructions

1.1.1 Comply with the requirements of all Sections. Work is to be in accordance with Contract Documents and Contract Drawings.

1.1.2 Report in writing to the Vendor any defects of surfaces or Work prepared by other trades which affect the quality or dimensions of this Sub-contractor's Work. Commencement of this Sub-contractor's Work shall imply complete acceptance of all Work by other trades.

1.2 Section Includes

1.2.1 Complete painting of all surfaces noted on Drawings and in Room Finish Schedule.

1.2.2 Finishing of new closet doors in Resident Rooms.

1.2.3 Mechanical and electrical conduit, piping and ductwork including hangers in exposed locations.

1.3 Related Sections

1.3.1 Section 09 29 00, Gypsum Board.

1.4 Quality Assurance

1.4.1 Employ fully trained workers who are regularly employed in this field.

1.4.2 Arrange for testing of paint/coatings by product manufacturer. Obtain in writing from manufacturer representative, approval of surface preparation methods, and obtain reports that materials and application methods conform to specification.

1.4.3 Comply with VOC limits set out by Green Seal Organization for all non-alkyd and non-epoxy coatings/paints.

1.5 Referenced Standards

1.5.1 Green Seal Certified Products:

CAN CGSB 1.100-99	Interior Flat Paint Latex
CAN CGSB 1.119.95	Interior Latex Primer-Sealer
CAN CGSB 1.195-99	Interior Latex Semi-gloss Paint
CAN CGSB 1.209.93	Low Sheen Latex Interior Paint

1.5.2 ECP Environmental Choice Program:

ECP 07.89	Water-borne Surface Coatings
ECP 02.89	Solvent-borne Paints
MPI	Master Painters Institute Manual
SSPC	Steel Structures Painting Council

1.6 Samples

1.6.1 Submit brush-outs 152.4mm x 152.4mm (6" x 6") of each paint application, labelled as to product and location. Proceed with painting and staining mock-up only when colour and finish has been approved.

1.7 Rejections

1.7.1 Defective materials or quality of Work, whenever found, at any time prior to acceptance of the Work, shall be rejected regardless of previous inspection. Inspection will not relieve responsibility, but is a precaution against oversight or errors.

1.7.2 Remove and replace defective materials and Work of other trades affected by this replacement, at no additional cost to the Agency.

1.8 Examination

1.8.1 Report to the Consultant, in writing, all defects of surfaces or Work prepared by other trades and on unsatisfactory site conditions.

1.8.2 Thoroughly examine all surfaces scheduled to receive paint to see that they are dry, clean, free from cracks, scaling, grease, oil, or other foreign materials liable to impair adhesion, performance or appearance. Take moisture readings.

1.8.3 Commencement of Work implies total acceptance of all surface conditions.

1.9 Material, Storage and Handling

1.9.1 Bring materials to the site in the original unopened containers labelled to indicate the name of the manufacturer, brand, colour and quality of the contents.

1.9.2 Store thinners, loose soaked rags and similar combustible materials in closed containers. Remove from site or store in an assigned area.

1.9.3 Store paint materials at temperatures recommended by manufacturer.

1.10 Job Conditions

1.10.1 Co-operate in coordinating the Work of other Sections with the Work of this Section, so that the Work may proceed in an orderly and effective manner.

1.10.2 If requested, provide proof of purchase of all paint materials needed for the job.

1.10.3 Maintain minimum interior temperature of 18 degrees Celsius during application and drying of paint and maintain until handover to Agency.

1.10.4 Do not paint when ambient air and surface temperatures are less than 15 degrees Celsius for 24 hours before or during painting application.

1.11 Scheduling

1.11.1 Unoccupied Areas: Cooperate with other trades to minimize touch-ups, but to ensure completion prior to installation of floor coverings and furniture.

1.11.2 Occupied Areas: Schedule painting to prevent disruption to occupants. Painting shall be carried out as arranged with Agency.

1.11.3 All finishing work must be done in staging area. No painting is permitted within the Resident Rooms.

1.12 Clean-up

1.12.1 Upon completion of the Work of this Section, remove from the site all surplus material and debris caused by the Work of this trade to the satisfaction of the Consultant.

1.12.2 Extra Paint: Leave one litre of each finish material in each colour used on the jobsite, properly labelled.

1.13 Guarantee

1.13.1 Provide a written guarantee of Work of this Section against defects in material and quality of Work for a period of one year from the date of publication of the Certificate of Substantial Performance.

2 PRODUCTS

2.1 General

2.1.1 Provide new materials in perfect condition, free from defects impairing physical performance and appearance.

2.1.2 No claim as to unsuitability or unavailability of any material specified, or unwillingness to use same, or inability to produce first class work with same will be entertained unless such claims are made in writing and submitted with proposal.

2.1.3 Select materials for application on each type surface from a single manufacturer.

2.2 Finish and Colours

2.2.1 The Consultant will issue a schedule of the colours of paint and other finishes as required by job progress.

2.2.2 Gloss/Sheen Ratings:

.1 Paint gloss shall be defined as the sheen rating of applied paint, in accordance with following Master Painters Institute (MPI) values:

Gloss Level	Description
G1	Matte or flat finish
G2	Velvet finish
G3	Eggshell finish
G4	Satin finish
G5	Semi-gloss finish
G6	Gloss finish
G7	High-gloss finish

.2 Gloss level ratings of all painted surfaces shall be as specified herein and as noted on finish schedule.

2.3.4 The submitted brushouts and approved mock-up shall be the only determining factors in assessing approved colour tone and shade.

2.3.5 Interior colours will be based on two base colours and three accent colours with a maximum of two deep or bright colours. No more than three colours will be selected in each area. Note that this does not include pre-finished items by others, e.g. aluminum or vinyl windows, aluminum doors and handrails, etc.

2.3.6 Unless otherwise noted or scheduled, wall shall be painted the same

colour within a given area.

2.4 Gloss Levels

2.4.1 Except as described below or indicated on the finish schedule, interior walls and ceiling surfaces shall be painted in accordance with the following criteria over appropriate prime / sealer coat:
- .1 Universal Washroom / Shower & Barrier Free Washroom - washable latex with G5 (semi-gloss) finish.
- .2 Doors, frames and trim

2.4.2 Access doors, prime coated butts and other prime painted hardware (e.g. door closers), registers, radiators and covers, exposed piping and electrical panels shall be painted to match adjacent surfaces (i.e. same colour, texture and sheen), unless otherwise noted or where pre-finished.

2.5 Mixing and Tinting

2.5.1 Deliver paints and enamels ready mixed to jobsite. Job mix and tint only when approved by the Consultant.

2.5.2 Tint undercoats and each finish coat progressively to enable confirmation of number of coats.

2.6 Paint and Stain Applications for Various Uses

2.6.1 New Drywall:
- .1 One coat latex primer.
- .2 Two coats finish G3 / G4.

2.6.2 Existing Drywall:
- .1 One coat primer.
- .2 One coat finish G3 or G4.

2.6.3 Hollow metal door and frame:
- .1 One coat latex primer.
- .2 Two coats finish G3/G4.

3 EXECUTION

3.1 Verification of Surface Conditions

3.1.1 Start Work only when surfaces and conditions are satisfactory for production of quality Work. Report to Consultant in writing any surfaces which are found to be unsatisfactory. Commencement of Work shall imply acceptance of substrate surfaces.

3.1.2 Ensure temperature of surfaces to be finished between ten degrees Celsius and twenty degrees Celsius (50˚F and 68˚F) and surfaces are dry and free of dirt, grease or other contaminants that may affect applied finish.

3.1.3 Verify moisture content of surfaces with electronic moisture metre. Do not proceed without written directions if moisture reading is higher than 12-15 percent.

3.1.4 If substrate is steel, do not apply coatings over moisture or when surface temperature is within three degrees Celsius (5˚F) of dew point.

3.1.5 If substrate is masonry, allow to cure for 30 to 90 days. Ensure that

moisture content is below 12 percent and test for alkalinity and neutralize (pH 6.5-7.5) before proceeding with priming.

3.1.6 If substrate is gypsum board, inspect to ensure joints are completely filled and sanded smooth. Inspect surfaces for “nail popping”, screw heads not recessed and taped, breaks in surface or other imperfections and have repaired as required.

3.1.7 If substrate is wood, do not stain or paint if moisture reading is higher than 12%. Inspect work to assure surfaces are smooth, free from machine marks and nail heads have been countersunk.

3.2 Protection

3.2.1 Remove finish hardware, electrical switch and outlet covers, receptacle plates, fittings and fastenings, to protect from paint splatter. Mask items not removable. Use sufficient drop cloths and protective coverings for full protection of floors, furnishings, mechanical, electrical and special equipment, all other components of building which do not require painting or to be removed, from paint spotting and other soiling. Re-install items when paint is dry. Clean any components that are paint spotted or soiled.

3.2.2 Keep waste rags in covered metal drums containing water and remove from building at end of each day.

3.2.3 Prohibit traffic, where possible, from areas where painting is being carried out and until paint is cured. Post “wet paint” or other warning signage during and on completion of Work.

3.2.4 When handling solvent coating materials, wear approved vapour/particulate respirator as protection from vapours. Dust respirators do not provide protection from vapours.

3.3 Surface Preparation

3.3.1 Remove dust, grease, rust and extraneous matter from surfaces (except rust occurring on items specified to be primed under other Sections shall be removed and Work re-primed under those Sections). Vacuum (fibre acoustic tile and) insulation covering surfaces. Vacuum clean floors before painting; wipe clean adjacent surfaces and surfaces to be painted before Work is commenced to prevent dust and debris damage to wet paint.

3.3.2 Remove mildew by scrubbing affected area with solution of tri-sodium-phosphate (TSP) (150g) and bleach (125g) in 3.5L water. Rinse well with clean water and allow to dry. If condition is serious, source out finishes with extra mildew resistance.

3.3.3 Previously Finished Surfaces:

.1 Clean existing interior and exterior surfaces to be repainted or varnished to provide bond. Remove rust, scale, oil, grease, mildew, chemical and other foreign matter. Remove loose paint and fill flush with suitable patching material. Clean off bubbled, cracked, peeling or otherwise defective paint by stripping with suitable environmental strippers or by burning. Do not burn off paints suspected of having lead content. Treat residue from stripping as hazardous waste. Flatten gloss paint

and varnish with sandpaper and wipe off dust. If previous coating have failed so as to affect proper performance or appearance of coatings to be applied, remove previous coatings completely and prepare substrates properly and refinish as specified for new work. Leave entire surface suitable to receive designated finishes and in accordance with finish manufacturer's instructions.

3.3.4 Gypsum Board:

.1 Examine surfaces after for imperfections showing through and fill small nicks or holes with patching compound and sand smooth. Examine surfaces after priming for imperfections showing through. Clean surfaces dry, free of dust, dirt, powdery residue, grease, oil, wax or any other contaminants. Sand and dust as necessary prior to painting.

3.4 During Work of this Section cover finished floors, walls, ceilings, and other Work in vicinity and protect from paint and damage.

3.5 Clean adjacent surfaces which have been painted, soiled or otherwise marred.

3.6 Application

3.6.1 Spraying not allowed without written permission.

3.6.2 Paint entire plane of areas exhibiting incomplete or unsatisfactory coverage and of areas which have been cut and patched. Patching not acceptable.

3.6.3 Do not paint baked enamel, chrome plated, stainless steel, aluminum or other surfaces finished with final finish in factory. Finish paint all primed surfaces.

3.6.4 Advise Consultant when each applied paint coat can be inspected. Do not re-coat without inspection. Tint each coat slightly to differentiate between applied coats.

3.6.5 Sand smooth enamel and varnish undercoats prior to re-coating.

3.6.6 Apply primer coat soon after surface preparation is completed to prevent contamination of substrate.

3.6.7 Apply primer-sealer coats by brush or roller. Permit to dry in accordance with manufacturer's recommendations before applying succeeding coats. Touch-up suction spots and sand between coats with No. 120 sandpaper.

3.6.8 Apply primer coat to unprimed ferrous metal surfaces.

3.6.9 Apply final coats on smooth surfaces by roller or brush. Hand brush wood trim surfaces.

3.6.10 Apply additional paint coats, beyond the number of coats specified for any surface, to completely cover and hide the substrate and to produce a solid, uniform appearance.

3.6.11 Allow each coat of paint to cure and become dry and hard before application of succeeding coats (unless manufacturer's directions require otherwise).

3.6.12 Before finishing paint coats are applied, inspect and touch-up shop

coats of primers previously applied by other trades or fabricators.

3.6.13 Apply paint in accordance with manufacturer's directions.

3.6.14 Provide paint coating thicknesses indicated, measured as minimum dry film thicknesses.

3.7 Existing Spaces

3.7.1 Refinish existing surfaces of rooms or areas which have been damaged, altered or otherwise specified. Use same procedure as for new Work but primer (or filler, stain and sealer in case of varnish finish) may be omitted. Prepare existing surfaces as specified herein. Finish shall match previous finish.

3.7.2 Paint or repaint rooms or areas where noted on room finish schedule and/or as indicated on Drawings.

3.7.3 Repaint surfaces entirely between changes of plane.

3.7.4 Extend painting to a suitable boundary to avoid a "patched" effect. Sand, wire brush, or scrape such existing finished surfaces to remove loose paint and to reduce gloss. Also clean existing films of dirt, grease or wax. If metallic surfaces are rusted, remove loose scale to provide a firm surface. Patch and sand cracks and other imperfections.

3.7.5 Provide paint to interior existing spaces effected by alterations and shelled-in spaces in accordance with following:

.1 Paint walls to the nearest inside and outside corners for the full wall height.

.2 Paint full ceilings to the nearest wall or bulkhead.

.3 Unless indicated otherwise match the existing colour.

.4 Where room finish schedule indicates existing and /or new wall finishes to be painted, existing surfaces such as, existing door and frames, mechanical supply and return air grilles (both on walls and ceilings), access doors and electrical panels which has been previously painted shall be painted for a complete finish room. If the room finish schedule indicates "-" it denotes the entire room need not be painted, only the patched areas to be painted.

3.7.6 Apply at least the number of coats specified to produce a finish of even colour, texture and sheen.

3.7.7 Lightly sand all finishes between coats and clean. Finish tops, bottoms and edges of doors, after doors are fitted.

3.7.8 Fill screw heads, holes and other defects in metal work with mineral filler. Putty nail holes, cracks and other defects in Work, other than metal to match finish intended.

3.7.9 Spray work is not permitted, unless done off-site.

3.8 Re-touching

3.8.1 Make a close inspection of all surfaces decorated, after completing this Work, and ensure that they are properly and perfectly re-touched where damaged before removing equipment.

3.9 Clean-up

3.9.1 Do not wash brushes, rollers, clothes, etc. in running water; fill two suitably sized containers with clean water. Use first clean and second clean process for all paint. Final rinse only may be in running water.

3.9.2 Keep closed container of paint thinners on hand for ongoing cleaning. Do not dispose of paint thinners to sewer; take off site at end of each day and take to hazardous waste disposal depot.

3.9.3 Collect all emulsion from cleaning into containers and recycle or dispose at hazardous waste disposal depot, in accordance with local, provincial and federal environmental regulations.

3.9.4 Provide proof of proper disposal by receipt from hazardous waste disposal depot.

4 PAINT COLOUR SCHEDULE

4.1 A colour schedule of architectural finishes will follow.

END OF SECTION

1 GENERAL

1.1 Instructions

1.1.1 Comply with the requirements of all Sections. Work is to be in accordance with Contract Documents and Contract Drawings.

1.1.2 Report in writing to the Vendor any defects of surfaces or Work prepared by other trades which affect the quality or dimensions of this Sub-contractor's Work. Commencement of this Sub- contractor's Work shall imply complete acceptance of all Work by other trades.

1.2 Intent

1.2.1 The following prefabricated items to be supplied and installed:

- .1 PPE Cabinet
- .2 Grab Bars
- .3 Washroom Accessories
- .4 Access panels
- .5 Magnet board
- .6 LED Mirrors
- .7 Privacy Curtain Rail
- .8 Ceiling Mounted Lift Track
- .9 Blinds
- .10 Shower Bench
- .11 Acoustic Panels

1.2.2 Approved Manufacturers: The manufacturers listed are only approved if they can provide the product as described.

1.3 Rejections

1.3.1 Defective materials or quality of work, whenever found, at any time prior to acceptance of the Work, shall be rejected regardless of previous inspection. Inspection will not relieve responsibility, but is a precaution against oversight or errors.

1.3.2 Remove and replace defective materials and work of other trades affected by this replacement, at no additional cost to the Agency.

1.4 Performance

1.4.1 Design products to meet or exceed the performance criteria of the applicable C.G.S.B. Specification.

1.5 Material Storage

1.5.1 Deliver and store materials undamaged in original cartons or wrappings.

1.5.2 Store material in a secure, dry area.

1.6 Guarantee

1.6.1 Provide a written guarantee of work of this Section against defects in material and quality of work for a period of one (1) year from the date of publication of the Certificate of Substantial Performance.

1.7 Cleaning and Protection

1.7.1 Be responsible for protection of all manufactured specialty work during period of construction.

1.7.2 Upon completion of installation of all manufactured specialty items remove all excess material, empty cartons, wrappings, etc. and remove any dirt spots and foreign material from the installed items, leaving them in a clean, usable condition.

1.8 Submittals

1.8.1 Shop Drawings:

.1 Requirements for Shop Drawings submission are described in Section 01 30 00, Instructions to All Trades, specifically provide the following:

.1 PPE Cabinet
.2 Grab Bars
.3 Washroom Accessories
.4 Access panels
.5 Magnet board
.6 Tilted MirrorPrivacy Curtain Rail
.7 Ceiling Mounted Lift Track
.8 Blinds
.9 Acoustic Ceilings
.10 Shower bench (SB)
.11 Nurse call (NC)
.12 Shelf (SHLF)
.13 Electric hand dryer (HD)

1.9 Clean-up

1.9.1 Upon completion of the work of this Section, remove all surplus materials and debris caused by the work of this Trade from the site to the satisfaction of the Consultant.

2 PRODUCTS

2.1 Materials

2.1.1 Provide new materials in perfect condition, free from defects impairing strength, durability or appearance. Provide backing as required.

2.1.2 Refer to the Architectural plans for location and required quantityof items specified.

2.2 PPE Cabinet

2.2.1 Provide one (1) Personal Protective Equipment Cabinet. Cabinet shall be 1'-8" w x 2'-6" h, high density polyethylene body with (2) two frosted plexiglass doors and (3) three stainless steel shelves. Southwest Solutions Group 1-800-803-1083.

2.3 Grab Bars

2.3.1 For quantity and location, refer to Drawings.

2.3.2 GB1: 1 ½" diameter stainless steel grab bars with snap flanges, satin finish with peened gripping surface, 24" long behind water closet.

2.3.3 GB2: 1 ½" diameter stainless steel grab bars with snap flanges, satin finish with peened gripping surface, 30 x 30" - 90 degree "L" on adjacent wall

2.3.4 GB3: 1-1/4" diameter tubing, satin finish, slip resistant surface stainless steel grab bar, penned surface, wall mounted swing up type. Bobrick B-4998.99 or equivalent.

2.4 Washroom Accessories

2.4.1 Coat Hook (CH): provide one (1) vandal resistant coat hook per washroom, stainless steel with satin finish. Bobrick B-983 or equal.

2.4.2 Soap Dispenser (SD): provide two (2) surface mounted soap dispenser per washroom, stainless steel with satin finish. Bobrick B-818615 or equal.

2.4.3 Toilet Paper Dispenser (TPD): provide one (1) surface mounted toilet paper dispenser per washroom, stainless steel with satin finish. Bobrick B-2892 or equal.

2.4.4 Shower Bench (SB): Provide one (1) bariatric folding shower seat with legs, securely anchored to wall. Bobrick 918116 or equivalent.

2.4.5 Wall Shelf (WS): Provide one (1) wall mounted stainless steel shelf with satin finish. Bobrick B298x24 or equal.

2.4.6 Automatic Hand Dryer (HD): Provide one (1) surface mounted automatic hand dryer per washroom, stainless steel with brushed finish. Global Industrial, High Velocity Automatic Thin Hand Dryer, ADA, WB641565 or equal.

2.4.7 Towel Warmer (TW) Provide one (1) surface mounted towel warmer, brushed nickel finish. Mr. Steam W228T or equal.

2.4 Access Panels For Drywall Ceilings

2.5.1 Manufactured by: Acudoor (905) 683-6121 or Agency approved equivalent

2.5.2 Nustrom Products Co. 1-800-547-2635

2.5.3 Buyline WB-DW 24" X 24"

2.6 Corner Guards

2.6.1 Provide stainless steel corner guards as indicated on architectural drawings. 48" x 3-1/2" rounded corner, non-reflective. Seton SS-48R or Agency approved equivalent.

2.7 Magnet Board

2.7.1 Provide Magnet Board (MB) - Painted steel magnetic surface, wall mounted, commercial grade, rust resistant, white frame.

2.8 Tilt Mirrors

2.8.1 Mirror (MIR): Provide one (1) wall mounted mirror per room, 18" wide x 36" tall, fixed-position tilt mirror. Bobrick B293-1836 or Agency approved equivalent.

2.9 Privacy Curtain Rail

2.9.1 Dual channel, heavy extruded aluminum curtain track with snag free operation, anodized aluminum finish, standard carriers (1/6" curtain), complete with all attachment hardware and supports to match and suit application. Construction Specialties Traditional track 6062 or equivalent.

2.10 Ceiling Mounted Lift Track

2.10.1 Remove and reinstate existing lift motor as required for track modifications. Remove and/or modify sections of track to suit new layout. New track to be Arjo Ceiling track to match existing. Provide new ceiling supports as required, anchored to structure above, tight to underside of bulkhead at 2200±.

2.11 Blinds

2.11.1 Roller shade (RS1), motorized lift system, vinyl blackout, exposed roll, flame retardant, mounting hardware, 1000mm wide by Select Blinds or equivalent. Consultant to select colour. Provide 3 colour samples.

3 EXECUTION

3.1 Examinations

3.1.1 Report to the Consultant, in writing, all defects of Work prepared by other trades and on unsatisfactory site conditions.

3.1.2 Do not commence the work of this Division until surfaces, area, conditions specified or indicated on Drawings, to receive manufactured specialties, are

compatible with the manufacturer's installation requirements.

3.1.3 Commencement of work implies total acceptance of all preliminary installation requirements by the Vendor installing manufactured specialty items.

3.1.4 Waive any after claims by failure to comply with the above procedure of examination.

3.2 Quality of Work and Installation

3.2.1 Carry out installation of manufactured specialty items by tradesmen with the necessary training and experience and certified by the manufacturer or by the Vendor's own forces with strict adherence to the manufacturer's printed installation instructions and/or Shop Drawings.

END OF SECTION

1. GENERAL

1.1 **General Requirements**

1.1.1 The requirements of this section shall apply to all sections in Division 22 – Plumbing.

1.1.2 Conform to Division 01 General Conditions.

1.1.3 All material, labour, equipment, and services required under this section shall be the full responsibility of the Plumbing Vendor including any material, labour, equipment, and services provided by their subcontractors.

1.1.4 Complete and submit the Supplemental Tender Form including list of equipment and materials to be used on this project and forming part of the tender documents.

1.2 **Summary of Work:**

1.2.1 Refer to Division 1, Section 01 30 00 – Instruction to All Trades.

1.3 **Definitions**

1.3.1 "Supply" shall mean supply only.

1.3.2 "Install" shall mean install and connect.

1.3.3 "Provide" shall mean supply, install, and connect.

1.3.4 "Drawings and Specifications" shall mean Contract Documents.

1.3.5 "Authorities" or "Authorities having jurisdiction" shall mean all agencies that enforce the applicable laws, ordinances, rules, regulations, or codes of the Place of Work.

1.3.6 "Work" shall mean all equipment, materials, labour, and permits to provide a complete and operational plumbing system as detailed in the drawings and specifications.

1.3.7 "Region" shall mean Region of Peel.

1.4 **Related Work**

1.4.1 Division 01 – General Requirements

1.4.2 Division 23 –Heating, Ventilation and Air Conditioning

1.4.3 Division 26 – Electrical

1.4.4 Division 22 specifications form a part of the Contract Documents and shall be read, interpreted, and coordinated with all other Divisions.

1.5 **Intent**

1.5.1 The drawings and specifications are not a detailed set of installation instructions. Drawings and specifications are complementary to one another and that which is shown on one is as binding as that which is shown on both.

1.5.2 The Consultant shall be immediately informed of any discrepancies between drawings and specifications leaving in doubt the true intent of the work.

1.5.3 Supply all labour, equipment, and materials necessary to install a complete and operational plumbing system described herein and shown on the drawings.

1.5.4 It is the intent of these drawings and specifications to provide for a plumbing installation complete and in operating condition. The responsibility for supplying and installing all material necessary to accomplish this, except where specifically noted that such work or materials is not included, shall be part of this section.

1.5.5 Assess and be familiar with existing site conditions prior to pricing and construction and allow for same in tender price.

1.5.6 All work must be done by qualified, certified and experienced persons in such line of work. Trade certificates must be available on demand.

1.5.7 All work shall be in accordance with standard industry practice accepted and recognized by the Consultant and the Trade.

1.5.8 This Vendor shall coordinate with and cooperate with all other trades prior to installation. Where work interferes with other trades due to failure to coordinate or cooperate, the work shall be removed and relocated as approved by the Consultant at no extra cost to the Region.

1.5.9 The Consultant shall have the right to reject any work that does not conform to the Contract Documents and accepted standards of practice including but not limited to performance, quietness of operation and finish.

1.6 **Codes, Bylaws, Standards, and Regulations**

1.6.1 The plumbing system shall comply with the latest editions and revisions of applicable codes, bylaws, standards, and regulations including but not limited to:

.1 Ontario Building Code
.2 Ontario Fire Code
.3 ASHRAE
.4 Canadian Standards Association
.5 Local Building Bylaws
.6 Ontario Occupational Health and Safety Act

1.6.2 Provide work in accordance with the requirements of all applicable government codes, local by-laws, underwriter's regulations base building standards, contract documents, and all authorities having jurisdiction.

1.6.3 Where discrepancies occur between contract drawings and specifications and above codes and standards referred to

herein, the Vendor is to notify the Consultant in writing and obtain clarification prior to proceeding with the work.

1.6.4 The Vendors shall not reduce the requirements on the contract drawings and specifications by applying any codes and standards referred to herein.

1.7 **Permits and Fees**

1.7.1 Obtain copy of building permit, as applied for by the consultant and Region, when ready and issued by the local municipality. Post on site as per permit requirements.

1.7.2 Coordinate and schedule all required inspections and give necessary notice to all authorities.

1.7.3 Upon completion of project, provide inspection certificates confirming acceptance by all authorities having jurisdiction for all applicable disciplines.

1.8 **Contract Breakdown**

1.8.1 After the tenders close, submit a breakdown of the price into phase, scope and trades to the satisfaction of the Consultant based on the sections of the specifications.

1.8.2 Breakdown shall include but not be limited to:

.1 Mobilization and shop drawing submission
.2 Demolition
.3 Plumbing Fixtures & Materials
.4 Plumbing Labour – Rough In
.5 Plumbing Labour - Finishing
.6 Pipe Insulation
.7 Testing, Startup & Training
.8 Close-out Submittals

1.8.3 Progress claims shall be based on the breakdown. Submit in table format showing contract amount, work complete to date as percentage, previous draw, amount this draw and balance for each line item.

1.9 **Shop Drawings**

1.9.1 Within thirty (30) days of award, the Vendor shall submit shop drawings of all equipment for the project. Partial submittals will not be accepted.

1.9.2 Prior to ordering of products or delivery of any products to job site, submit shop drawings electronically in PDF format to the Consultant for review and comments. Submit sufficiently in advance of construction to allow ample time for review. Size of shop drawings shall be 215.9mm by 279.4mm (8.5x11"). 279.4mm x 431.8mm (11x17") will be acceptable where appropriate for content and scale.

1.9.3 Submittals shall contain but not be limited to:

.1 Construction information
.2 Product data
.3 Performance data including performance curves
.4 Acoustical sound power data (where applicable)
.5 Dimensional layout and clearances
.6 Mounting arrangements
.7 Certification of compliance to applicable codes
.8 Operating and Maintenance information
.9 Wiring, single line and schematic diagrams (where applicable)

1.9.4 Clearly mark each sheet of printed submittal material, using arrow, underlining or circling, to show particular sizes, dimensions, wiring diagrams, operating clearances, control diagrams, project identification, types, model numbers, ratings, capacities and options actually being proposed. Cross out non-applicable material. Note on the submittal specified features such as special tank linings, pump seals, materials or painting.

1.9.5 Prior to submission to the Consultant, the Vendor shall review all shop drawings. By this review the Vendor represents that they have determined and verified all field measurements, field construction criteria, materials, catalogue numbers and similar data or will do so and that they have checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents.

1.9.6 The Vendor's review of each shop drawing shall be indicated by their approval stamp, date and signature on the front of each page. Drawings will not be considered if not previously checked by the Vendor.

1.9.7 Review comments from the Consultant. If shop drawings are modified, confirm changes before proceeding. If shop drawings are not approved, revise and resubmit changes for approval within two (2) weeks.

1.9.8 Review of the shop drawings by the Consultant does not relieve the Vendor or their Supplier of the responsibility to provide the correct and complete equipment, material or installation.

1.9.9 Keep one complete set of shop drawings at the job site during construction.

1.9.10 Include stamped reviewed shop drawings in the Maintenance Manuals.

1.10 **Product Delivery Schedule**

1.10.1 Within two (2) weeks from shop drawing review, a schedule must be submitted by the Vendor showing projected delivery dates of all products to meet required construction schedule.

1.11 **Construction Meetings**

1.11.1 The Plumbing Vendor shall attend all site meetings unless otherwise pre-approved.

1.11.2 Sub-trades shall attend site meetings as requested or as required.

1.12 **Record Drawings**

1.12.1 Refer to Section 23 05 02 – Documentation and Manuals.

1.12.2 Maintain accurate, neat, and clean record drawings on an on-going basis during construction to be reviewed periodically by the Consultant during construction.

1.12.3 Record drawing mark-ups shall be made available at every site meeting or inspection.

1.12.4 Record drawings shall include but not be limited to final location of any access doors on same for future service requirements.

1.12.5 Prior to Substantial Performance submit a complete set of record drawings in pdf format to the consultant for review.

1.13 **Reports**

1.13.1 Provide the following reports upon completion of work by certified Vendors for review and approval by the Consultant:

.1 Equipment Start-Up Reports
.2 Piping Pressure Test Reports
.3 Backflow Preventer Test Report (where applicable)
.4 Other equipment startup reports and test sheets certified by the manufacturer or a qualified technician.
.5 Demonstration and Training Reports/Logs

1.13.2 All reports shall be dated and signed by the Technician who performed the start-up and/or tests.

1.14 **Maintenance Manuals**

1.14.1 Refer to Section 23 05 02 – Documentation and Manuals.

1.14.2 Provide the Region with an electronic copy of the indexed, maintenance manuals on memory stick or file transfer. Manuals shall contain and be tabbed in the following order:

.1 Table of Contents
.2 Vendor's, Manufacturer's and Supplier's Contact Information
.3 Warranty Letter
.4 Valve schedule
.5 Colour coding charts for access areas
.6 Reports as specified herein and as applicable
.7 ALL stamped approved shop drawings – Include a tab and blank section for any Region supplied equipment
.8 Equipment maintenance instructions and manuals

.9 As-built drawings

1.14.3 Submit one (1) complete copy to the Consultant for review and approval. Revise based on any comments and resubmit electronic copy to Consultant.

1.15 **Testing and Startup**

1.15.1 Refer to Section 22 05 92 – Testing.

1.15.2 Test and startup all equipment and work.

1.15.3 Fully coordinate all testing and startups with all trades, the Consultant, and authorities having jurisdiction.

1.15.4 Where applicable, the Controls Vendor shall be present during all equipment start-ups. Coordinate scheduling with Controls Vendor

1.15.5 Provide adequate notice to all parties.

1.16 **Demonstration and Training**

1.16.1 Demonstrate and train the Region on proper operation of the system.

1.16.2 The Vendor shall arrange for all necessary personnel and equipment specialists to be in attendance for purposes of demonstration and training.

1.16.3 Provide instruction by a manufacturer's representatives as required to fully demonstrate the systems

1.16.4 Demonstration and Training shall include but not be limited to:

.1 Training in the normal, abnormal and emergency operation of all systems provided under this Division - Plumbing.

.2 Review of all necessary maintenance procedures, of all systems provided under this Division - Plumbing.

.3 Provision of a documented maintenance program covering all systems provided or modified under this contract.

.4 Review of all close-out documentation including complete maintenance manuals and record drawings.

1.16.5 Prepare a Training Agenda and Log for signature by all Participants. Submit to Consultant and include in Manuals.

1.17 **Substantial Completion and Performance**

1.17.1 Substantial completion and performance shall be determined and awarded by the Consultant.

1.17.2 Complete the following to the satisfaction of the Consultant prior to request for substantial performance:

.1 Fire Stopping

.2 System Testing and Startups including report

.3 Maintenance Manuals

.4 Record Drawings

.5 Demonstration and Training

1.18 **Warranty**

1.18.1 Provide a one (1) year full parts and labour warranty for the new system from date of substantial completion.

1.18.2 Submit warranty letter on Company letterhead signed by Company representative stating warranty terms including warranty period from date of substantial completion.

2. PRODUCTS

2.1 **Materials**

2.1.1 All material used shall be new, free from defects, of quality specified, and installed in accordance with manufacturer's instructions.

2.1.2 Major equipment shall have nameplates on the exterior of the equipment in a visible location containing manufacturer's name, model number, serial number, performance data, and electrical characteristics.

2.1.3 The same manufacturer shall be used for types of equipment used in similar applications.

2.1.4 It is the responsibility of the Vendor to store and protect materials supplied by this scope.

2.1.5 Materials shall be stored in original containers.

2.1.6 Submit to the Consultant and the Region, current MSDS Sheets for any products being used on the job site where they exist.

2.1.7 Remove and dispose of all redundant materials and garbage from site.

2.1.8 Supply anchor bolts and templates for installation by other Divisions.

2.2 **Selected Products and Equivalents**

2.2.1 Sections within Division 22, Plumbing list "Acceptable Manufacturers" which must meet characteristics of the specified equipment and products for each section.

2.2.2 Base specified products are specified and/or shown on the Contract Drawings, and identified by manufacturer's name, type and catalogue number.

2.2.3 Any alternate manufacturers from base specified products and equipment must equal or exceed the quality, finish and performance of those base specified and/or shown, and not exceed the space requirements allotted on the drawings. Include costs for any associated work to accommodate such

substitutions, including the Consultant's time and revisions to the work of other divisions (i.e. electrical changes).

2.2.4 If item or material specified is unobtainable, state in Tender proposed substitute and amount added or deducted for its use. Extra monies will not be paid for substitutions after the Contract has been awarded.

2.2.5 If item of size indicated is unobtainable, supply next larger size without additional charge.

2.3 **Quality of Product**

2.3.1 All products provided shall be listed and/or approved by relevant authorities and new, unless otherwise specified.

2.3.2 If products specified are not listed and/or approved, obtain approval of provincial regulatory authority. Pay all applicable charges levied and make all modifications required for approval.

2.3.3 All products provided shall be new including those not specified and shall be of a quality best suited to the purpose required and their use subject to approval by the Consultant.

2.4 **Product Finishes**

2.4.1 Shop drawings shall indicate finishes. Use standard finish unless otherwise specified.

2.4.2 Repair dents and touch up all damaged finishes with matching finish, or if required by the Consultant or Region, completely repaint or replace damaged surface at no extra cost to the Contract.

2.5 **Access Doors**

2.5.1 Provide access doors/panels as required for access, adjustment, operation, service, and maintenance.

2.5.2 Minimum size of panels shall be 300mm x 450mm (12" x 18"). Wherever possible 600mm x 600mm (24" x 24") panels shall be used.

2.5.3 Access doors/panels shall have concealed hinges and screwdriver locking device.

2.5.4 ACCESS DOORS/COVERS - FLUSH ACCESS DOOR – DRYWALL CEILING

Acudor #DW-5040 Series or Agency approved equivalent. Flush to surface for drywall, satin coat steel with white baked enamel finish, formed door panel, flanged on four sides, 20 gauge. Galvanized frame with multiple bends and integral taping bead, 26 gauge. Concealed hinge, stainless steel screwdriver operated cam latch.

2.5.5 ACCESS DOORS/COVERS - FLUSH ACCESS DOOR - UNIVERSAL

Acudor #UF-5000 Universal Access Doors or Agency approved equivalent. 14 GA. (1.7mm) Type 304 #4 satin polish stainless steel, continuous concealed hinge, with positive and self-opening screwdriver operated lock.

2.5.6 ACCESS DOORS/COVER – RECESSED ACCESS DOOR – TILED AREA

Acudor #ADC-DW-5058 Aluminum extrusion 6063-T6 or Agency approved equivalent recessed to provide similar edge to drywall bead to allow for finishing of wall or ceiling surface and self-opening screwdriver operated lock.

2.6 **Equipment Supports**

2.6.1 Refer to Section 22 05 29 – Hangers and Supports.

2.6.2 Equipment supports not supplied by equipment manufacturer: fabricate from structural grade steel meeting requirements of – Structural Steel Section. Submit structural calculations with shop drawings.

2.6.3 Install base mounted equipment on chamfered edge housekeeping pads, minimum of 100mm (4") high and 150 mm (6") larger than equipment dimensions all around.

2.7 **Sleeves**

2.7.1 Pipe sleeves: at points where pipes pass through masonry, concrete or fire rated assemblies and as indicated.

2.7.2 Schedule 40 steel pipe.

2.7.3 Sleeves with annular fin continuously welded at midpoint:

.1 Through foundation walls.

.2 Where sleeve extends above finished floor.

.3 Through fire rated walls and floors.

2.7.4 Sizes: minimum 6mm (1/4") clearance all around, between sleeve and un-insulated pipe or between sleeve and insulation.

2.7.5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25mm (1") above other floors.

2.7.6 Fill voids around pipes:

.1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.

.2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.

.3 Ensure no contact between copper tube or pipe and ferrous sleeve.

.4 Fill future-use sleeves with lime plaster or other easily removable filler.

.5 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M+Amdt-Mar-78.

2.8 **Fire Stopping**

2.8.1 The Vendor shall work with all other subcontractors on the project in providing one common method of fire stopping all penetrations in the fire rated assemblies.

2.8.2 Approved fire stopping and smoke seal material in all fire separations and fire ratings within annular space between pipes, ducts, insulation and adjacent fire separation and/or fire rating.

2.8.3 Do not use cementitious or rigid seals around penetrations for pipe, ductwork, or other plumbing items.

2.8.4 Insulated pipes and ducts; ensure integrity of insulation and vapour barrier at fire separation.

2.8.5 Provide materials and systems capable of maintaining effective barrier against flame, smoke and gases. Ensure continuity and integrity of fire separation.

2.8.6 Comply with the requirements of CAN4-S115-M85, and do not exceed opening sized for which they have been tested.

2.8.7 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation. Provide "fire wrap" blanket around services penetrating fire walls. Extent of blanket must correspond to ULC recommendations.

2.8.8 The fire stopping materials are not to shrink, slump or sag and to be free of asbestos, halogens and volatile solvents.

2.8.9 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.

2.8.10 Fire stop materials are to be capable of receiving finish materials in those areas which are exposed and scheduled to receive finishes. Exposed surfaces are to be acceptable to consultant prior to application of finish.

2.8.11 Firestopping shall be inspected and approved by local authority prior to concealment of enclosure.

2.8.12 Install material and components in accordance with ULC certification, manufacturer's instructions and local authority.

2.8.13 Submit product literature and insulation material on fire stopping in shop drawing and product data manual. Maintain copies of these on site for viewing by installers and Consultant.

2.8.14 Manufacturer of product shall provide certification of installation. Submit letter to the consultant.

2.8.15 Acceptable Manufacturers:

.1 Fryesleeve Industries Inc.
.2 General Electric Pensiil Firestop Systems
.3 International Protective Coatings Corp.
.4 Rectorseal Corporation (Metacaulk)
.5 Proset Systems
.6 3M
.7 AD Systems
.8 Hilti
.9 Or Agency approved equivalent

2.8.16 Ensure firestop manufacturer representative performs on-site inspections and certifies installation. Submit inspection reports/certification at time of substantial completion.

2.9 **Escutcheons**

2.9.1 On pipes passing through walls, partitions, floors and ceilings in finished areas.
2.9.2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws.
2.9.3 Outside diameter to cover opening or sleeve.
2.9.4 Inside diameter to fit around finished pipe.

2.10 **Spare Parts**

2.10.1 Provide spare parts as specified under this Division - Plumbing.
2.10.2 Provide list of equipment in maintenance manuals indicating corresponding spare parts required. List of spare parts to be signed off by receiving personnel.

2.11 **Special Tools**

2.11.1 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Maintenance Materials Special Tools and Spare Parts.

3. EXECUTION

3.1 **Site Examination**

3.1.1 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Maintenance Materials Special Tools and Spare Parts.
3.1.2 Examine the site of work and become familiar with all features and characteristics affecting this work before submitting tender.
3.1.3 No additional compensation will be given for extra work due to existing conditions which such examination should have disclosed.

3.1.4 Report to the Consultant any unsatisfactory conditions which may adversely affect the proper completion of this work.

3.2 **Interference and Coordination Drawings**

3.2.1 Examine the drawings and all divisions of the specifications.

3.2.2 Prepare interference and equipment layout drawings to ensure all components will be properly accommodated within the spaces provided.

3.2.3 Lay out the work and equipment with due regard to architectural, structural and electrical features, and service requirements.

3.2.4 Submit interference drawings to the Consultant.

3.2.5 Before commencing any work, obtain a ruling from the Consultant if any conflict exists, otherwise no additional compensation will be made for any necessary adjustments.

3.3 **Separation of Services**

3.3.1 Contact between dissimilar metals, such as copper and aluminum, in damp or wet locations is not permitted.

3.3.2 All pipes, ductwork and wiring shall be supported from permanent building structure. Use of other services for support is not permitted.

3.4 **Workplace Safety**

3.4.1 The workplace must be kept safe at all times.

3.4.2 Conform to all ministries of labour, and health and safety regulations at all times.

3.4.3 Use ladders and proper techniques as approved by the ministry of labour to perform all work.

3.4.4 Cover all holes/openings and provide barriers around hazards, etc. to ensure occupants and workers are not at risk.

3.4.5 Where work does not conform to such regulations, stop work immediately and report the situation to the Region's representative or Consultant or rectify the situation immediately.

3.4.6 Report any hazards or concerns to the Region's representative immediately.

3.4.7 Conform to Region's safety requirements and construction regulations.

3.5 **Temporary Requirements**

3.5.1 All temporary requirements to complete plumbing work during construction shall be the responsibility of the Vendor except temporary power or water.

3.6 **Location of Equipment**

3.6.1 Approximate distances and dimensions may be obtained by scaling off the drawings. Figured dimensions shall govern over scaled dimensions.

3.6.2 Equipment locations shown on the drawings are approximate. Locations may be revised to suit construction and equipment arrangements provided design intent is not jeopardized and there is no additional cost to the Region.

3.7 **Mounting Heights**

3.7.1 Mounting height of equipment is from finished floor to equipment unless otherwise specified or indicated. Coordinate with block coursing if applicable.

3.7.2 Where mounting heights are not indicated on the drawings, obtain verification from the Consultant before proceeding.

3.7.3 Install plumbing equipment as indicated on the architectural drawings. Confirm all heights prior to installation. Where confirmation or coordination has not been done and changes are required, the Vendor shall cover all costs.

3.8 **Excavating and Backfilling (if required)**

3.8.1 Provide all excavating and backfilling inside and to 1.5m outside the building for plumbing pipes, drains and equipment. All backfilling shall be new clean granular 'A' fill brought in specifically for the purpose of backfilling to the underside of floor slab. All backfilling shall be compacted at intervals not more than 150mm (6") layer to the satisfaction of the Consultant.

3.8.2 Bottoms of trenches shall be excavated so that the pipe will be supported on a 150mm (6") compacted bed of clean granular 'A' fill. Provide all necessary pumping to maintain excavation free of water.

3.8.3 Should water be encountered during excavation, the Vendor shall provide all labour and material, including all equipment required for dewatering the excavation. After the water has been removed, this Vendor shall install a 300mm (12") base of compacted 50mm (2") clear stone covered with filter cloth before installing backfill as detailed and/or as specified.

3.8.4 Be responsible for any weather protection (if required) to install piping and/or equipment to the satisfaction of the Consultant.

3.8.5 Be responsible for providing all clear stone or granular 'A' material suitable for application to replace existing soil not suitable for backfilling above the 450mm (18") bedding material.

3.8.6 It is the responsibility of the Vendor to review the soils report. Additional work requested due to failure of soil conditions due to Vendor not reviewing report will not be entertained.

3.9 **Repairs, Cutting and Restoration**

3.9.1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

3.9.2 Each Section of this Division - Plumbing shall bear expense of cutting, patching, and repairing to install their work and/or replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

3.9.3 All patching, painting and making good of the existing walls, floors, ceilings, partitions and roof will be at the expense of the Vendor but performed by the Vendor or subcontractor specializing in the type of work involved unless otherwise noted.

3.9.4 Provide ULC approved fire stops and smoke seal material around the pipes passing through the floor, fire rated walls, and partitions.

3.9.5 Pack and seal space between sleeves and piping insulation for full depth of the sleeve with ULC approved material to maintain integrity of fire separation.

3.10 **Painting**

3.10.1 Refer to other Divisions for Painting unless otherwise specified herein.

3.10.2 Apply at least one (1) coat of corrosion resistant primer paint to ferrous supports and site fabricated work.

3.10.3 Prime and touch up marred finished paintwork to match original Peel Living color pending Region's approval.

3.10.4 Restore to new condition, or replace equipment at discretion of the Consultant, finishes which have been damaged too extensively to be merely primed, painted and touched up.

3.11 **Concealment**

3.11.1 All equipment, components, piping, and conduit shall be concealed in ceiling spaces, bulkheads or walls in finished areas.

3.11.2 Exposed equipment, components, piping, and conduit installed in unfinished areas, shall be installed as high as possible. Run piping and conduit parallel to building lines, tight to roof deck and down columns.

3.12 **Access Doors**

3.12.1 Provide access doors as required for access, adjustment, operation, service, and maintenance. Access doors and other

items requiring maintenance or access shall be removable and sealable.

3.13 **Clearances and Accessibility**

3.13.1 Install all work for easy access for adjustment, operation, service, and maintenance.

3.13.2 Maintain clearances for all equipment as per local codes and manufacturer's instructions.

3.13.3 Access panels shall be with concealed hinges and screwdriver locking device.

3.13.4 Provide access panels of adequate size as required to access equipment and components in concealed areas. Do not install access doors in specialty walls or ceilings.

3.13.5 Provide fire rated access doors where installed in fire separations to match rating of separation.

3.13.6 Install all services in exposed areas so that a minimum head clearance of 2200mm (88") is maintained.

3.14 **Equipment and System Protection**

3.14.1 Protect equipment and materials from damage in storage and on site before, during, and after installation until final acceptance.

3.14.2 Protect equipment and system openings from dust and debris with appropriate covers that will withstand throughout construction.

3.14.3 Where equipment and system components become dirty or damaged, clean and repair to new condition to the satisfaction of the Consultant and the Region at no expense to the Region.

3.15 **Supports**

3.15.1 Provide all miscellaneous metals and materials as required for support, hanging, anchoring, and guiding of all equipment, ductwork, piping, and all other work in Division 22 – Plumbing

3.15.2 All supports must be securely mounted to structures.

3.15.3 Refer to Section 22 05 29 – Hangers and Supports.

3.16 **Fire Stopping**

3.16.1 Refer to Part 2 herein.

3.17 **Cleaning**

3.17.1 Clean interior and exterior of all systems including strainers.

3.17.2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition including replacement of all filters in all air and piping systems.

3.18 **Region Supplied Equipment**

3.18.1 Connect to equipment supplied by the Region and make operable.

3.19 **Identification and Labeling**

3.19.1 All equipment, valves, panels and devices shall be labeled under this Division - Plumbing.

3.19.2 Refer to Section 22 05 53 - Identification.

3.20 **Field Review and Deficiencies**

3.20.1 The Vendor shall notify the Consultant when the job is ready for field review at various stages including rough-in stages.

3.20.2 During the course of construction, the Consultants will monitor construction and provide written reports of work progress, discussions and deficiencies.

3.20.3 The Vendor shall correct all deficiencies within the work period prior to the next review.

3.20.4 The Vendor shall not conceal any work until inspected. Where work was concealed, the Vendor shall remove and replace tiles, coverings or other obstructions to allow proper inspection at the Vendor's expense.

3.20.5 Upon completion of the project the Consultant will do a final review. Upon receiving the final inspection report, the Vendor must correct and sign back the inspection report indicated all deficiencies are completed. A re-inspection will only be done once the Consultant receives this in writing. Where the Consultant performs the re-inspection and the work is not complete, the Vendor is responsible for reimbursing the Consultant for the field review. The fee for additional reviews will be at the Consultant's hourly rates plus mileage and applicable taxes to be paid directly to the Consultant prior to performing the next field review.

END OF SECTION

1. GENERAL

1.1 **Manufacturer**

1.1.1 Provide valves of same manufacturer throughout where possible.

1.1.2 Provide valves with manufacturer's name and pressure rating clearly marked on outside of body.

1.2 **Quality Assurance**

1.2.1 All valves shall meet all MSS, ANSI and ASME manufacturing standards.

1.3 **Submittals**

1.3.1 Manufacturer’s data and shop drawings for all valves and accessories including dimensions, pressure ratings, materials, service acceptability.

2. PRODUCTS

2.1 **General**

2.1.1 All valves shall be acceptable for domestic water use, lead free.

2.1.2 Metallic valves shall be suitable for solder or threaded connections. Provide solder to threaded adapters where applicable.

2.2 **Check Valves**

2.2.1 50mm (2”) and smaller: Class 125/200PSI, lead free bronze body and cap, bronze seat, solder or threaded ends. Equal to Kitz #822 and #823

2.2.2 63mm (2.5”) and larger: To Class 150, stainless steel body, hard face seat, 13% chrome, flanged ends. Equal to Kitz #150UOAM.

2.3 **Ball Valves (Brass)**

2.3.1 600 WOG, lead free brass, two or three piece body, chrome plate ball, full port, teflon seats, blow-out proof stem, threaded or soldered ends, lever handle. Soldered up to 76.2mm (3”), threaded up to 101.6mm (4”).

2.3.2 Acceptable Manufacturer:

.1 Jenkins
.2 NH
.3 Kitz #858 & #859
.4 Red & White (Toyo) 5044A-LF & 5049-LF
.5 MAS #B3-LF and #B4-LF
.6 Or Agency approved equivalent.

2.4 **Circuit Balancing Valves (CBV) – Domestic Water**

2.4.1 Where noted on plans, provide circuit balancing valve on each domestic recirculation loop designed specifically for use in drinking water applications, NSF/ANSI 61-G rated for commercial hot water service (temperature rated to 82°C) and certified by the NSF with all wetted parts stainless steel.

2.4.2 Lead free construction in compliance with ANS/NSF-372.

2.4.3 Series 300 stainless steel body, nickel plated brass union nut, and tamper-resistant 300 series stainless steel flow cartridge.

2.4.4 Valve shall be suitable for minimum flow of 1.13lpm (0.3gpm) and maximum flow of 45.42lpm (12.0 gpm), and flow rate pre-set accuracy variation of +/- 5% over 95% of the control range.

2.4.5 Valves shall have a full body rating of 2758 kPa (400 psi), but is suitable for working pressures with differential control ranges of 13.78kPa – 20.68kPa (2 – 32 psi) or 34.47kPa – 413.68kPa (5 – 60 psi) differential.

2.4.6 All wetted parts shall comply with NSF/ANSI Standard 372 for minimal lead content

2.4.7 Compact inline design for tight installations.

2.4.8 Acceptable Manufacturer

.1 IMI TA BBV LF or 76X Series, Victaulic ICSS

.2 Or Agency approved equivalent

2.5 **Pressure Reducing Valves – Water**

2.5.1 Listed to ASSE 1003 and IAPMO and certified to CSA B356.

2.6 **Vacuum Breakers – Water**

2.6.1 Bronze body, brass trim, composition silicone float disc, full size orifice.

2.7 **Relief Valves**

2.7.1 Provide ASME rated direct spring loaded type, lever operated nonadjustable factory set discharge pressure as indicated.

2.8 **Drain Valves**

2.8.1 Bronze compression stop with 19.05 mm (¾") hose threaded.

2.8.2 Brass ball valve with 19.05mm (¾") hose thread.

2.8.3 Provide hose thread connection on valve or piping.

2.8.4 Equal to #868C (Lead Free), KITZ #68AC (Non Lead Free)

2.9 **Double Check Valve Assembly - Reduced Pressure Type**

2.9.1 Bronze or red brass body, stainless steel springs, composition diaphragm.

2.9.2 Independent acting spring loaded double internal disc valve, three chamber, discharge to atmosphere.

2.9.3 Acceptable Models:

.1 Watts 009 QT
.2 Zurn 975 XL
.3 Febco 825 Y
.4 Combraco 40-200
.5 Or Agency approved equivalent

2.9.4 Non-electronic testing apparatus including gauge, hoses, fittings, accessories, and case. Maximum temperature 104.4°C, maximum pressure 1034 kPa (150 psi). Equal to Watts TK-9A.

2.10 **Strainers**

2.10.1 Strainers 50mm (2") and smaller shall be constructed for 250 psig operating pressure at 208°C and shall have a cast iron threaded body and 20 mesh Type 304 stainless steel screen.

2.10.2 Strainers larger than 50mm (2") shall be constructed for 125 psig @ 65.55°C and shall have a cast iron flanged body and a 1.19mm (3/64") perforated Type 304 stainless steel screen up to 75mm (3") and a 3.175mm (1/8") perforated Type 304 stainless steel screen on 100mm (4") and larger.

2.10.3 Screen free area shall be minimum three times area of inlet pipe. Provide valved drain and hose connection off strainer bottom.

2.10.4 Strainers 50mm (2") and smaller shall have straight thread and gasketed caps and plugged blow-off connections.

2.10.5 Strainers larger than 50mm (2") shall include drain connections complete with ball valve, cap and chain.

2.10.6 Grooved end (where approved): 50mm (2") and larger, 300 PSI (2065 kPa) Y-Type Strainer shall consist of ductile iron body, ASTM A-536, Grade 65-45-12, Type 304 stainless steel perforated metal removable baskets with 1.6mm (1/16") diameter perforations 2"-3" (DN50-DN75) strainer sizes, 3.2mm (1/8") diameter perforations 101.6mm – 304.8mm (4"-12") (DN100-DN300) strainer sizes, and 4mm (0.156") diameter perforations for larger sizes. Victaulic Style 732 and W732.

2.11 **Pressure Ratings**

2.11.1 Unless otherwise indicated, use valves suitable for minimum 860 kPa (125 psi) and 232°C.

3. EXECUTION

3.1 **General**

3.1.1 All valves shall be located such that the removal of their bonnets is possible.

3.1.2 Install valves with stems upright or horizontal, not inverted.

3.1.3 All valves shall be installed to allow for ease of access, service and reading of devices from the floor.

3.2 **Application**

3.2.1 Use ball valves on pressure gauges.

3.2.2 Use plug cocks, globe valves, ball valves, butterfly valves, and metering valves in water systems for throttling service.

3.3 **Isolation Valves**

3.3.1 Isolation valves are to be ball type valves, pipe size as required, but in no case less than 13mm (½") diameter.

3.3.2 For equipment removal purposes. Install valves as close as possible to isolated equipment in order to minimize the amount of water lost during maintenance, replacement or drain down operations.

3.3.3 Isolation drain valves are to be provided with combination air inlet fitting as required to relieve vacuum during draining operations.

3.3.4 Install ball valves where approved for shutoff and isolating service, or to isolate equipment, parts of systems or vertical risers.

3.3.5 Provide drain valves at main shutoff valves, low points of piping and equipment.

3.4 **Circuit Balancing Valves (CBV) – Domestic Wate**

3.4.1 The Vendor shall install a CBV on each recirculating loop.

3.4.2 Install CBVs in accordance with manufacturer's instructions including straight pipe run upstream and downstream of CBV.

3.4.3 Valves shall be installed with flow in the direction of the arrow on the valve body.

3.4.4 Label ceiling tile or gypsum board ceilings where CBV is installed above ceiling. Provide access door for access where required.

3.5 **Pressure Reducing Valves**

3.5.1 Provide pressure reducing valves where shown or where required. Provide adequately rated shutoff valves.

3.5.2 Install as per manufacturer's recommendations.

3.5.3 Install in vertical position only.

3.6 **Relief Valves**

3.6.1 Provide relief valves at pressure tanks, low pressure side of reducing valves, heating convertors, expansion tanks and where indicated.

3.6.2 Pipe relief valve to nearest floor drain.

3.6.3 System relief valve capacity shall equal make up pressure reducing valve capacity. Equipment relief valve capacity shall exceed input rating of connected equipment.

3.6.4 Where one line vents several relief valves, cross sectional area shall equal sum of individual vent areas.

3.7 **Drain Valves**

3.7.1 Provide ball valves for drains on open systems.

3.7.2 Provide unions downstream of the valve to allow breaking the piping system.

3.7.3 Provide hose thread connection on drain valve and piping.

3.8 **Double Check Valve Assembly**

3.8.1 Install reduced pressure double check valve assembly where indicated on drawings and as required by code.

3.8.2 Install double check valve assembly at no more than 1.5m (5') above finished floor and to allow a minimum of 1m (3') clearance above the device for connection and operation of testing equipment.

3.8.3 Pipe overflow to drain with air gap.

3.8.4 Provide shutoff valves and unions on both sides of double check valve assembly for testing purposes.

3.9 **Strainers**

3.9.1 Install on the inlet of any large pumps and where otherwise indicated.

END OF SECTION

1. GENERAL

1.1 **Quality Assurance**

1.1.1 Domestic water pipe supports shall meet the requirements of Ontario Building Code.

1.2 **General Requirements**

1.2.1 Provide hangers and supports to secure equipment in place, prevent vibration, maintain grade and provide for expansion and contraction.

1.2.2 Install supports of strength and rigidity to suit loading without unduly stressing building. Locate adjacent to equipment to prevent undue stresses in piping and equipment.

1.2.3 Select hangers and supports for the service and in accordance with the manufacturer's recommended maximum loading. Hangers shall have a safety factor of 5 to 1.

1.2.4 Obtain approval prior to drilling for inserts and supports for piping systems.

1.2.5 Obtain approval prior to using percussion type fastenings.

1.2.6 Use of other piping or equipment for hangers and supports is not permitted.

1.2.7 Use of perforated band iron, wire or chain as hangers is not permitted.

1.3 **Firestop Sealants and Collars**

1.3.1 Standard method of fire tests of firestop system CAN4-S115-M85.

1.3.2 UL Classified and/or FM Systems Approved and tested to the requirements of ASTM E814 (UL1479).

1.3.3 Seals, assemblies and materials for penetration of fire rated surfaces shall be listed by FM and certified by UL or ULC for the service application.

1.4 **Submittals**

1.4.1 Firestop materials: Submit service limitations, installation instructions, UL certification and FM listing.

1.4.2 Fire rated penetration seals: Submit dimensional data, service limitations, installation instructions, UL certification and FM listing.

2. PRODUCTS

2.1 **Inserts**

2.1.1 Inserts shall be malleable iron case or galvanized steel shell and expander plug for threaded connection with lateral

adjustment, top slot for reinforcing rods and lugs for attaching to forms.

2.1.2 Size inserts to suit threaded hanger rods.

2.2 **Suspended Mechanical Equipment**

2.2.1 Suspend mechanical equipment from structure with adjustable length steel rods, threaded both ends or continuous threaded, complete with lock nuts on both ends. Provide spreader beams to distribute weight.

2.2.2 Construct supports of structural steel members or steel pipe and fittings. Brace and fasten with flanges bolted to structure.

2.2.3 Provide anchors, bolts and accessories required for mounting and anchoring equipment.

2.3 **Pipe Hangers and Supports**

2.3.1 Pipe hangers shall wrap around outside of insulation for all sizes. Piping shall be provided with insulation flashing of heavy gauge metal to prevent crushing and hanger sized for exterior of insulation.

2.3.2 Hangers:

.1 Pipe Sizes 13mm (½") to 38mm (1½"): Adjustable wrought steel ring, or swivel.

.2 Pipe Sizes 50mm (2") and over: Adjustable wrought steel clevis.

.3 Hanger Rods: Provide steel hanger rods, threaded both ends or continuous threaded, complete with lock nuts on both ends.

.4 Saddles shall wrap around the outside of the insulation for all piping and be sized accordingly.

.5 Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods, cast iron roll and stand for hot pipe sizes 150mm (6 ") and over.

2.3.3 Wall Support:

.1 Pipe Sizes to 75mm (3"): Cast iron hook, or fabricated bracket of 1"x1"x¼" angle bar.

.2 Pipe Sizes 100mm (4") and over: Welded steel bracket and wrought steel clamp.

2.3.4 Vertical Support:

.1 Steel riser clamp.

2.3.5 Floor Support:

.1 Fabricated stand and pipe clamp or saddle.

2.4 **Equipment Bases and Curbs**

2.4.1 Equipment bases and curbs shall be provided by the Vendor. The Vendor shall coordinate locations and sizes with the subcontractor if applicable.

2.4.2 Provide mounting plates to be formed into pads.

3. EXECUTION

3.1 Inserts

3.1.1 Use inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams wherever practicable.

3.1.2 Set inserts in position in advance of concrete work. Provide reinforcement rod in concrete for inserts carrying pipe over 100mm (4") or ducts over 1500mm (60") wide.

3.1.3 Where concrete slabs form finished ceiling, finish inserts flush with slab surface.

3.1.4 Where inserts are omitted, drill through concrete slab from below and provide rod with recessed square steel plate and nut above slab.

3.1.5 Expansion bolt type connections will be approved under certain conditions. Obtain approval from the Consultant. Generally, pipe 50mm (2") or smaller, and ducts less than 600mm x 300mm (24" x 12") will be approved, subject to adequate number of support points.

3.2 Suspended Mechanical Equipment

3.2.1 Suspend mechanical equipment from structure with adjustable length steel rods. Provide spreader beams to distribute weight.

3.2.2 The threaded rod shall be secured to trusses or to steel angle bars spanning the building trusses. The steel spanning bars are to be provided by this Division - Plumbing.

3.2.3 Construct supports of structural steel members or steel pipe and fittings. Brace and fasten with flanges bolted to structure.

3.2.4 Provide anchor bolts and accessories required for mounting and anchoring equipment.

3.2.5 Provide rigid anchors for ducts and pipes immediately after vibration connections to equipment.

3.3 Pipe Hangers and Support

3.3.1 Fasten hangers and supports to building structure or inserts in concrete construction.

3.3.2 Support horizontal metallic piping as follows:

Nominal Pipe Size	Distance Between Supports	Hanger Rod Diameter
13mm (½")	1.8m (6')	9.5mm (3/8")
19 to 38mm (¾" to 1½")	2.4m (8')	9.5mm (3/8")
50 to 63mm (2" to 2½")	3.0m (10')	9.5mm (3/8")
63 to 100mm (3" to 4")	3.6m (12')	13mm (½")

150 to 300mm (6" to 12")	4.3m (14')	13mm (½")
350 to 450mm (14" to 18")	5.0m (16')	25mm (1")

3.3.3 Install hangers to provide minimum 32mm (1¼") clear space between finished covering and adjacent work.

3.3.4 Place a hanger within 300mm (12") of each horizontal elbow.

3.3.5 Use hangers which are vertically adjustable 38mm (1½") minimum after piping is erected.

3.3.6 Support vertical piping at every floor.

3.3.7 Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

3.3.8 Where practical, support riser piping independently of connected horizontal piping.

3.3.9 Exposed piping, with less than 2.6m (8½ ft) clearance to floors shall be provided with two times the number of hangers normally required. Spacing shall be equal or adjusted for maximum benefit.

3.3.10 Provide copper plated hangers and supports for copper piping or provide nonferrous packing between hanger or support and piping.

3.3.11 Large capacity piping with vibration potential shall not be suspended from any building structure that will allow transfer of vibrations to the occupied spaces.

3.4 **Equipment Bases and Curbs**

3.4.1 All equipment shall be mounted on concrete bases, minimum 100mm (4") high.

3.4.2 A curb shall be provided around all piping passing through mechanical room floors, minimum 100mm (4") high.

3.4.3 Equipment bases and curbs shall be provided by the Vendor. The Vendor shall coordinate locations and sizes with the subcontractor if required.

3.4.4 Provide mounting plates to be formed into pads.

END OF SECTION

1. GENERAL

1.1 **References**

1.1.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.60-M89, Interior Alkyd Gloss Enamel

.2 CAN/CGSB-24.3-92, Identification of Piping Systems.

1.2 **Product Data**

1.2.1 Submit product data in accordance with Division 01 – General Requirements.

1.2.2 Product data to include paint colour chips and all other products specified in this section.

1.3 **Product Literature**

1.3.1 Submit product literature in accordance with Division 01 – General Requirements.

1.3.2 Product literature to include nameplates, labels, tags, lists of proposed legends.

2. PRODUCTS

2.1 **Manufacturer's Equipment Nameplates**

2.1.1 Metal or plastic lamacoid nameplate mechanically fastened to each piece of equipment by manufacturer.

2.1.2 Lettering and numbers to be raised or recessed.

2.1.3 Information to include, as appropriate:

.1 Equipment: Manufacturer's name, model, size, serial number, capacity

.2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 **System Nameplates**

2.2.1 Colours:

.1 Hazardous: red letters, white background

.2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).

2.2.2 Construction:

.1 3mm (1/8") thick laminated plastic, matte finish, with square corners, letters accurately aligned and machine engraved into core.

2.2.3 Sizes:

.1 Conform to the following table:

Size	Dimensions mm (")	No. of Lines mm (")	Height of Letters mm (")
1	10 x 50 (3/8" x 2")	1 (3/64")	3 (1/8")
2	15 x 75 (1/2" x 3")	1 (3/64")	6 (1/4")

3	15 x 75 (1/2" x 3")	2 (5/64")	3 (1/8")
4	20 x 100 (3/4" x 4")	1 (3/64")	10 (3/8")
5	20 x 100 (3/4" x 4")	2 (6/64")	6 (1/4")
6	20 x 200 (3/4" x 8")	1 (3/64")	10 (3/8")
8	25 x 125 (1" x 5")	1 (3/64")	15 (1/2")
8	25 x 125 (1" x 5")	2 (5/64")	10 (3/8")
9	32 x 200 (1-1/4" x 8")	1 (3/64")	20 (3/4")

.2 Use maximum of 25 letters/numbers per line.

2.2.4 Locations:

.1 Equipment in Mechanical Rooms: Use size #9.

.2 Equipment above ceiling: Use size #1 riveted to ceiling suspension system.

2.3 **Identification of Piping Systems**

2.3.1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

2.3.2 Legend:

.1 Block capitals to sizes and colours listed in CAN/CGSB-24.3.

2.3.3 Arrows showing direction of flow:

.1 Outside diameter of pipe insulation less than 75mm (3"): 100mm (4") long x 50mm (2") high.

.2 Outside diameter of pipe or insulation 75mm (3") and greater: 150mm (6") long x 50mm (2") high.

.3 Use double-headed arrows where flow is reversible.

2.3.4 Extent of background colour marking:

.1 To full circumference of pipe or insulation

.2 Length to accommodate pictogram, full length of legend and arrows.

2.3.5 Materials for background colour marking, legend, arrows:

.1 Pipes and tubing 20mm (3/4") and smaller: Waterproof and heat-resistant pressure sensitive plastic marker tags.

.2 All other pipes: Pressure sensitive vinyl with protective overcoating, waterproof contact adhesive undercoating suitable for ambient of 100% Relative Humidity (RH) and continuous operating temperature of 150°C and intermittent temperature of 200°C.

2.3.6 Colours and Legends:

.1 Where not listed, obtain direction from the Consultant.

.2 Colours for legends, arrows:

Background colour	Legend	Arrows

Yellow	White	Black
Green	White	Black
Red	White	Black

2.4 **Concrete Pads for Mechanical Equipment (where applicable)**

2.4.1 General Vendor to paint tops and sides of all concrete pads for mechanical equipment with two (2) coats of yellow paint.

2.5 **Valves, Controllers**

2.5.1 Brass tags with 15mm (1/2") stamped identification data filled with black paint.

2.5.2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

2.5.3 Provide coloured adhesive label indication on ceiling grid to locate valves/equipment above. Label description to match device. Size, colour and description to be pre-approved by the Consultant.

2.6 **Language**

2.6.1 Identification to be in English.

3. EXECUTION

3.1 **Timing**

3.1.1 Provide identification only after all painting specified has been completed.

3.2 **Installation**

3.2.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

3.2.2 Provide ULC and/or CSA registration plates as required by respective Region.

3.3 **Nameplates**

3.3.1 Locations:

.1 In conspicuous location to facilitate easy reading and identification from operating floor.

3.3.2 Standoffs:

.1 Provide for nameplates on hot and/or insulated surfaces.

3.3.3 Protection:

.1 Do not paint, insulate or cover in any way.

3.4 **Location of Identification on Piping Systems**

3.4.1 On long straight runs in open areas in mechanical rooms, equipment rooms, galleries, parking, tunnels not more than 1.7m (5'-8") intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.

3.4.2 Adjacent to each change in direction.

3.4.3 At least once in each small room through which piping passes.

3.4.4 On both sides of visual obstruction or where run is difficult to follow.

3.4.5 On both sides of separations such as walls, floors, partitions.

3.4.6 Where system is installed in pipe chases, ceiling spaces, galleries, other confined spaces, at entry and exit points, and at each access opening.

3.4.7 At beginning and end points of each run and at each piece of equipment in run.

3.4.8 Identification to be easily and accurately readable from usual operating areas and from access points. Position of identification to be approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 **Valves**

3.5.1 Valves, except at plumbing fixtures or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or close "S" hooks.

3.5.2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Consultant. Provide one copy (reduced in size if required) in each operating and maintenance manual.

3.5.3 Number valves in each system consecutively.

END OF SECTION

1. GENERAL

1.1 **Quality Assurance**

1.1.1 Test equipment and material where specified required by authorities having jurisdiction to demonstrate its proper and safe operation.

1.1.2 Test procedures shall be in accordance with applicable portions of:

.1 Ontario Building Code
.2 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
.3 American Society of Mechanical Engineers
.4 Ontario Ministry of Health
.5 Local codes and ordinances
.6 Other recognized test codes

1.1.3 Provide additional tests and re-testing as required and requested by the Consultant or Region.

1.2 **Submittals**

1.2.1 Obtain certificates of approval and acceptance from authorities having jurisdiction and include in Operating and Maintenance Manuals.

1.2.2 Prior to commencing Work, shop drawings shall be submitted showing equipment, proof of calibration, testing methods to be used.

1.2.3 On completion of mechanical installation, provide certification of tests with detailed data as required. Itemize tests as to time performed and personnel responsible. Include a copy of field data in Operating and Maintenance Manuals.

1.3 **Liability**

1.3.1 During tests, assume responsibility for damages in the event of injury to personnel, building or equipment and bear costs for liability, repairs and restoration.

2. PRODUCTS

2.1 All equipment and products necessary to perform tests shall be covered under Division 22 - Plumbing at no cost to the Agency.

3. EXECUTION

3.1 **Pressure Tests**

3.1.1 Piping, fixtures or equipment shall not be concealed or covered until inspected and approved by the Consultant.

3.1.2 Provide equipment, materials and labour for tests. Use test instruments from approved laboratory or manufacturer and furnish certificate showing degree of accuracy.

3.1.3 Test equipment and material where specified required by authorities having jurisdiction to demonstrate its proper and safe operation.

3.1.4 Provide notice to the Consultant before tests.

3.1.5 Carry out hydraulic tests for a minimum of one (1) hour as per OBC. Where leakage occurs, repair and retest.

3.1.6 Domestic and Make-Up Water Piping: Test to 1½ times maximum working pressure or 1034kPa (150psi) water pressure measured at system low point.

3.1.7 Drainage Systems: Test by filling with water to produce water pressure of 35kPa (5psi) minimum and 83kPa (12psi) maximum. Check for proper grade and obstruction by ball test or other approved means.

3.2 **Equipment Tests**

3.2.1 Perform testing and balancing of all equipment and systems as per manufacturer's recommendations and requirements under full operational ranges and submit reports.

3.2.2 Follow start-up procedures as recommended by manufacturer

3.2.3 Use the services of a qualified Technician and submit report.

3.3 **Test Reports**

3.3.1 Submit all test reports to the Consultant as specified herein and as requested by the municipal plumbing inspector, within one (1) week of each test completion.

3.3.2 Include a copy of all test reports in the manuals.

END OF SECTION

1. GENERAL

1.1 **Work Included**

1.1.1 Piping Insulation
1.1.2 Adhesives, Tie wires, Tapes
1.1.3 Recovering

1.2 **Quality Assurance**

1.2.1 All workers engaged in the application of insulation shall be journeymen, or indentured apprentices working under a journeyman who is on the site. Trades Qualification certificates must be submitted prior to commencing work and must be on site for inspection.

1.3 **Job Conditions**

1.3.1 Deliver material to job site in original non-broken factory packaging, labeled with manufacturer's density and thickness.
1.3.2 Perform work at ambient and equipment temperatures as recommended by the adhesive manufacturer. Make good separation of joints or cracking of insulation due to thermal movement or poor workmanship.

1.4 **Acceptable Manufacturers:**

1.4.1 Fibreglass Canada
1.4.2 Knauf
1.4.3 Mason
1.4.4 Owens Corning
1.4.5 Johns Manville
1.4.6 Or Agency approved equivalent.

2. PRODUCTS

2.1 **General**

2.1.1 Adhesives, Insulation, Coatings, Sealers and Recovering Jackets shall have composite fire and smoke hazard ratings not exceeding 25 for flame spread and 50 for smoke developed per OBC and NFPA 90A requirements.
2.1.2 Adhesives, coatings and sealers shall be waterproof.

2.2 **Materials**

2.2.1 Insulation shall be precovered, preformed insulation complete with foil or kraft all purpose jacket unless otherwise noted.
2.2.2 Insulation shall be 25.4mm (1”) thick unless otherwise noted.

2.2.3 Cold Piping: Fine fibrous glass insulation with factory applied vapour barrier jacket, molded to conform to piping, "K" value at 0.035 W/m-deg C (0.24 btu-in/sq ft/deg F/hr).

2.2.4 Hot and Tempered Water Piping: Fine fibrous glass insulation with factory applied general purpose jacket, molded to conform to ping, "K" value at 0.035 W/m-deg C (0.24 btu-in/sq. ft/deg. F/hr).

2.2.5 Concealed Vents: Flexible fibrous glass insulation with factory applied vapour barrier jacket, molded to conform to piping, "K" value at 0.038 W/m-deg C (0.26 btu-in/sq ft/deg F/hr).

2.2.6 Storm Drainage: Flexible fibrous glass insulation, "K" value at 0.038 W/m-deg C (0.26 btu-in/sq ft/deg F/hr).

2.2.7 Recovering Jackets, Exposed Finished Areas (i.e. Mechanical Rooms, Custodial Rooms, Storage Rooms, etc.): PVC pre-formed.

3. EXECUTION

3.1 Preparation

3.1.1 Do not install covering before piping and equipment has been tested and approved.

3.1.2 Ensure surface is clean and dry prior to installation. Ensure insulation is dry before and during application. Finish with systems at operating conditions.

3.1.3 Verify that items to be insulated have been pressure tested and approved before applying insulation material.

3.1.4 Verify that surfaces are clean, foreign material removed, and dry.

3.2 Installation

3.2.1 In non fire rated surfaces, ensure insulation is continuous through inside walls. Pack around pipes with fireproof self-supporting insulation material, properly sealed.

3.2.2 Finish insulation neatly at hangers, supports and other protrusions.

3.2.3 Provide recovering jackets on exposed insulation as specified herein.

3.2.4 Coat recovering jacket with two coats of waterproof fire retardant coating.

3.2.5 Do not install and seal vapour proof insulation if ambient air has a high humidity.

3.2.6 Pipe hangers shall wrap around outside of insulation for all sizes. Piping shall be provided with insulation flashing of heavy gauge metal to prevent crushing and hanger sized for exterior of insulation.

3.2.7 For non-fire rated barriers (e.g. wall, floor, ceiling, or roof) continue insulation and vapor barrier through penetrations. For fire rated barriers, provide ULC/FM approved through penetration stop systems.

3.3 **Domestic Water Piping – Hot, Cold and Tempered**

3.3.1 Insulate all new domestic hot, cold, recirculation and tempered water piping.

3.3.2 Insulate valves, unions, flanges, strainers, flexible connections and expansion joints for all cold water systems. Not required for hot or tempered water systems.

3.3.3 Cover elbows, tees and similar fittings with equivalent thickness of insulation material.

3.4 **Storm Drainage**

3.4.1 Allow for re-insulation of vertical and horizontal piping where exposed during renovations.

3.5 **Plumbing Vents**

3.5.1 Insulate plumbing vents within 1.5m (5') of insulated surface penetration where concealed.

END OF SECTION

1. GENERAL

1.1 **Quality Assurance**

1.1.1 Water piping shall meet the requirements of the Ontario Building Code and Municipal Codes.

1.1.2 Pipe fittings shall conform to the following standards:

.1 ANSI B36.10, ASTM-197-47 (Materials)

.2 ANSI B16.24, ANSI/ASME B16.15, ANSI B16.8, ANSI/ASME B16.22 (Copper Fittings)

1.2 **Reference Sections**

1.2.1 Section 22 05 01 – Plumbing General Req's

1.2.2 Section 22 05 29 – Hangers and Supports

1.2.3 Section 22 07 19 – Piping Insulation

1.3 **Reference Standards and Codes**

1.3.1 Ontario Building Code

1.3.2 ASTM

1.3.3 CSA

1.3.4 ANSI

1.3.5 ULC

1.3.6 Local Codes and Requirements

2. PRODUCTS

2.1 **Domestic Water (Aboveground)**

2.1.1 Domestic hot and cold water pipe shall be Type "L" hard drawn copper tubing, conforming to ASTM B88. Domestic hot water recirculation piping shall be Type "K".

2.1.2 Fittings shall be wrought copper, solder joint, pressure type. Make soldered joints on copper tubing for potable water using lead free solder and matching flux.

2.1.3 Solder to threaded adapters shall be provided at screwed valves or equipment.

2.1.4 Unions shall be all bronze construction with ground joint and either solder joint or screwed ends as required. Provide dielectric unions or couplings at all connections between copper tubing and ferrous piping.

2.1.5 Provide commercial type water hammer arrestors on all plumbing lines serving fixtures and equipment with quick closing or solenoid valves.

2.1.6 Exposed plumbing brass and metal work shall be heavy chromium plated (including under countertops without cabinets).

2.1.7 Hot, cold and tempered water piping to fixtures shall be flexible copper tube complete with angle type screwdriver stop, reducer, and escutcheon plate.

2.1.8 Provide isolation valves on domestic water piping to each group of fixtures.

2.2 **Domestic water (underground – where applicable)**

2.2.1 50mm (2") and smaller: Copper Type K, ASTM B88, annealed temper.

2.2.2 100mm (4") and larger: Listed PVC

2.3 **Water hammer arrestors**

2.3.1 Refer to 22 42 00 – Plumbing Fixtures and Trim.

2.4 **Solder**

2.4.1 Potable water systems shall use 95:5 tin-antimony solder to ASTM B 32, lead free alloys.

2.5 **Aboveground drainage, venting and storm**

2.5.1 Pipe up to and including 50mm (2") for services (except Urinals, where applicable), shall be:

.1 Copper DWV pipe complete with cast brass or wrought copper drainage fittings to ASME B16.23, or ASME B16.29 with solder joints, use tin-antimony solder 95/5 to ASTM B32 alloy Sb5 and matching flux for copper drain, waste, and vent piping.

2.5.2 Pipe up to and including 50mm (2") for Urinals (where applicable) shall be:

.1 PVC DWV pipe and fittings certified to CSA B181.2 and tested and listed in accordance with CAN/ULC S102.2 and clearly marked with the certification logo indicating a Flame Spread Rating not more than 25 and a Smoke Developed Classification not exceeding 50, equal to IPEX XFR.

2.5.3 Pipe 75mm (3") and up shall be:

.1 Copper DWV pipe complete with cast brass or wrought copper drainage fittings to ASME B16.23, or ASME B16.29 with solder joints, use tin-antimony solder 95/5 to ASTM B32 alloy Sb5 and matching flux for copper drain, waste, and vent piping, or

.2 Cast iron MJ pipe to CSA B70. Mechanical sleeve joints to CSA B602 and ASTM C1540 with neoprene or butyl rubber compression gaskets to ASTM C564, with stainless steel sleeve and not less than four stainless steel drive clamps with stainless steel worms.

2.6 **Drainage system (underground)**

2.6.1 Pipe up to and including 75mm (3") shall be:

.1 ULC certified PVC 40 DWV pipe to CAN/CSA B181.2 complete with PVC DWV fittings to CAN/CSA B181.2 with solvent weld joint.

2.6.2 Pipe 75mm (3") up to and including 100mm (4") shall be:

.1 ULC certified PVC 40 DWV pipe to CAN/CSA B181.2 complete with PVC DWV fittings to CAN/CSA B181.2 with solvent weld joint, or

.2 ULC certified PVC SDR 28/35 BDS pipe to CAN/CSA B182.1 complete with PVC BDS fittings to CAN/CSA B182.2 with solvent weld joints.

2.6.3 Pipe 150mm (6") and up shall be:

.1 ULC certified PVC SDR 28/35 sewer pipe to CAN/CSA B182.2 complete with PVC fittings to CAN/CSA B182.2 with ring gasket joints.

2.7 **Cleanouts**

2.7.1 Refer to Section 22 13 19 – Plumbing Drains.

2.8 **Plumbing vent stack flashings**

2.8.1 Existing to be reused.

2.8.2 Where new are required due to condition or alteration, plumbing vent stack roof flashings shall be 18" (457mm) high, vandal proof, 0.064" (1.6mm) mill finish 1100-0T alloy aluminum, to CSA B272-93, with aluminum hood and perforated collar, thick pre-molded urethane insulation liner and EPDM Base Seal, bituminous painted deck flange or to match type of roofing system. Equal to Thaler SJ-31, STACK JACK Flashing.

2.9 **Firestop sealants and collars**

2.9.1 Provide firestop sealants around all pipe penetrations through rated separations.

2.9.2 Provide firestop collars for any combustible pipe penetrations through rated separations (where combustible piping is approved).

2.9.3 Intumescent insert: Flexible, elastomeric strip, two stage expansion, designed to firestop penetrations in fire-rated walls and floors and floor/ceiling assemblies.

2.9.4 Provide a minimum of 15 time free expansion.

2.9.5 Sealants shall not contain water soluble expansion ingredients.

3. EXECUTION

3.1 **General**

3.1.1 Obtain permit before beginning any work. Have drawings approved for construction by authorities having jurisdiction or local agencies prior to beginning work.

3.1.2 Review all inverts and elevations before beginning any installation.

3.1.3 Do not suspend hangers including wires and rods from the steel roof deck nor from other mechanical or electrical components. Support hangers from structural bearings such as beam, top chords of steel joists or structural concrete slabs. Where structural bearings do not exist, provide angle or channel iron form nearest structural bearings to support hangers.

3.1.4 Refer to Section 22 05 29 - Hangers and Supports.

3.1.5 Have entire installation inspected, at various stages where required, to ensure approval at completion of project.

3.1.6 Provide clearance for proper installation of insulation and for access to components including but not limited to valves and drains.

3.1.7 Maintain proper grades on piping for proper drainage and provide valves at all low points.

3.1.8 All sanitary lines shall be sloped minimum 1:50 unless otherwise approved.

3.1.9 All exposed piping to run parallel to walls and in a neat and orderly fashion to maintain headroom. Group piping where possible.

3.1.10 Do not run combustible or non-approved pipe through fire separations or return air ceiling plenums. Use approved materials and methods only.

3.1.11 Provide drain valves at low points where required.

3.1.12 Install piping to allow for expansion and contraction and to eliminate stress on equipment, piping, or connections.

3.1.13 Provide isolation valves or shutoff valves at all equipment.

3.1.14 Provide cleanouts as indicated on drawings and as required by code. Floor cleanouts are not approved in finished floor areas unless otherwise noted. Ensure adequate clearance to all cleanouts.

3.1.15 Provide sleeves for piping passing through floor slab. Caulk around piping and fill entire space between piping and floor slab with approved fire retardant material to maintain required fire rating where necessary.

3.1.16 Provide fire stop sealant at all pipe penetrations through fire separations.

3.1.17 Install backflow prevention, where indicated on drawings and as required by code.

3.2 **Grades, Routes and Installations**

3.2.1 All sanitary lines shall be sloped 1:50 unless otherwise specified.

3.2.2 Route piping in orderly manner and maintain proper grades. Install to conserve headroom and interfere as little as possible with use of space.

3.2.3 Run exposed piping parallel to walls. Group piping wherever practical at common elevations.

3.2.4 Install concealed pipes close to the building structure to keep furrings to a minimum.

3.3 **Roof jacks**

3.3.1 Provide roof jacks as required, and in compliance with the roofing specifications. Generally, SBS torch down roofing requires aluminum roof jacks. Conventional bituminous roofing accepts lead or aluminum roof jacks.

3.3.2 Flash pipes projecting above finished roof surface with approved material.

3.4 **Flashing**

3.4.1 Flash all mechanical equipment passes through weather or waterproofed walls and roofs.

3.4.2 Flash floor drains over finished areas by extending flashing 250mm (10”) clear on sides. Fasten flashing to drain clamp device. Use lead sheet or approved nonmetallic waterproofing membrane.

3.5 **Sleeves**

3.5.1 Provide and set sleeves required for piping.

3.5.2 Set sleeves in position in advance of other work. Provide suitable reinforcing around sleeves.

3.5.3 Extend sleeves through potentially wet floors 50mm above finished floor level. Caulk sleeves full depth and provide floor plate.

3.5.4 Where piping passes through floor, ceiling or wall, close off space between pipe and sleeve with noncombustible insulation or approved non-combustible insulation, fire rated as required to match the rating of the penetrated surface. Provide tight fitting metal caps on both sides.

3.5.5 Install chrome plated escutcheons where piping passes through finished surfaces including millwork.

3.5.6 Size large enough to allow for movement due to expansion and to provide for continuous insulation.

3.6 **Firestop Sealants and Collars**

3.6.1 Clean all concrete, masonry and stone penetrations of all contaminants and impurities, concrete form release agents,

water repellents, oils, surface dirt and rust, scale, all old sealants and other surface treatments.

3.6.2 Metal surfaces shall be cleaned by wiping them with an oil-free absorbent cloth saturated with solvent such as xylol or toluol. Do not use alcohols.

3.6.3 Do not apply to polycarbonates or to building materials that bleed oils, plasticizers or solvents, or where sealant is not exposed to atmospheric moisture, or to surfaces which have been or will be painted.

3.6.4 Collars are to be installed with steel fasteners or steel expansion anchors. Low melting temperature anchors of lead, plastic or aluminum are not approved.

3.6.5 Installation only when temperatures are between 4°C and 37°C.

3.7 **Identification**

3.7.1 Identify all piping with type of service and arrows.

3.7.2 Refer to Section 22 05 53 - Identification.

3.8 **Testing**

3.8.1 Refer to Section 22 05 92 - Testing.

3.9 **Cleaning**

3.9.1 Thoroughly flush domestic water systems upon completion of work.

END OF SECTION

1. GENERAL

1.1 **General Requirements**

1.1.1 Provide materials, equipment and labour to install plumbing as required by Provincial and local codes as specified herein, using tradespersons holding certificates of competency required from O.reg 1073.

1.1.2 Provide water and drainage connections to equipment specified in other sections of this specification.

1.2 **Quality Assurance**

1.2.1 Provide new equipment, CSA approved.

1.3 **Submittals**

1.3.1 Submit shop drawings to the Consultant for review prior to ordering or installation.

1.3.2 Shop drawings shall include manufacturer, model numbers, performance data, and indicate conformance to above reference standards.

1.3.3 Fixtures and Cleanouts: Dimensions and installation details

1.3.4 Floor drains: Accessories, dimensions and installation details

1.3.5 One copy of all stamped reviewed shop drawings shall be included in maintenance manual.

1.4 **Acceptable Manufacturers:**

1.4.1 Watts

1.4.2 Zurn

1.4.3 Mifab

1.4.4 Jay R Smith

1.4.5 Or Agency approved equivalent.

2. PRODUCTS

2.1 **Cleanouts and Cleanout Accessories**

2.1.1 Sanitary and Storm: Provide caulked or threaded type cleanouts extended to unfinished floor or wall surface. Provide bolted coverplate or threaded cleanouts on vertical rainwater leaders.

2.1.2 Floor cleanout access covers in unfinished areas shall be round with nickel bronze scoriated frames and plates. Wall cleanouts shall be located behind approved access panels.

2.1.3 Provide cleanout inside building at building wall where sanitary and storm services leave the building. Space cleanouts along horizontal drainage lines per OBC requirements.

2.1.4 FLOOR CLEANOUTS / ACCESS COVERS – ADJUSTABLE CLEANOUTS
Watts #CO-200-R-34G Cleanout - epoxy coated, cast iron body, 127 mm (5") round adjustable gasketed nickel bronze top, ABS plug with neoprene gasket, no hub outlet.

2.2 **Floor Drains**

2.2.1 Floor drains to be suitable for application and environment they are installed.

2.2.2 FD - FLOOR DRAINS - FINISHED AREA - ADJUSTABLE STRAINER – ROUND
Watts #FD-200-5-1 Floor Drain - epoxy coated, cast iron body, trap primer connection with plug, anchor flange and weepholes, no hub outlet Watts 127 mm (5-1 5") diameter, nickel bronze adjustable round strainer.

2.2.3 HD - HUB DRAINS – UNFINISHED AREA
Watts #FD-200-7-DD-1 Floor Drain - epoxy coated, cast iron body, trap primer connection with plug, anchor flange and weepholes, no hub outlet Watts -DD-127 mm (5-1 5") diameter, nickel bronze hub funnel.

2.3 **Trap Seal Primers**

2.3.1 TSP - TRAP SEAL PRIMERS – UNDER-LAV
Precision Plumbing Products Model #PRO1-ULP500 under lavatory trap primer valve. Chrome plated angle stop with 15.875mm (5/8") compression fitting, body and cap. 9.525mm (3/8") compression lavatory supply fitting. Minimum discharge rate when flow is activated for 5 seconds at 20 psi is 0.845 oz. Minimum in-line flow through the valve is 0.25 gpm. Maximum is 7 gpm.

3. EXECUTION

3.1 **Installation**

3.1.1 Install trap primers for all floor drains and as required by codes. Refer to schedule.

3.1.2 Drainage lines 75mm (3") and less shall slope at 2% grade unless otherwise shown on drawings. All lines 100mm (4") and larger shall slope at 1%.

3.2 **Cleanouts and Access Covers**

3.2.1 Unless otherwise noted, floor cleanouts in finished areas are not approved.

3.2.2 Ensure ample clearance at cleanout for rodding of drainage systems.

3.2.3 Provide cleanouts at the base of each stack.

3.3 **Floor Drains**

3.3.1 Provide trap primer connected to intermittent operating cold water service on suitable fixture.

3.3.2 Provide sealed drains where indicated.

3.3.3 Set drain at elevation to allow finished floor to slope to mouth. Coordinate setting elevation with floor finish thickness and the Vendor prior to installation.

3.3.4 Provide flashing of sheet lead or approved nonmetallic membrane where floor drains are located over occupied spaces.

3.3.5 All floor drains and trap primer lines shall be covered, sealed and protected during construction to ensure construction waste or other debris does not fall in. If any drainage problems occur due to floor drains not being covered, the Vendor shall rectify at no cost to the Agency.

3.4 **Trap Seal Primers**

3.4.1 Coordinate location of all trap seal primers with site and the Contract Drawings

END OF SECTION

1. GENERAL

1.1 **Requirements**

1.1.1 Plumbing fixtures shall meet the following requirements where applicable:

.1 Ontario Building Code

.2 Local Codes and Requirements including barrier free.

1.2 **Codes and Standards**

1.2.1 CAN 3-B45

1.2.2 CSA B125

1.3 **Submittals**

1.3.1 Shop Drawings:

.1 Submit shop drawings to the Consultant for review prior to ordering or installation.

.2 Shop drawings shall include manufacturer, model numbers, performance data, and indicate conformance to above reference standards.

.3 One copy of all stamped reviewed shop drawings shall be included in maintenance manual.

1.3.2 Operation and Maintenance Data:

.1 Provide operation and maintenance literature for all equipment indicating manufacturer and model of equipment, instructions for operation and maintenance of same, and parts list.

.2 Operation and maintenance data shall be included in the maintenance manual.

2. PRODUCTS

2.1 **Fixtures**

2.1.1 Determine fixture quantity and location from Architectural Drawings. Refer to and provide plumbing fixtures as per schedule on mechanical drawings.

2.1.2 Refer to Section 22 05 01 – Plumbing General Req's for mounting heights. Coordinate with Architectural Drawings and the Vendor prior to installation.

2.1.3 Report any discrepancies of fixtures and mounting heights between Architectural Drawing and Plumbing Drawings/Schedule/Specification to the Consultant.

2.1.4 Plumbing Fixtures shall be approved for intended application.

2.1.5 Fixtures and trim of same type to be of one manufacturer.

2.1.6 Where particular fixture or piece of trim is identified by a manufacturers' catalogue designation this reference is to establish standard and fixture or trim from manufacturers

listed below is equally acceptable when conforming to the same level of quality.

2.1.7 Finished surfaces to be clear, smooth and bright, and guaranteed not to craze, discolour or scale.

2.1.8 Visible parts of faucets, escutcheons, wastes, strainers, traps, shower heads, supplies and stops to be chrome plated.

2.1.9 Floor mounted water closets to be fitted with china bolt caps.

2.1.10 Swing spouts for sinks shall be sized so spout does not swing beyond the sides of bowl. Spouts for sinks shall have stopper to prevent spout from swinging past back of bowl.

2.1.11 Water supply faucet spouts to be fitted with modulators (non-aerating).

2.1.12 Fixtures to be ordered to suit construction schedule.

2.1.13 Acceptable Manufacturers:

.1 Vitreous China (water closets, urinals and lavatories): American Standard

.2 Wall Carriers: Watts, Zurn

.3 Toilet Seats: American Standard

.4 Faucets: Moen

.5 Stainless Steel Sinks: American Standard

.6 Or Region approved equivalent.

2.2 **Trim**

2.2.1 Provide trim for plumbing fixtures as per schedule.

2.2.2 Trim to be suitable for exposed piping application where applicable.

2.3 **New Plumbing Fixture Schedule**

2.3.1 Refer to mechanical drawings for new plumbing fixture schedule.

3. EXECUTION

3.1 **Installation**

3.1.1 Support fixtures level and square and connect with supplies, drains, traps and vents.

3.1.2 Hot water service to be on left side.

3.1.3 Fixtures on outside walls to have water supplies in insulated chase.

3.1.4 Exposed supply tail pieces, drains and traps on barrier free fixtures are to be insulated and/or covered in conformance with the Ontario Building Code.

3.1.5 Completely remove and reinstall existing fixtures which are indicated to remain and connect to drain, vent, hot and cold water supply piping, to approval of authorities. Provide new seals and “O” rings.

3.1.6 Accurately lay out roughing-in. Offsets will not be accepted.
3.1.7 Provide fixtures complete with necessary trim, including traps, faucets, supplies, stops, strainers and escutcheons. Any exposed trim shall be chrome.
3.1.8 Provide chrome plated rigid or flexible connections with screwdriver stops, reducers, and escutcheons.
3.1.9 Provide trap easily accessible for service and cleaning.
3.1.10 Provide independent threaded check valves on the hot and cold water supply lines to all thermostatic and pressure balancing faucets prior to mixing valves.
3.1.11 Seal fixtures and trim to counters as per architectural and millwork specifications.
3.1.12 Install vacuum breakers on plumbing lines where contamination of domestic water may occur.
3.1.13 Install any prefabricated shower units with additional support by applying a heavy donut or furrow of wet cement, just prior to unit installation and level unit so that the cement will form a firm support between the floor and the unit.
3.1.14 Provide caulking around mounting face to seal with clear or white silicone.
3.1.15 Thoroughly clean all plumbing fixtures and trim prior to turnover of units back to residents.

3.2 **Fixture Supports**

3.2.1 Install wall mounted fixtures with approved wall carriers where specified. Model to suit installation.
3.2.2 Provide plates, brackets, wall carriers, cleats, and supports to rigidly secure fixtures in place.
3.2.3 Fasten wall brackets with bolts attached to double steel supporting plates.
3.2.4 Bolt fixture to wall through cored holes under lavatory wall flange, using chrome plated carriage bolts with integral washers, and expansion shields.
3.2.5 Install extra heavy chair carriers for fixtures not directly supported from floor.
3.2.6 Conceal vertical supports and baseplates in wall construction.
3.2.7 All floor mounted plumbing fixtures (such as water closet bowls, service sinks, mop receptors, and pre-fabricated shower units) to be set in mastic.

3.3 **Mounting Heights**

3.3.1 Refer to Section 22 05 01 – Plumbing General Req's and Architectural Drawings/Details for mounting heights. Report any discrepancies.

3.4 **Protection**

3.4.1 Plumbing fixtures and trim to be covered with plywood, cardboard or heavy paper and kept protected before, during and after installation and until work is completed and accepted.

3.4.2 Clean fixtures and trim immediately prior to building completion.

END OF SECTION

1. GENERAL

1.1 General Requirements

1.1.1 The requirements of this section shall apply to all sections in Division 23 – Heating, Ventilation and Air Conditioning.

1.1.2 Conform to Division 01 General Conditions.

1.1.3 All material, labour, equipment, and services required under this section shall be the full responsibility of the Mechanical Vendor including any material, labour, equipment, and services provided by their subcontractors.

1.1.4 Complete and submit the Supplemental Tender Form including list of equipment and materials to be used on this project and forming part of the tender documents.

1.2 Summary of Work

1.2.1 Refer to Division 1, Section 01 11 00 – Summary of Work.

1.3 Definitions

1.3.1 "Supply" shall mean supply only.

1.3.2 "Install" shall mean install and connect.

1.3.3 "Provide" shall mean supply, install, and connect.

1.3.4 "Drawings and Specifications" shall mean Contract Documents.

1.3.5 "Authorities" or "Authorities having jurisdiction" shall mean all agencies that enforce the applicable laws, ordinances, rules, regulations, or codes of the Place of Work.

1.3.6 "Work" shall mean all equipment, materials, labour, and permits to provide a complete and operational mechanical system as detailed in the drawings and specifications.

1.4 Related Work

1.4.1 Division 01 – General Requirements

1.4.2 Division 22 – Plumbing

1.4.3 Division 26 – Electrical

1.4.4 Division 23 – Heating, Ventilation and Air Conditioning specifications form a part of the Contract Documents and shall be read, interpreted, and coordinated with all other Divisions.

1.5 Intent

1.5.1 The drawings and specifications are not a detailed set of installation instructions. Drawings and specifications are complementary to one another and that which is shown on one is as binding as that which is shown on both.

1.5.2 The Consultant shall be immediately informed of any discrepancies between drawings and specifications leaving in doubt the true intent of the work.

1.5.3 Supply all labour, equipment, and materials necessary to install updated and operational mechanical systems described herein and shown on the drawings.

1.5.4 It is the intent of these drawings and specifications to provide for a mechanical installation complete and in operating condition. The responsibility for supplying and installing all material necessary to accomplish this, except where specifically noted that such work or materials is not included, shall be part of this section.

1.5.5 Assess and be familiar with existing site conditions prior to pricing and construction and allow for same in tender price.

1.5.6 All work must be done by qualified, certified and experienced persons in such line of work. Trade certificates must be available on demand.

1.5.7 All work shall be in accordance with standard industry practice accepted and recognized by the Consultant and the Trade.

1.5.8 This Vendor shall coordinate with and cooperate with all other trades prior to installation. Where work interferes with other trades due to failure to coordinate or cooperate, the work shall be removed and relocated as approved by the Consultant at no extra cost to the Agency.

1.5.9 The Consultant shall have the right to reject any work that does not conform to the Contract Documents and accepted standards of practice including but not limited to performance, quietness of operation and finish.

1.6 **Codes, Bylaws, Standards, and Regulations**

1.6.1 The mechanical system shall comply with the latest editions and revisions of applicable codes, bylaws, standards, and regulations including but not limited to:

.1 Ontario Building Code
.2 ASHRAE
.3 SMACNA
.4 NFPA
.5 Canadian Standards Association
.6 Canadian Gas Association
.7 Local Building Bylaws
.8 Ontario Occupational Health and Safety Act
.9 Ontario Fire Code

1.6.2 Provide work in accordance with the requirements of all applicable government codes, local by-laws, underwriter's regulations base building standards, contract documents, and all authorities having jurisdiction.

1.6.3 Where discrepancies occur between contract drawings and specifications and above codes and standards referred to

herein, the Vendor is to notify the Consultant in writing and obtain clarification prior to proceeding with the work.

1.6.4 Vendors shall not reduce the requirements on the contract drawings and specifications by applying any codes and standards referred to herein.

1.7 **Permits and Fees**

1.7.1 Obtain copy of building permit, as applied for by the consultant and the Agency, when ready and issued by the local municipality. Post on site as per municipal requirements.

1.7.2 Coordinate and schedule all required inspections and give necessary notice to all authorities.

1.7.3 Upon completion of project, provide inspection certificates confirming acceptance by all authorities having jurisdiction for all applicable disciplines.

1.8 **Contract Breakdown**

1.8.1 After the tenders close, submit a breakdown of the price into scope and trades to the satisfaction of the Consultant based on the sections of the specifications.

1.8.2 Breakdown shall include but not be limited to:

.1 Mobilization and shop drawing submission
.2 Fans
.3 Grilles and Diffusers
.4 Ductwork
.5 Duct Insulation
.6 Close-out Submittals – Manuals & As-builts

1.8.3 Progress claims shall be based on the breakdown. Submit in table format showing contract amount, work complete to date as percentage, previous draw, amount this draw and balance for each line item.

1.9 **Shop Drawings**

1.9.1 Within thirty (30) days of award, the Vendor shall submit shop drawings of all equipment for the project. Partial submittals will not be accepted.

1.9.2 Prior to ordering of products or delivery of any products to job site, submit shop drawings electronically in PDF format to the Consultant for review and comments. Submit sufficiently in advance of construction to allow ample time for review. Size of shop drawings shall be 215.9 by 279.4 mm (8.5x11"). 279 × 432 mm (11x17") will be acceptable where appropriate for content and scale.

1.9.3 Submittals shall contain but not be limited to:

.1 Construction information
.2 Product data

.3 Performance data including performance curves
.4 Acoustical sound power data
.5 Dimensional layout and clearances
.6 Mounting arrangements
.7 Certification of compliance to applicable codes
.8 Operating and Maintenance information
.9 Wiring, single line and schematic diagrams (where applicable)

1.9.4 Clearly mark each sheet of printed submittal material, using arrow, underlining or circling, to show particular sizes, dimensions, wiring diagrams, operating clearances, control diagrams, project identification, types, model numbers, ratings, capacities and options actually being proposed. Cross out non-applicable material. Note on the submittal specified features such as special tank linings, pump seals, materials or painting.

1.9.5 Prior to submission to the Consultant, the Vendor shall review all shop drawings. By this review the Vendor represents that they have determined and verified all field measurements, field construction criteria, materials, catalogue numbers and similar data or will do so and that they have checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents.

1.9.6 The Vendor's review of each shop drawing shall be indicated by their approval stamp, date and signature on the front of each page. Drawings will not be considered if not previously checked by the Vendor.

1.9.7 Review comments from the Consultant. If shop drawings are modified, confirm changes before proceeding. If shop drawings are not approved, revise and resubmit changes for approval within two (2) weeks.

1.9.8 Review of the shop drawings by the Consultant does not relieve the Vendor or their Supplier of the responsibility to provide the correct and complete equipment, material or installation.

1.9.9 Keep one complete set of shop drawings at the job site during construction.

1.9.10 Include stamped reviewed shop drawings in the Maintenance Manuals.

1.10 **Product Delivery Schedule**

1.10.1 Within two (2) weeks from shop drawing review, a schedule must be submitted by the Vendor showing projected delivery dates of all products to meet required construction schedule.

1.11 **Construction Meetings**

1.11.1 The Vendor shall attend all site meetings unless otherwise pre-approved.
1.11.2 Sub-trades shall attend site meetings as requested or as required.

1.12 **Record Drawings**
1.12.1 Refer to Section 23 05 02 – Documentation and Manuals.
1.12.2 Maintain accurate, neat, and clean record drawings on an on-going basis during construction to be reviewed periodically by the Consultant during construction.
1.12.3 Record drawing mark-ups shall be made available at every site meeting or inspection.
1.12.4 Record drawings shall include but not be limited to final location of any access doors on same for future service requirements.
1.12.5 Prior to Substantial Performance submit a complete set of record drawings in pdf format to the consultant for review.

1.13 **Reports**
1.13.1 Provide the following reports upon completion of work by certified subcontractors for review and approval by the Consultant:
.1 Equipment Start-Up Reports
.2 Balance Reports
.3 Duct Cleaning Reports
.4 Demonstration and Training Reports/Logs
1.13.2 All reports shall be dated and signed by the Technician who performed the start-up and/or tests.

1.14 **Maintenance Manual**
1.14.1 Refer to Section 23 05 02 – Documentation and Manuals.
1.14.2 Provide the Agency with an electronic copy of the indexed, maintenance manuals on memory stick or file transfer. Manuals shall contain and be tabbed in the following order:
.1 Table of Contents
.2 Vendor's, Manufacturer's and Supplier's Contact Information
.3 Warranty Letter
.4 Reports as specified herein and as applicable
.5 ALL stamped approved shop drawings – Include a tab and blank section for any Agency supplied equipment
.6 Equipment maintenance instructions and manuals
.7 As Built drawings
1.14.3 Submit one (1) complete copy to the Consultant for review and approval. Revise based on any comments and resubmit electronic copy to Consultant.

1.15 **Testing and Startup**

1.15.1 Test and startup all equipment and work.

1.15.2 Fully coordinate all testing and startups with all trades, the Consultant, and authorities having jurisdiction.

1.15.3 Provide adequate notice to all parties.

1.16 **Demonstration and Training**

1.16.1 Demonstrate and train the Agency on proper operation of the system.

1.16.2 The Vendor shall arrange for all necessary personnel and equipment specialists to be in attendance for purposes of demonstration and training.

1.16.3 Provide instruction by a manufacturer's representatives as required to fully demonstrate the systems, where applicable.

1.17 **Substantial Completion and Performance**

1.17.1 Substantial completion and performance shall be determined and awarded by the Consultant.

1.17.2 Complete the following to the satisfaction of the Consultant prior to request for substantial performance:

.1 Fire Dampers and Fire Stopping
.2 System Testing and Startups including report
.3 Balancing including report
.4 Maintenance Manuals
.5 As Built Drawings
.6 Demonstration and Training

1.18 **Warranty**

1.18.1 Provide a one (1) year full parts and labour warranty for the new system from date of substantial completion.

1.18.2 Submit warranty letter on Company letterhead signed by Company representative stating warranty terms including warranty period from date of substantial completion.

2. PRODUCTS

2.1 **Materials**

2.1.1 All material used shall be new, free from defects, of quality specified, and installed in accordance with manufacturer's instructions.

2.1.2 Major equipment shall have nameplates on the exterior of the equipment in a visible location containing manufacturer's name, model number, serial number, performance data, and electrical characteristics.

2.1.3 The same manufacturer shall be used for types of equipment used in similar applications.

2.1.4 It is the responsibility of the Vendor to store and protect materials supplied by this scope.
2.1.5 Materials shall be stored in original containers.
2.1.6 Submit to the Consultant and the Agency, current MSDS Sheets for any products being used on the job site where they exist.
2.1.7 Remove and dispose of all redundant materials and garbage from site.
2.1.8 Supply anchor bolts and templates for installation by other Divisions.

2.2 **Selected Products and Equivalents**

2.2.1 Sections within Division 23 list "Acceptable Manufacturers" which must meet characteristics of the specified equipment and products for each section.
2.2.2 Base specified products are specified and/or shown on the drawings, and identified by manufacturer's name, type and catalogue number.
2.2.3 Any alternate manufacturers from base specified products and equipment must equal or exceed the quality, finish and performance of those base specified and/or shown, and not exceed the space requirements allotted on the drawings. Include costs for any associated work to accommodate such substitutions, including the Consultant's time and revisions to the work of other divisions (i.e. electrical changes).
2.2.4 If item or material specified is unobtainable, state in Tender proposed substitute and amount added or deducted for its use. Extra monies will not be paid for substitutions after the Contract has been awarded.
2.2.5 If item of size indicated is unobtainable, supply next larger size without additional charge.

2.3 **Quality of Product**

2.3.1 All products provided shall be listed and/or approved by relevant authorities and new, unless otherwise specified.
2.3.2 If products specified are not listed and/or approved, obtain approval of provincial regulatory authority. Pay all applicable charges levied and make all modifications required for approval.
2.3.3 All products provided shall be new including those not specified and shall be of a quality best suited to the purpose required and their use subject to approval by the Consultant.

2.4 **Product Finishes**

2.4.1 Shop drawings shall indicate finishes. Use standard finish unless otherwise specified.

2.4.2 Repair dents and touch up all damaged finishes with matching finish, or if required by the Consultant or Agency, completely repaint or replace damaged surface at no extra cost to the Contract.

2.5 **Access Door**

2.5.1 Refer to requirements in Division 22, Plumbing.

2.6 **Fire Stopping**

2.6.1 The Vendor shall work with all other subcontractors on the project in providing one common method of fire stopping all penetrations made in the fire rated assemblies.

2.6.2 Approved fire stopping and smoke seal material in all fire separations and fire ratings within annular space between pipes, ducts, insulation and adjacent fire separation and/or fire rating.

2.6.3 Do not use cementitious or rigid seals around penetrations for pipe, ductwork, or other mechanical items.

2.6.4 Insulated pipes and ducts; ensure integrity of insulation and vapour barrier at fire separation.

2.6.5 Provide materials and systems capable of maintaining effective barrier against flame, smoke and gases. Ensure continuity and integrity of fire separation.

2.6.6 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.

2.6.7 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation. Provide "fire wrap" blanket around services penetrating fire walls. Extent of blanket must correspond to ULC recommendations.

2.6.8 The fire stopping materials are not to shrink, slump or sag and to be free of asbestos, halogens and volatile solvents.

2.6.9 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.

2.6.10 Fire stop materials are to be capable of receiving finish materials in those areas which are exposed and scheduled to receive finishes. Exposed surfaces are to be acceptable to consultant prior to application of finish.

2.6.11 Firestopping shall be inspected and approved by local authority prior to concealment of enclosure.

2.6.12 Install material and components in accordance with ULC certification, manufacturer's instructions and local authority.

2.6.13 Submit product literature and insulation material on fire stopping in shop drawing and product data manual. Maintain copies of these on site for viewing by installers and Consultant.

2.6.14 Manufacturer of product shall provide certification of installation. Submit letter to the consultant.

2.6.15 Acceptable Manufacturers
- .1 Fryesleeve Industries Inc.
- .2 General Electric Pensiil Firestop System
- .3 International Protective Coatings Corp
- .4 Rectorseal Corporation (Metacaulk)
- .5 Proset System
- .6 3M
- .7 AD Systems
- .8 Hilti
- .9 Agency approved equivalent

2.6.16 Ensure firestop manufacturer representative performs on-site inspections and certifies installation. Submit inspection reports/certification at time of substantial completion.

2.7 **Escutcheons**

2.7.1 On pipes and ductwork passing through walls, partitions, floors and ceilings in finished areas.

2.7.2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws.

2.7.3 Outside diameter to cover opening or sleeve.

2.7.4 Inside diameter to fit around finished pipe.

2.8 **Spare Parts**

2.8.1 Provide spare parts as specified under this Division.

2.8.2 Provide list of equipment in maintenance manuals indicating corresponding spare parts required. List of spare parts to be signed off by receiving personnel.

2.9 **Special Tools**

2.9.1 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Maintenance Materials Special Tools and Spare Parts.

3. EXECUTION

3.1 **Site Examination**

3.1.1 Examine the site of work and become familiar with all features and characteristics affecting this work before submitting tender.

3.1.2 No additional compensation will be given for extra work due to existing conditions which such examination should have disclosed.

3.1.3 Report to the Consultant any unsatisfactory conditions which may adversely affect the proper completion of this work.

3.2 **Interference and Coordination Drawings**

3.2.1 Examine the drawings and all divisions of the specifications.

3.2.2 Prepare interference and equipment layout drawings to ensure all components will be properly accommodated within the spaces provided.

3.2.3 Lay out the work and equipment with due regard to architectural, structural and electrical features, and service requirements.

3.2.4 Submit interference drawings to the Consultant.

3.2.5 Before commencing any work, obtain a ruling from the Consultant if any conflict exists, otherwise no additional compensation will be made for any necessary adjustments.

3.3 **Separation of Services**

3.3.1 Contact between dissimilar metals, such as copper and aluminum, in damp or wet locations is not permitted.

3.3.2 All pipes, ductwork and wiring shall be supported from permanent building structure. Use of other services for support is not permitted.

3.4 **Workplace Safety**

3.4.1 The workplace must be kept safe at all times.

3.4.2 Conform to all ministries of labour, and health and safety regulations at all times.

3.4.3 Use ladders and proper techniques as approved by the ministry of labour to perform all work.

3.4.4 Cover all holes/openings and provide barriers around hazards, etc. to ensure occupants and workers are not at risk.

3.4.5 Where work does not conform to such regulations, stop work immediately and report the situation to the Agency's representative or the Consultant or rectify the situation immediately.

3.4.6 Report any hazards or concerns to the Agency's representative immediately.

3.4.7 Conform to Agency's safety requirements and construction regulations.

3.5 **Temporary Requirements**

3.5.1 All temporary requirements to complete mechanical work during construction shall be the responsibility of the Vendor except temporary power or water.

3.6 **Location of Equipment**

3.6.1 Approximate distances and dimensions may be obtained by scaling off the drawings. Figured dimensions shall govern over scaled dimensions.

3.6.2 Equipment locations shown on the drawings are approximate. Locations may be revised to suit construction and equipment arrangements provided design intent is not jeopardized and there is no additional cost to the Agency.

3.7 **Mounting Heights**

3.7.1 Mounting height of equipment is from finished floor to equipment unless otherwise specified or indicated. Coordinate with block coursing if applicable.

3.7.2 Where mounting heights are not indicated on the drawings, obtain verification from the Consultant before proceeding.

3.8 **Repairs, Cutting and Restoration**

3.8.1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.

3.8.2 Each Section of this Division shall bear expense of cutting, patching, and repairing to install their work and/or replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

3.8.3 All patching, painting and making good of the existing walls, floors, ceilings, partitions and roof will be at the expense of the Vendor, but performed by the Vendor or subcontractor specializing in the type of work involved unless otherwise noted.

3.9 **Painting**

3.9.1 Refer to other Divisions for Painting unless otherwise specified herein.

3.9.2 Apply at least one (1) coat of corrosion resistant primer paint to ferrous supports and site fabricated work.

3.9.3 Prime and touch up marred finished paintwork to match original.

3.9.4 Restore to new condition, or replace equipment at discretion of the Consultant, finishes which have been damaged too extensively to be merely primed, painted and touched up.

3.10 **Concealment**

3.10.1 All equipment, components, piping, and conduit shall be concealed in ceiling spaces, bulkheads or walls in finished areas.

3.10.2 Exposed equipment, components, piping, and conduit installed in unfinished areas, shall be installed as high as possible. Run piping and conduit parallel to building lines, tight to roof deck and down columns.

3.11 **Access Doors**

3.11.1 Provide access doors as required for access, adjustment, operation, service, and maintenance.

3.12 **Clearances and Accessibility**

3.12.1 Install all work for easy access for adjustment, operation, service, and maintenance.

3.12.2 Maintain clearances for all equipment as per local codes and manufacturer's instructions.

3.12.3 Access panels shall be Acudor or equivalent with concealed hinges and screwdriver locking device.

3.12.4 Provide access panels of adequate size as required to access equipment and components in concealed areas. Do not install access doors in specialty walls or ceilings.

3.12.5 Provide fire rated access doors where installed in fire separations to match rating of separation.

3.12.6 Install all services in exposed areas so that a minimum head clearance of 2200mm (88") is maintained.

3.13 **Equipment and System Protection**

3.13.1 Protect equipment and materials from damage in storage and on site before, during, and after installation until final acceptance.

3.13.2 Protect equipment and system openings from dust and debris with appropriate covers that will withstand through the construction.

3.13.3 Where equipment and system components become dirty or damaged, clean and repair to new condition to the satisfaction of the Consultant and the Agency at no expense to the Agency.

3.14 **Supports**

3.14.1 Provide all miscellaneous metals and materials as required for support, hanging, anchoring, and guiding of all equipment, ductwork, piping, and all other work in Division 23 – Heating, Ventilation and Air Conditioning.

3.14.2 All supports must be securely mounted to structures.

3.15 **Fire Stopping**

3.15.1 Refer to Part 2.6 herein.

3.16 **Cleaning**

3.16.1 Clean interior and exterior of all updated systems.

3.16.2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition.

3.16.3 Refer to Section 23 06 30 – HVAC System Cleaning.

3.17 **Agency Supplied Equipment**

3.17.1 Connect to equipment supplied by the Agency and make operable.

3.18 **Identification and Labeling**

3.18.1 All equipment, valves, panels and devices shall be labeled under this Division.

3.19 **Field Review and Deficiencies**

3.19.1 The Vendor shall notify the Consultant when the job is ready for field review at various stages including rough-in stages.

3.19.2 During the course of construction, the Consultants will monitor construction and provide written reports of work progress, discussions and deficiencies.

3.19.3 The Vendor shall correct all deficiencies within the work period prior to the next review.

3.19.4 The Vendor shall not conceal any work until inspected. Where work was concealed, the Vendor shall remove and replace tiles, coverings or other obstructions to allow proper inspection at the Vendor's expense.

3.19.5 Upon completion of the project the Consultant will do a final review. Upon receiving the final inspection report, the Vendor must correct and sign back the inspection report indicated all deficiencies are completed. A re-inspection will only be done once the Consultant receives this in writing. Where the Consultant performs the re-inspection and the work is not complete, the Vendor is responsible for reimbursing the Consultant for the field review. The fee for additional reviews will be at the Consultant's hourly rates plus mileage and applicable taxes to be paid directly to the Consultant prior to performing the next field review.

END OF SECTION

1. GENERAL

1.1 **Work Included**

1.1.1 Operating and Maintenance Manuals
1.1.2 Assembly of equipment details sheets and shop drawings including the Agency supplied equipment.
1.1.3 Assembly of equipment and systems operating and maintenance instructions.
1.1.4 Assembly of equipment start up and performance tests and reports.
1.1.5 Assembly of Balancing Report
1.1.6 Assembly of final inspection certificates
1.1.7 As Built Drawings

1.2 **Related Work**

1.2.1 Division 01 – General Requirements
1.2.2 Section 22 05 01 – Plumbing General Requirements
1.2.3 Section 23 05 01 – HVAC General Requirements.

2. PRODUCTS

2.1 **Operation and Maintenance Materials**

2.1.1 Provide copy of complete manual in electronic PDF format on memory stick or file transfer.
2.1.2 Manufacturer's data section is to be indexed and ordered to exactly match the sections of the specifications. Each section of the manufacturer's data section is to include an up to date copy of the equipment schedule for that section. The schedule is to be revised to suit all addenda, change orders and field changes, as well as manufacturers and model numbers matching the equipment supplied.
2.1.3 Assemble or develop complete and correct documentation for the operation and maintenance information for equipment and systems provided.
2.1.4 Assemble or develop copies of all certified shop drawings and material required to complete the documentation. This generally includes but is not limited to the following:
.1 Table of Contents
.2 Vendor's, Manufacturer's and Supplier's Contact Information
.3 Warranty Letter
.4 Valve schedule
.5 Reports:
1. Equipment Start-Up Reports
2. Balance Report
3. Piping Pressure Test Reports (Domestic, Gas)

4. Backflow Preventer Test Report
5. Other equipment startup reports and test sheets certified by the manufacturer or a qualified technician.
6. Demonstration and Training Reports/Logs

.6 ALL stamped approved shop drawings – Include a section for any Agency supplied equipment.
.7 Maintenance instructions, requirements and schedule
.8 As Built Drawings

2.2 **As Built Drawings**

2.2.1 As Built Drawings shall be kept up-to-date on an ongoing basis during construction for periodic review by the Consultant. As Built drawings shall always be kept in the same location on site known to the Consultant.

2.2.2 the Vendor shall certify that final reproducible As Built drawings to be correct by notation and signature on the drawings.

2.2.3 As Built Drawings shall precisely identify the configuration, size and location of all systems and equipment installed under this Division, including but not limited to:
.1 Isolation valves, balancing valves, piping, access doors.
.2 Miscellaneous: actual room names and numbers, schematic diagrams, riser diagrams.

2.2.4 As Built Drawings must be submitted to consultant as specified herein.

2.3 **Test and Start-Up Reports**

2.3.1 Include a copy of all test and start-up reports in Operating and Maintenance Manuals.

2.3.2 Obtain final copies of any 3rd Party test reports for inclusion in Operating and Maintenance Manuals.

2.4 **Demonstration and Training Reports**

2.4.1 Refer to Section 23 05 01 – General Mechanical Requirements

2.4.2 Include a copy of all Training literature in the Operating and Maintenance Manuals.

2.4.3 Include a copy of the signed and dated Training Log.

3. EXECUTION

3.1 General

3.1.1 A hard copy of the maintenance manual shall be provided immediately upon completion of startup and testing for review and for use during the Demonstration and Training. The

Manual shall include all test and start-up reports. Substantial Completion will not be awarded until the manual is submitted and accepted.

3.1.2 The Consultant will review the manual and provide any comments or changes required. The Vendor shall revise and finalize all manuals within three (3) weeks.

3.1.3 Substantial Performance will not be granted until the final hard copies and electronic copy of the complete manual have been submitted by the Vendor and reviewed and accepted by the Consultant.

3.1.4 Submit a draft copy of the manual to the Consultant for review prior to final submission of all copies.

3.1.5 Provide two (2) final hard copies and one (1) electronic copy in PDF format to the Consultant for final acceptance.

3.2 **As Built Drawings**

3.2.1 Prior to Substantial Performance submit a complete set of As Built drawings in pdf format. Make any changes as requested by the Consultant after review.

3.2.2 Substantial performance will not be granted until the As Built Drawings have been submitted to the Consultant.

END OF SECTION

1. GENERAL

1.1 **Reference Standards**

1.1.1 Ontario Building Code
1.1.2 SMACNA (Sheet Metal and Air Conditioning Contractors National Association incorporated)
1.1.3 NFPA 90A – Air Conditioning and Ventilation Systems
1.1.4 ASTM A653
1.1.5 ULC
1.1.6 Local Codes and Requirements

2. PRODUCTS

2.1 **General**

2.1.1 Provide ductwork as recommended and specified in the latest revision of the Sheet Metal and Air Conditioning Contractors National Association incorporated (SMACNA).

2.2 **Ductwork**

2.2.1 Galvanized steel with G90 designation zinc coating lock forming quality to ASTM A525M.
2.2.2 Rectangular or Square:
.1 Conform to SMACNA standards.
2.2.3 Round:
.1 Factory fabricated, spiral wound, with matching fittings and specials. Longitudinal seam type is not acceptable.
.2 Transverse joints up to 900mm (36”): slip type with tape and sealants.
.3 Transverse joints over 900mm (36”): Ductmate or Exanno Nexas Duct System.
2.2.4 All exposed ductwork in finished areas shall be spiral with galvanealed finish unless otherwise indicated.

2.3 **Duct Construction**

2.3.1 All exhaust air ductwork from shall be constructed to 250 Pa (1” wg) duct construction class.
2.3.2 Tie rods shall not be used in lieu of external duct reinforcement except where specifically mandated by SMACNA duct construction standards.
2.3.3 Duct tapers to be at 14° maximum (1:4 ratio) for all systems with air velocities less than 1500fpm and 8° (1:7 ratio) for velocities 1500 fpm and greater.
2.3.4 The Vendor shall provide a schedule of proposed duct construction, meeting SMACNA standards, to be used on the project. Schedule shall include panel width, gauge, transverse

connector, reinforcement, longitudinal seam, sealing class and sealing compound. Submit schedule prior to performing any duct fabrication/installation.

2.4 **Fittings**

2.4.1 Fabrication: to SMACNA.

2.4.2 Radiused elbows:

.1 Rectangular: standard radius and or short radius with single thickness turning vanes Centreline radius: 1.5 times width of duct.

.2 Round: in exposed areas one-piece smooth radius, 1.5 times diameter.

2.4.3 Mitred elbows, rectangular:

.1 To 400mm (16”): with single thickness turning vanes.

.2 Over 400mm (16”): with double thickness turning vanes.

2.4.4 Branches:

.1 Rectangular main and branch: with 45° entry on branch.

.2 Round main and branch: enter main duct at 45° with conical connection.

.3 Provide volume control damper in branch duct near connection to main duct.

.4 Main duct branches: with splitter damper.

2.4.5 Diffuser connection to main:

.1 High efficiency takeoffs complete with rectangular duct opening and 45° slope body. Takeoffs shall be furnished complete with balancing damper and locking quadrant.

.2 The Vendor shall notify the Consultant if height of takeoff is required to be reduced to suit ceiling clearances and obtain approval from the same prior to installing or fabricating.

2.4.6 Transitions:

.1 Diverging: 20° maximum included angle.

.2 Converging: 30° maximum included angle.

2.4.7 Offsets:

.1 Full short radiused elbows.

.2 Obstruction deflectors: maintain full cross-sectional area.

2.5 **Firestopping**

2.5.1 40mm x 40mm x 3mm (1-1/2” x 1-1/2” x 16ga) retaining angles all around duct, on both sides of fire separation.

2.5.2 Firestopping material and installation must not distort duct.

2.5.3 All ductwork passing through rated partition walls shall be firestopped.

2.6 **Fasteners**

2.6.1 Fasteners shall be sheet metal screws, rivets, and bolts.

2.7 **Duct Sealer**

2.7.1 Duct Sealer to be ULC classified for surface burning characteristics and be water based.

2.7.2 Duct Sealer shall be Duro-Dyne DWN, grey, water-based for medium and high-pressure duct systems, non-flammable (wet state), fire retardant (dry state).

2.7.3 Duct Sealer shall be clear silicone type on all exposed ductwork or duct sealer shall be applied to inside of fittings to ensure clean look.

3. EXECUTION

3.1 **Rigid Ductwork**

3.1.1 Coordinate with other trades prior to installing ductwork.

3.1.2 All ductwork and fittings shall be installed in accordance with SMACNA and ASHRAE standards.

3.1.3 Duct tapers to be at 14 degrees maximum (1:4 ratio) for all systems with air velocities less than 1500fpm and 8° (1:7 ratio) for velocities 1500 fpm and greater.

3.1.4 Ductwork shall be properly constructed, braced, connected and jointed. Suspend with hangers to SMACNA Standards.

3.1.5 Do not suspend hangers including wires and rods from the steel roof deck nor from other mechanical or electrical components. Support hangers from structural bearings such as beam, top chords of steel joists or structural concrete slabs. Where structural bearings do not exist, provide angle or channel iron form nearest structural bearings to support hangers.

3.1.6 Ducts and joints shall be tight and rigid so as not to leak, rattle, or vibrate.

3.1.7 Install ductwork to allow adequate space for normal operation and maintenance of equipment nearby.

3.1.8 Direct size duct spin-ons are not acceptable. Conical spin-on or square-to-round fittings shall be provided. Where take-off is same size as main, use a 45° lead-in fitting.

3.1.9 Where ducts pass through walls, seal around ducts with noncombustible material.

3.1.10 All openings through wall must be sleeved and lined as specified. Openings shall be 50mm (2”) larger all around than

duct or piping and filled with fireproof Rockwool type insulation complete with fire retardant sealant both sides

3.1.11 All open ductwork, not being worked on, must be completely covered during construction phase until all sanding, plastering, painting, and finishing is complete.

3.1.12 Inspect and test ductwork prior to any required painting or insulation for air leakage at joints and connections under normal operating conditions

3.1.13 Paint ductwork visible through registers, grilles and diffusers flat black.

3.1.14 Under no conditions are pipes, rods or wires allowed to penetrate ducts.

3.2 **Flexible Ductwor**

3.2.1 Flexible duct shall not be used in new or revised exhaust air systems.

3.3 **Duct Sealing**

3.3.1 Seal all ductwork with duct sealer as specified herein. Ducts constructed to SMACNA 500Pa (50.8mm) duct construction class and under shall be sealed to SMACNA Standard Section 1.6 and 1.7, Class C.

3.3.2 The sealer shall be stored at room temperature for at least 24 hours prior to use. Surfaces shall be clean, dry and free from oil, grease, and any other foreign material.

3.3.3 Clean fittings to a depth of four inches with a solvent, exercising safe practices as recommended by the manufacturer.

3.3.4 Stir sealer thoroughly before application.

3.3.5 Use a brush, cartridge guns or spatula to apply the sealer to male section of spiral duct or to both fittings of rectangular duct. Join joints while sealer is wet (within approximately 15 minutes) and secure with sheet metal screws applied as close as possible (12.7mm or less). Apply sealer to outside of assembly with a 2” wide band of sealer, thoroughly covering joint head and sheet metal screws. Allow sealer to set (approximately 72 hours) before pressure testing. Do not thin.

3.3.6 The Consultant shall inspect the duct sealing prior to any insulation being installed.

3.4 **Painting**

3.4.1 All exposed ductwork in finished areas shall be painted by the Vendor.

3.5 **Cleaning (prior to start-up)**

3.5.1 Keep ductwork and duct liners clear from dust and debris during construction.

3.5.2 Prior to starting HVAC equipment, inspect and clean all equipment, and ductwork on the inside and outside to ensure that they are completely free from dust and debris.

3.5.3 Install clean filters in all units.

END OF SECTION

1. GENERAL

1.1 General Requirements

1.1.1 The requirements of this section shall apply to all sections in Division 26 – Electrical.

1.1.2 Conform to Division 01 General Conditions.

1.1.3 All material, labour, equipment, and services required under this section shall be the full responsibility of the Vendor including any material, labour, equipment, and services provided by their sub-contractors.

1.1.4 Complete and submit the Supplemental Tender Form including list of equipment and materials to be used on this project and forming part of the tender documents.

1.2 Summary of Work

1.2.1 Refer to Division 1, Section 01 30 00 – Instruction to All Trades.

1.3 Definitions

1.3.1 "Supply" shall mean supply only.

1.3.2 "Install" shall mean install and connect.

1.3.3 "Provide" shall mean supply, install, connect and test.

1.3.4 "Drawings and Specifications" shall mean Contract Documents.

1.3.5 "Authorities" or Authorities having jurisdiction" shall mean all agencies that enforce the applicable laws, ordinances, rules, regulations, or codes of the Place of Work.

1.3.6 "Work" shall mean all equipment, materials, labour, and permits to provide a complete and operational electrical system as detailed in the drawings and specifications.

1.3.7 "Agency" or "Region" shall mean Region of Peel.

1.3.8 "PL" shall mean Peel Living.

1.4 Related Work

1.4.1 Division 1 – General Requirements

1.4.2 Division 22 and 23 – Plumbing and Heating, Ventilating and Air Conditioning

1.4.3 Division 26 - Electrical specifications form a part of the Contract Documents and shall be read, interpreted, and coordinated with all other Divisions. The Instructions to Bidders, General Conditions, General Requirements, Supplementary General Conditions and Amendments and Supplements thereto form a part of this Division and contain items related to the electrical work.

1.5 Intent

1.5.1 The drawings and specifications are not a detailed set of installation instructions. Drawings and specifications are complementary to one another and that which is shown on one is as binding as that which is shown on both.

1.5.2 The Consultant shall be immediately informed of any discrepancies between drawings and specifications leaving in doubt the true intent of the work.

1.5.3 Supply all labour, equipment, and materials necessary to install a complete and operational electrical system described herein and shown on the drawings.

1.5.4 It is the intent of these drawings and specifications to provide for an electrical installation complete and in operating condition. The responsibility for supplying and installing all material necessary to accomplish this, except where specifically noted that such work or materials is not included, shall be part of this section.

1.5.5 Assess and be familiar with existing site conditions prior to pricing and construction and allow for same in tender price.

1.5.6 All work must be done by qualified and certified persons in such line of work. Trade certificates must be available on demand.

1.5.7 All work shall be in accordance with standard industry practice accepted and recognized by the Consultant and the Trade.

1.5.8 The Vendor shall coordinate with and cooperate with all other trades prior to installation. Where work interferes with other trades due to failure to coordinate or cooperate, the work shall be removed and relocated as approved by the Consultant at no extra cost to the Agency.

1.5.9 The Consultant shall have the right to reject any work that does not conform to the Contract Documents and accepted standards of practice including but not limited to performance, quietness of operation, and finish.

1.5.10 Responsibility to determine which Division provides various products and work rests with the Vendor. Additional compensation will not be considered because of differences in interpretation of specifications.

1.6 **Codes, Bylaws, Standards, and Regulations**

1.6.1 The electrical system shall comply with the latest editions and revisions of applicable codes, bylaws, bulletins, standards, and regulations including but not limited to:

.1 Ontario Building Code
.2 Ontario Electrical Safety Code
.3 Canadian Standards Association
.4 Local Municipal Codes
.5 Local Building Bylaws

.6 Ontario Occupational Health and Safety Act
.7 IEEE (Institute of Electrical and Electronics Engineers)

1.6.2 Provide work in accordance with the requirements of all applicable government codes, local by-laws, underwriter's regulations base building standards, contract documents, and all authorities having jurisdiction.

1.6.3 Where discrepancies occur between contract drawings and specifications and above codes and standards referred to herein, the Vendor is to notify the Consultant in writing and obtain clarification prior to proceeding with the work.

1.6.4 The Vendor shall not reduce the requirements on the contract drawings and specifications by applying any codes and standards referred to herein.

1.7 **Permits and Fees**

1.7.1 Apply for, obtain, and pay for all permits, fees, connections, inspections, licenses, certificates or charges necessary including all provincial and federal taxes including HST.

1.7.2 Coordinate all required inspections and give necessary notice to all authorities.

1.7.3 Upon completion of project, provide inspection certificates confirming acceptance by all authorities having jurisdiction.

1.8 **Contract Breakdown**

1.8.1 After the tenders close, submit a breakdown of the price into scope and trades to the satisfaction of the Consultant based on the sections of the specifications.

1.8.2 Breakdown shall include but not be limited to:

.1 Mobilization and shop drawing submission (minimum $2,000)
.2 Permits and Fees
.3 Feeder conduits
.4 Branch conduits
.5 Feeder cables
.6 Branch wiring
.7 Wiring for mechanical equipment
.8 Luminaires (interior)
.9 Emergency Luminaires
.10 Close-out Submittals – Manuals & As-builts (minimum $5,000)

1.8.3 Progress claims shall be based on the breakdown. Submit in table format showing contract amount, work complete to date as percentage, previous draw, amount this draw and balance for each line item.

1.9 **Shop Drawings**

1.9.1 Within thirty (30) days of award, the Vendor shall submit shop drawings of all equipment for the project.

1.9.2 Prior to ordering of products or delivery of any products to job site, submit shop drawings electronically in PDF format to the Consultant for review and comments. Submit sufficiently in advance of construction to allow ample time for review. Size of shop drawings shall be 215.9 by 279.4 mm (8.5"x11"). 279.4mm x 431.8mm (11"x17") will be acceptable where appropriate for content and scale.

1.9.3 Submittals shall contain but not be limited to details, dimensions, construction, size, arrangement, operating clearances, performance characteristics and capacities of products and parts of the work. Include wiring drawings and schematics showing interconnection with work of other Divisions.

1.9.4 Clearly mark each sheet of printed submittal material, using arrow, underlining or circling, to show particular sizes, dimensions, wiring diagrams, operating clearances, control diagrams, project identification, types, model numbers, ratings, capacities and options actually being proposed. Cross out non applicable material. Note on the submittal specified features such as special tank linings, pump seals, materials or painting.

1.9.5 Prior to submission to the Consultant, the Vendor shall review all shop drawings. By this review the Vendor represents that he has determined and verified all field measurements, field construction criteria, materials, catalogue numbers and similar data or will do so and that he has checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents.

1.9.6 The Vendor's review of each shop drawing shall be indicated by his approval stamp, date and signature on the front of each page. Drawings will not be considered if not previously checked by the Vendor.

1.9.7 Review comments from the Consultant. If shop drawings are modified, confirm changes before proceeding. If shop drawings are not approved, revise and resubmit changes for approval.

1.9.8 Review of the shop drawings by the Consultant does not relieve the Vendor or his supplier of the responsibility to provide the correct and complete equipment, material or installation.

1.9.9 Keep one complete set of shop drawings at job site during construction.

1.9.10 Include stamped reviewed shop drawings in the Maintenance Manuals.

1.10 **Product Delivery Schedule**

1.10.1 Within two (2) weeks from shop drawing review, a schedule must be submitted by the Vendor showing projected delivery dates of all products to meet required construction schedule.

1.11 **Construction Meetings**

1.11.1 The Vendor shall attend all site meetings unless otherwise pre-approved.

1.11.2 Sub-trades shall attend site meetings as requested or as required.

1.12 **As-built Drawings**

1.12.1 Refer to Section 26 05 02 – Documentation and Manuals.

1.12.2 Maintain accurate, neat, and clean As-built Drawings on an on-going basis during construction to be reviewed periodically by the Consultant during construction.

1.12.3 As-built drawing mark-ups shall be made available at every site meeting or inspection.

1.12.4 As-built drawings shall include but not be limited to final location of all component locations and conduit runs.

1.12.5 Prior to Substantial Performance submit a complete set of As-built drawings in PDF format. The Vendor is responsible for providing red-line drawings indicating all As-built conditions.

1.13 **ESA Certificates**

1.13.1 Furnish an unconditional Certificate of Acceptance from Electrical Safety Authority on completion of work. Arrange for interim and rough-in inspections. Arrange and pay for Occupancy Inspections if required for partial occupancies.

1.13.2 Incorporate a copy of the final ESA Certificate in the operating and maintenance manual.

1.14 **Maintenance Manual**

1.14.1 Refer to Section 26 05 02 – Documentation and Manuals.

1.14.2 Provide the Agency with two (2) **indexed**, hard cover maintenance manuals plus one (1) electronic copy on labeled on memory stick. Manuals shall contain and be tabbed in the following order:

.1 Table of Content
.2 Vendor's, Manufacturer's and Supplier's Contact Information
.3 Warranty Letter
.4 Colour coding charts for access areas
.5 Final ESA Certificate
.6 Fire Alarm Verification Report
.7 Emergency Lighting Test Report

.8 ALL stamped approved shop drawings – Include a tab and blank section for any Agency supplied equipment
.9 Maintenance instructions, requirements, and schedule
.10 As-built drawings

1.14.3 Submit one (1) complete copy to the Consultant for review and approval. Revise based on any comments and resubmit all copies and electronic copy to Consultant.

1.15 **Testing**

1.15.1 The installation shall be free of open circuits and grounds.
1.15.2 On completion, measure insulation resistances and comply with Table 24 of Ontario Electrical Safety Code.
1.15.3 Test all wiring and connections for continuity and grounds before equipment is energized.
1.15.4 Before energizing system, check all connections and set and calibrate all relays and instruments for proper operation, obtain necessary clearances, approval and instructions from utility company.
1.15.5 Carry out all tests and furnish all equipment required to demonstrate safe and proper completion of the work, without cost to the Agency.
1.15.6 Check load balance on all feeders and make necessary adjustments to provide a "balanced" load.
1.15.7 Check voltage drop on all feeders/branch circuits and make necessary adjustments to provide a 2% voltage drop in all feeders and branch circuits and a 4% drop from supply side to point of utilization.
1.15.8 Fully coordinate all testing and commissioning with all trades, the Consultant, and authorities having jurisdiction.
1.15.9 Provide a minimum of forty-eight (48) hours written notice to all parties.

1.16 **Demonstration and Training**

1.16.1 Demonstrate and train the Agency on proper operation of the Electrical and Auxiliary systems.
1.16.2 Work with and assist Division 22 - Plumbing, and 23 - Heating, Ventilation and Air Conditioning during training as required. Allow a minimum of four (4) separate two-hour sessions.
1.16.3 The Vendor shall arrange for all necessary personnel and equipment specialists to be in attendance for purposes of demonstration and training.
1.16.4 Provide instruction by a manufacturer's representatives as required too fully demonstrate the systems.
1.16.5 Demonstration and Training shall include but not be limited to:

.1 Training in the normal, abnormal and emergency operating condition of all systems provided under this Division.
.2 Review of all necessary maintenance procedures of all systems provided under this Division.
.3 Provision of a documented maintenance program covering all systems provided or modified under this contract.
.4 Review of all close-out documentation including complete maintenance manuals and As-built drawings.

1.16.6 Prepare a Training Agenda and Log for signature by all Participants. Submit to Consultant and include in Manuals.

1.17 **Substantial Completion and Performance**

1.17.1 Substantial completion and performance shall be determined and awarded by the Consultant.

1.17.2 Complete the following to the satisfaction of the Consultant prior to request for substantial performance:
.1 Submit Electrical Safety Authority Certificate
.2 Submit reports as specified herein – fire alarm, emergency lighting as required.
.3 Fire stopping
.4 Security Test Report
.5 As-built drawings
.6 Demonstration and Training

1.18 **Warranty**

1.18.1 Provide a one (1) year full parts and labour warranty for the new system from date of substantial completion.

1.18.2 Submit warranty letter on Company letterhead signed by Company representative stating warranty terms including warranty period from date of substantial completion.

2. PRODUCTS

2.1 **General**

2.1.1 All material used shall be new, free from defects, of quality specified, and installed in accordance with manufacturer's instructions.

2.1.2 Major components shall have nameplates on the exterior of the equipment in a visible location containing manufacturer's name, model number, serial number, performance data, and electrical characteristics.

2.1.3 The same manufacturer shall be used for types of components used in similar applications.

2.1.4 It is the responsibility of the Vendor to store and protect materials supplied by this scope.
2.1.5 Materials must be stored in original containers.
2.1.6 Remove and dispose of all redundant materials and garbage from site.

2.2 **Selected Products and Equivalents**

2.2.1 Sections within Division 26 - Electrical list "Acceptable Manufacturers" which must meet characteristics of the specified equipment and products for each section.
2.2.2 Base specified products are specified and/or shown on the drawings, and identified by manufacturer's name, type and catalogue number.
2.2.3 Any alternate manufacturers from base specified products and equipment must equal or exceed the quality, finish and performance of those base specified and/or shown, and not exceed the space requirements allotted on the drawings. Include costs for any associated work to accommodate such substitutions, including the Consultant's time and revisions to the work of other divisions.
2.2.4 If item or material specified is unobtainable, state in Tender proposed substitute and amount added or deducted for its use. Extra monies will not be paid for substitutions after the Contract has been awarded.
2.2.5 If item of size indicated is unobtainable, supply next larger size without additional charge.

2.3 **Quality Of Product**

2.3.1 All products provided shall be CSA approved, approved by other relevant authorities.
2.3.2 If supplied products are not CSA approved, obtain approval of provincial regulatory authority. Pay all applicable charges levied and make all modifications required for approval.
2.3.3 All products provided shall be new including those not specified and shall be of a quality best suited to the purpose required and their use subject to approval by the Consultant.

2.4 **Voltage Ratings**

2.4.1 Operating Voltages: to CAN3-C235.
2.4.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

2.5 **Electric Motors, Equipment and Controls**

2.5.1 Refer to the Contract Drawings for the Vendor's equipment wiring responsibility.

2.5.2 Control wiring and conduit shall be covered under this Division except connections below 50V which are related to control systems specified under Division 23 - Heating, Ventilation and Air Conditioning.

2.6 **Product Finishes**

2.6.1 Shop drawings shall include finishes.

2.6.2 All cabinets, panelboards, switchboards, cable trays, etc. shall be finished in ANSI 61 grey enamel unless otherwise specified.

2.6.3 Apply primer on all items which are to be finished on the job.

2.6.4 Repair dents and touch up all damaged finishes with matching finish, or if required by the Consultant or Agency, completely repaint or replace damaged surface at no extra cost to the Contract.

2.7 **Access Doors**

2.7.1 Provide access doors/panels as required for access, adjustment, operation, service, and maintenance.

2.7.2 Access doors shall be flush mounted 600mmx600mm (24"x24") for body entry and 300mmx300mm (12"x12") for hand entry. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.

2.7.3 ACCESS DOORS/COVERS - FLUSH ACCESS DOOR – DRYWALL AREA

.1 **Acudor #DW-5040 Series** flush to surface for drywall, satin coat steel with white baked enamel finish, formed door panel, flanged on four sides, 20 gauge. Galvanized frame with multiple bends and integral taping bead, 26 gauge. Concealed hinge, stainless steel screwdriver operated cam latch.

2.7.4 ACCESS DOORS/COVERS - FLUSH ACCESS DOOR - UNIVERSAL

.1 **Acudor #UF-5000** Universal Access Doors, 14 GA. (1.7mm) steel, baked enamel prime coat, continuous concealed hinge, with positive and self-opening screwdriver operated lock.

2.7.5 Acceptable Manufacturers:

.1 Acudor
.2 Zurn
.3 Nailor Industries
.4 Le HagE
.5 Or Agency approved equivalent.

2.8 **Sleeves**

2.8.1 Provide sleeves for all cables passing through masonry, concrete or fire rated assemblies unless run in conduit.

2.8.2 Sleeves shall be EMT conduit complete with bushing.

2.9 **Fire Stopping**

2.9.1 This Vendor shall work with all other subcontractors on the project in providing one common method of fire stopping all penetrations made in the fire rated assemblies.

2.9.2 Approved fire stopping and smoke seal material in all fire separations and fire ratings within annular space between pipes, ducts, insulation and adjacent fire separation and/or fire rating.

2.9.3 Do not use cementitious or rigid seals around penetrations for pipe, ductwork, or other mechanical items.

2.9.4 Provide materials and systems capable of maintaining effective barrier against flame, smoke and gases. Ensure continuity and integrity of fire separation.

2.9.5 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.

2.9.6 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation. Provide "fire wrap" blanket around services penetrating fire walls. Extent of blanket must correspond to ULC recommendations.

2.9.7 The fire stopping materials are not to shrink, slump or sag and to be free of asbestos, halogens and volatile solvents.

2.9.8 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.

2.9.9 Fire stop materials are to be capable of receiving finish materials in those areas which are exposed and scheduled to receive finishes. Exposed surfaces are to be acceptable to consultant prior to application of finish.

2.9.10 Firestopping shall be inspected and approved by local authority prior to concealment of enclosure.

2.9.11 Install material and components in accordance with ULC certification, manufacturer's instructions and local authority.

2.9.12 Submit product literature and insulation material on fire stopping in shop drawing and product data manual. Maintain copies of these on site for viewing by installers and Consultant

2.9.13 Acceptable Manufacturers:

.1 Fryesleeve Industries Inc.
.2 General Electric Pensiil Firestop Systems
.3 International Protective Coatings Corp.
.4 Rectorseal Corporation (Metacaulk)
.5 Proset Systems

.6 3M
.7 AD Systems
.8 Hilti
.9 Or Agency approved equivalent.

3. EXECUTION

3.1 Site Examination

3.1.1 Examine the site of work and become familiar with all features and characteristics affecting this work before submitting tender.

3.1.2 No additional compensation will be given for extra work due to existing conditions which such examination should have disclosed.

3.1.3 Report to the Consultant any unsatisfactory conditions which may adversely affect the proper completion of this work.

3.2 Interference and Coordination Drawings

3.2.1 Examine the drawings and all divisions of the specifications.

3.2.2 Prepare interference and equipment layout drawings to ensure all components will be properly accommodated within the spaces provided.

3.2.3 Lay out the work and equipment with due regard to architectural, structural and mechanical features, and service requirements.

3.2.4 Submit interference drawings to the Consultant.

3.2.5 Before commencing any work, obtain a ruling from the Consultant if any conflict exists, otherwise no additional compensation will be made for any necessary adjustments.

3.3 Separation of Services

3.3.1 Maintain separation between electrical wiring system and building piping, ductwork, etc. so that wiring system is isolated (except at approved connections to such systems) to prevent galvanic corrosion.

3.3.2 In particular, contact between dissimilar metals, such as copper and aluminum, in damp or wet locations is not permitted.

3.3.3 Do not support wiring from pipes, ductwork, etc. Hangers for suspended ceilings may be used for the support of wiring only when approval is obtained from ceiling installer, and approved clips or hangers are used.

3.3.4 Do not disconnect any services without prior written authorization by the Agency's representative. Restore all interrupted electrical services at end of each working day.

3.3.5 Allow for uninterrupted use of the building by the occupants for the duration of the Work. Notify the Agency's representative prior to gaining access to perform Work within any tenant area.

3.4 **Workplace Safety**

3.4.1 The workplace must be kept safe at all times.

3.4.2 Conform to all ministries of labour, and health and safety regulations at all times.

3.4.3 Use ladders and proper techniques as approved by the ministry of labour to perform all work.

3.4.4 Cover all holes/openings and provide barriers around hazards, etc. to ensure occupants and workers are not at risk.

3.4.5 Where work does not conform to such regulations, stop work immediately and report the situation to the Agency's representative or Consultant or rectify the situation immediately.

3.4.6 Report any hazards or concerns to the Agency's representative immediately.

3.4.7 Conform to the Agency's safety requirements and construction regulations.

3.4.8 In areas where flammable adhesives are used, ensure that adequate ventilation and spark-proof electrical equipment are provided, and that smoking is prohibited. Store materials to prevent spontaneous combustion.

3.5 **Temporary Requirements**

3.5.1 Provide grounded extension cords and temporary lights required for work.

3.5.2 Any specific task lighting required on site is the responsibility of this Division.

3.6 **Location Of Luminaires**

3.6.1 Locations may have to be revised to suit construction and equipment arrangements and it is expected that such changes will not result in additional cost to the Agency, provided that no additional labour or material is required and installation has not been completed.

3.7 **Mounting Heights**

3.7.1 Mounting height of equipment is from finished floor to centerline of equipment unless specified or indicated otherwise. Coordinate with block coursing (if applicable).

3.7.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

3.7.3 Install electrical equipment at following heights unless indicated otherwise (measurement to the centre of device unless specified):

.1 Local switches: 900mm (36") - 1100mm (43")

.2 Wall receptacles:

1. General: 400mm (16")
2. Above top of continuous baseboard heater: 200mm (8")
3. Above top of counters or counter splash backs: 100 mm (4")
4. In mechanical rooms: 1200mm (48")

.3 Panelboards: as required by Code or 1400mm (56")

.4 Voice/Data outlets: At height of adjacent outlet or at 400mm (16")

.5 Voice outlet for phone: 900mm (36") - 1100mm (43")

.6 Fire alarm pull stations: 1200mm (47")

.7 Fire alarm horns: 150mm (6") below ceiling and maximum 2300mm (90") above finished floor (measured to top of device)

.8 Fire alarm visual signal device: entire lens is 2000-2400mm (78"-94")

.9 Fire alarm combination visual and signal devices: Conform to 3.7.3.7 and 3.7.3.8.

.10 Thermostat: 1200mm (47")

.11 Space Sensors: 1400mm (55")

.12 Clocks: 2100mm (84")

3.8 **Repairs, Cutting and Restoration**

3.8.1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match finishes of same materials.

3.8.2 Each Section of this Division shall bear expense of cutting, patching, and repairing to install their work and/or replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

3.8.3 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

3.8.4 All patching, painting and making good of the existing walls, floors, ceilings, partitions and roof will be at the expense of the Vendor, but performed by the Vendor or subcontractor specializing in the type of work involved unless otherwise noted.

3.9 **Painting**

3.9.1 Refer to other Divisions for Painting unless otherwise specified herein.
3.9.2 Apply at least one (1) coat of corrosion resistant primer paint to ferrous supports and site fabricated work
3.9.3 Prime and touch up marred finished paintwork to match original.
3.9.4 Restore to new condition, or replace equipment at discretion of the Consultant, finishes which have been damaged too extensively to be merely primed, painted and touched up.

3.10 **Concealment**

3.10.1 All equipment, components, piping, and conduit shall be concealed in ceiling spaces, bulkheads or walls where possible unless otherwise noted on the drawings or approved by the Agency or the Consultant.
3.10.2 Exposed equipment, components, piping, and conduit installed in unfinished areas, shall be installed as high as possible. Run piping and conduit tight to roof deck and down columns.

3.11 **Clearances and Accessibility**

3.11.1 Install all work for easy access for adjustment, operation, and maintenance.
3.11.2 Maintain clearances for all components as per code and manufacturer's instructions.
3.11.3 Provide access panels of adequate size as required to access components in concealed areas. Do not install access doors in specialty walls or ceilings.
3.11.4 Provide fire rated access doors shall be installed in fire separations and match rating of separation.

3.12 **Equipment and System Protection**

3.12.1 Protect components and materials from damage in storage and on site before, during, and after installation until final acceptance.
3.12.2 Protect inside and outside of components from dust and debris with appropriate covers that will withstand through the construction.
3.12.3 Where equipment and system components become dirty or damaged, clean and repair to new condition to the satisfaction of the Consultant at the expense of this Vendor.

3.13 **Supports**

3.13.1 Provide all miscellaneous metals and materials as required for support, hanging, anchoring, and guiding of all components
3.13.2 All supports must be securely mounted to structures.

3.14 **Concrete Pads**

3.14.1 Provide 100mm (4") high concrete pads under all floor mounted electrical equipment including but not limited to MCCs, switchboards and transformers. Concrete pad shall extend 100mm (4") beyond footprint of equipment

3.14.2 Paint top and all sides of pad with two (2) coats of yellow paint.

3.15 **Location of Outlets**

3.15.1 Do not install outlets back-to-back in wall. Allow minimum 150mm (6") horizontal clearance between boxes.

3.15.2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3m (10') and information is given before installation.

3.15.3 Locate light switches on latch side of doors. Locate disconnect devices in mechanical and elevator machine rooms on latch side of door.

3.16 **Fire Stopping**

3.16.1 Refer to Part 2 - PRODUCTS herein.

3.17 **Cleaning**

3.17.1 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition.

3.18 **Agency Supplied Equipment**

3.18.1 Connect to equipment supplied by the Agency and make operable.

3.19 **Equipment Identification**

3.19.1 Identify electrical equipment with nameplates as follows:

3.19.2 Nameplates:

.1 Lamacoid 3mm (1/8") thick plastic engraving sheet, black face, white core, mechanically attached with self-tapping screws.

Nameplate Sizes

Size 1	9mm x 50mm (3/8" xx 2")	1 line	3mm (1/8") high letters
Size 2	12mm x 70mm (1/2" x 2-1/2")	1 line	5mm (3/16") high letters
Size 3	12mm x 70mm (1/2" x 2-1/2")	2 lines	3mm (1/8") high letters
Size 4	20mm x 90mm (3/4" x 3-1/2")	1 line	9mm (3/8") high letters
Size 5	20mm x 90mm (3/4" x 3-1/2")	2 lines	5mm (3/16") high letters
Size 6	25mm x 100mm (1" x 4")	1 line	12mm (1/2") high letters
Size 7	25mm x 100mm (1" x 4")	2 lines	6mm (1/4") high letters

.2 Wording on nameplates labels to be approved by Consultant prior to manufacture.

.3 Allow for average of twenty-five (25) letters per nameplate.

.4 Identification to be English.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Nameplates for disconnects, starters and contactors must indicate equipment being controlled and voltage.

.7 Nameplates for transformers must indicate transformer label as indicated and capacity, primary, and secondary voltages.

3.20 **Wiring Identification**

3.20.1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

3.20.2 Maintain phase sequence and colour coding throughout.

3.20.3 Colour code: to CSA C22.1.

3.20.4 Use colour coded wires in communication cables, matched throughout system.

3.21 **Conduit and Cable Identification**

3.21.1 Colour code conduits, boxes and metallic sheathed cables.

3.21.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15m (45') intervals.

3.21.3 Colour bands must be 25mm (1") wide.

Prime

Up to 208V	yellow
Voice system	green
Data system	orange
Security	brown
Public address	black
Fire alarm	red

3.21.4 This Vendor must paint all system junction boxes and covers in conformance with the above schedule.

3.22 **Wiring Terminations**

3.22.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

3.23 **Warning Signs**

3.23.1 Meet requirements of Electrical Safety Authority and Consultant.

3.23.2 Provide porcelain enamel signs, with a minimum size of 175mm x 250mm (7" x 10").

3.24 **Load Balance**

3.24.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance. Adjust branch

circuit connections as required to obtain best balance of current between phases and record changes.

3.24.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage equipment.

3.24.3 Submit at completion of work, report listing phase and neutral currents on panelboards, dry-core transformers and motor control centres operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

3.25 **Field Quality Control**

3.25.1 Conduct and pay for following tests:

.1 Power distribution system including phasing, voltage, grounding, and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Lighting and its control.

.4 Motors, heaters and associated control equipment including sequenced operating systems where applicable

.5 Systems: fire alarm system.

3.25.2 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions

3.25.3 Insulation resistance testing.

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument

.3 Check resistance to ground before energizing.

3.25.4 Carry out tests in presence of the Consultant.

3.25.5 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.25.6 Submit test results for Consultant's review.

3.26 **Coordination of Protective Devices**

3.26.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings as indicated on drawings or as determined from coordination study.

3.27 **Field Review and Deficiencies**

3.27.1 The Vendor shall notify the Consultant when the job is ready for field review at various stages including rough-in stages.

3.27.2 During the course of construction, the Consultants will monitor construction and provide written reports of work progress, discussions and deficiencies.

3.27.3 The Vendor shall correct all deficiencies within the work period prior to the next review.

3.27.4 The Vendor shall not conceal any work until inspected. Where work was concealed, the Vendor shall remove and replace tiles, coverings or other obstructions to allow proper inspection at the Vendor's expense.

3.27.5 Upon completion of the project the Consultant will do a final review. Upon receiving the final inspection report, the Vendor must correct and sign back the inspection report indicated all deficiencies are completed. A re-inspection will only be done once the Consultant receives this in writing. Where the Consultant performs the re-inspection and the work is not complete, the Vendor is responsible for reimbursing the Consultant for the field review. The fee for additional reviews will be at the Consultant's hourly rates plus mileage and applicable taxes to be paid directly to the Consultant prior to performing the next field review.

END OF SECTION

1. GENERAL

1.1 **Work Included**

1.1.1 Operating and Maintenance Manuals
1.1.2 Assembly of certificates and tests reports
1.1.3 Assembly of shop drawings
1.1.4 Assembly of equipment and systems operating and maintenance instructions
1.1.5 Assembly of identification schedule
1.1.6 As Built Drawings

1.2 **Related Work**

1.2.1 Division 1
1.2.2 Section 26 05 01 - General Electrical Requirements

2. PRODUCTS

2.1 **Operation and Maintenance Materials**

2.1.1 Provide two (2) 215.9 by 279.4 mm (8½" x 11"), 3 ring type catalogue binders, labeled front and spine, with plastic tab dividers and Table of Contents. Also provide one (1) complete manual in electronic PDF format on labeled memory stick.

2.1.2 Manufacturer's data section is to be indexed and ordered to exactly match the sections of the specifications. Each section of the manufacturer's data section is to include an up to date copy of the equipment schedule for that section. The schedule is to be revised to suit all addenda, change orders and field changes, as well as manufacturers and model numbers matching the equipment supplied.

2.1.3 Assemble or develop complete and correct documentation for the operation and preventative maintenance of equipment and systems provided.

2.1.4 Assemble or develop copies of all certified shop drawings and material required to complete the documentation. This generally includes but is not limited to the following:

.1 Table of Contents
.2 Vendor's, Manufacturer's and Supplier's Contact Information
.3 Warranty Letter
.4 Colour coding charts for access areas
.5 Final ESA Certificate
.6 Fire Alarm Verification Report
.7 Emergency Lighting Test Report
.8 Security Test Report

.9 ALL stamped approved shop drawings – Include a tab and blank section for any Agency supplied equipment
.10 Maintenance instructions, requirements, and schedule
.11 As Built drawings

2.2 **As Built Drawings**

2.2.1 As Built drawings shall be kept up to date on an ongoing basis during construction for periodic review by the Consultant. As Built drawings shall always be kept in the same location on site known to the Consultant.

2.2.2 The Vendor shall certify that final reproducible As Built drawings to be correct by notation and signature on the drawings.

2.2.3 As Built drawings shall precisely identify the configuration, size and location of all systems and equipment installed under this Division.

2.2.4 As Built drawings must be submitted in AutoCAD as specified herein.

2.3 **Test Reports**

2.3.1 Include a copy of all test reports for inclusion in Operating and Maintenance Manuals.

2.4 **Demonstration and Training Reports**

2.4.1 Refer to Section 26 05 01 – General Electrical Requirements

2.4.2 Include a copy of all Training literature in the Operating and Maintenance Manuals.

2.4.3 Include a copy of the signed and dated Training Log.

3. EXECUTION

3.1 **General**

3.1.1 Substantial Performance will not be granted until the hard copies and electronic copy of the complete manual have been submitted by the Vendor and reviewed and accepted by the Consultant.

3.1.2 Submit a draft copy of the manual to the Consultant for review prior to final submission of all copies.

3.1.3 Provide two (2) final hard copies and one (1) electronic copy in PDF format to the Consultant for final acceptance.

3.2 **As Built Drawings**

3.2.1 Prior to Substantial Performance submit a complete set of As Built drawings in PDF format. The Vendor is responsible for providing red-line drawings indicating all As Built conditions.

Make any changes as requested by the Consultant after review.

3.2.2 Substantial performance will not be granted until the As Built drawings have been submitted to the Consultant.

END OF SECTION

1. GENERAL

1.1 **General**

1.1.1 The following specification represents the minimum standard required for installation of basic electrical components.

1.2 **Work Included**

1.2.1 Refer to Section 26 05 01 – General Electrical Requirements.

1.2.2 Work to be done under this Section – Materials Devices and Equipment includes labour, materials, and equipment required to install, test and operate Electrical and Communication Systems.

1.2.3 Removal of all redundant wiring and conduit including where specifically requested by the Agency.

1.3 **Codes and Standards**

1.3.1 Ontario Electrical Safety Code – Current Edition.

1.3.2 CSA

1.3.3 ULC

1.3.4 Local Codes and Requirements

1.4 **Submittals**

1.4.1 Shop Drawings:

.1 Submit shop drawings to the Consultant for review prior to ordering or installation.

.2 Shop drawings shall include manufacturer, model numbers, electrical data, wiring diagrams, and indicate conformance to above reference standards.

.3 The Vendor is responsible for reviewing and stamping all shop drawings to ensure equipment is as per specifications and match site conditions. Shop drawings will not be reviewed without the Vendor stamp indicating review.

.4 One copy of all stamped reviewed shop drawings shall be included in maintenance manual.

1.4.2 Operation and Maintenance Data:

.1 Provide operation and maintenance literature for all equipment indicating manufacturer and model of equipment, instructions for operation and maintenance of same, and parts list.

.2 Operation and maintenance data shall be included in the maintenance manual.

1.5 **Standard of Materials**

1.5.1 Materials and equipment are specifically described and named in this Specification in order to establish a standard of material and workmanship.

1.5.2 Materials required for performance of work shall be new and the best of their respective kinds and of uniform pattern throughout work.

1.5.3 Equipment items shall be standard products of approved manufacture. Identical units of equipment shall be of same manufacture.

1.5.4 Chemical and physical properties of materials and design performance characteristics and methods of construction and installation of items of equipment, specified herein, shall be in accordance with latest issue of applicable Standards or Authorities when such are either mentioned herein, or have jurisdiction over such materials or items of equipment.

1.5.5 Materials shall bear approval labels as required by Code and/or Inspection Authorities.

1.5.6 Install materials in strict accordance with manufacturer's recommendations.

1.5.7 Include items of material and equipment not specifically noted on Drawings or mentioned in Specification but which are necessary to make a complete and operating installation.

1.5.8 Remove materials, condemned as not approved for use, from job site and deliver and install suitable approved materials in their place.

1.5.9 Where a specific manufacturer is noted herein, other manufacturers may be considered where approved by the Agency.

2. PRODUCTS

2.1 **General**

2.1.1 Provide all equipment as per the following description to complete the entire works as shown on drawings and as indicated in the specifications to provide a complete and operational system.

2.1.2 Coordinate with other trades to provide the components required to make all systems operational – see mechanical schedules for details of equipment provided to make sure the works are complete.

2.2 **Outlet Boxes**

2.2.1 Outlet boxes shall conform to C.S.A. Standard C22.2 No. 18-1972.

2.2.2 Ceiling boxes shall be 103mm octagon or square, complete with fittings, where required to support fixtures.

2.2.3 Switch and receptacle boxes shall be:

.1 103mm square with plaster ring, where flush mounted in plaster walls

.2 No. 1104, where flush mounted in wood or drywall, with stud fasteners as required.

.3 Masonry boxes in masonry walls.

2.2.4 Where boxes are surface mounted in unfinished areas they shall be FS conduits.

2.2.5 Standard outlet boxes shall be manufactured from code gauge galvanized steel.

2.2.6 Provide a suitable outlet box for each light, switch, receptacle or other outlet, approved for the particular area it is to be installed.

2.2.7 Boxes shall be of a size suitable for the number and size of conductors and the space requirements for the wiring device.

2.3 **Conduit Accessories, Condulets and Fittings**

2.3.1 Conduit accessories, condulets and fittings shall conform to C.S.A. Standard C22.2 No. 18-1972.

2.3.2 Rigid conduit bushings shall be as manufactured by:

.1 Thomas & Betts Ltd. – Series 503

.2 Efcor of Canada Ltd. – Series 720

.3 Commander / Iberville

.4 Agency approved equivalent

2.3.3 EMT Connectors shall be steel set screw type as manufactured by:

.1 Thomas & Betts Ltd. – Steel City TC 121E Series

.2 Efcor of Canada Ltd. – Series 720

.3 Commander / Iberville

.4 Agency approved equivalent

2.3.4 Ground Bushing shall be as manufactured by:

.1 Thomas & Betts – Blackjack or 1220 Series

.2 Efcor of Canada Ltd

.3 Commander / Iberville

.4 Agency approved equivalent

2.3.5 Flexible conduit connectors shall be as manufactured by:

.1 Thomas & Betts Ltd. – Series 3110

.2 Efcor of Canada Ltd. – Series 1001

.3 Commander / Iberville

.4 Agency approved equivalent

2.3.6 Conduit fittings shall be as manufactured by:

.1 Crouse-Hinds of Canada Ltd

.2 Kondu Mfg. Co. Limited

.3 Thomas & Betts Ltd.

.4 Killark of Canada
.5 Efcor of Canada Ltd.
.6 Commander / Iberville
.7 Agency approved equivalent

2.3.7 Steel conduit shall be as manufactured by:
.1 Conduits National Co. Ltd
.2 MBF Industries
.3 Agency approved equivalent

2.3.8 Aluminum conduits shall be as manufactured by:
.1 Alcan Canada Products Ltd.
.2 Agency approved equivalent

2.3.9 Terminate rigid conduit entering boxes or enclosures with nylon insulated steel threaded bushings.
.1 Thomas & Betts – 8125 Series
.2 Agency approved equivalent

2.3.10 Terminate EMT entering boxes or enclosures with nylon insulated steel threaded bushings.

2.3.11 Terminate flexible conduit entering boxes or enclosures with nylon insulated steel connectors.
.1 Thomas & Betts – 5332 Series
.2 Agency approved equivalent

2.3.12 Install wall entrance seals where conduits pass through exterior walls below grade.

2.3.13 Provide expansion coupling in conduit runs at building expansion joints and in long runs subject to thermal expansion, all in accordance with manufacturer recommendations.

2.3.14 All cabling shall be run in EMT conduit unless otherwise approved.

2.3.15 BX cable is acceptable for short drops to light fixtures to a **MAXIMUM LENGTH OF 1500mm**. Any installations exceeding 1500mm **WILL BE REMOVED AND REPLACED AT THE VENDORS EXPENSE**. All installations of BX cable shall be complete with anti-short bushings at all stripped ends as per OEC #12-608(1)(a). Connectors for BX cable shall be Crouse Hinds #L16ST.

2.3.16 Rigid PVC (unplasticized) conduit shall be CSA approved according to CSA Standard C22.2 No. 136.

2.3.17 Pull Cords/Strings
.1 Nylon twine

2.4 Conductors, Wires and Cables

2.4.1 Wiring installed in conduit, unless otherwise noted, shall be copper 600 volt RW75XLPE, RWU75XLPE or T-75 nylon jacket as per the requirements on the plans. It is the

responsibility of the Vendor to verify all equipment termination temperature and adjust wire size/rating to suit.

2.4.2 Lighting and power wiring shall be copper, minimum No. 12 gauge. Size wires for 2% maximum voltage drop to farthest outlet on a maximum 80% loaded circuit.

2.4.3 Conductors shall be colour coded. Conductors No. 10 gauge and smaller shall have colour impregnated into insulation at time of manufacture. Conductors size No. 8 gauge and larger may be colour coded with adhesive colour coding tape but only black insulated conductors shall be employed in this case, except for neutrals which shall be white wherever possible.

2.4.4 Colour Coding shall be as follows:
- .1 Phase “A” – Red
- .2 Phase “B” – Black
- .3 Phase “C” – Blue
- .4 Control – Orange
- .5 Ground – Green
- .6 Neutral – White

2.4.5 Wire shall be as manufactured by:
- .1 Nexans
- .2 Industrial Wire and Cable (1970) Ltd.
- .3 Southwire Canada
- .4 Prysmian Cables & Systems Ltd (formerly Pirelli Cables Ltd.)
- .5 Neatly train circuit wiring in cabinets, panels, pull boxes and junction boxes and hold with nylon cable ties.
- .6 Splice wire, up to and including No. 6 gauge, with nylon insulated expandable spring type connectors.
  1. Thomas & Betts – Marr Max Series
  2. Agency approved equivalent

2.4.6 Splice large conductors using compression type connections insulated with heat shrink sleeves.
- .1 Thomas & Betts – 5400 Series lugs and heat shrink type #s series
- .2 Agency approved equivalent

2.4.7 Where colour coding tape is utilized, it shall be applied for a minimum of 50.8mm (2”) at terminations, junction and pull boxes and condulet fittings. Do not paint conductors under any condition. Colour coding shall also apply to bussing in panels and, switchgear, disconnects, and metering cabinets.

2.5 **Junction Boxes and Pull Boxes**

2.5.1 Junction and pull boxes must conform to CSA C22.2 No. 40 (latest edition).

2.5.2 Welded steel construction with screw-on flat covers for surface mounting.

2.5.3 Covers with 25 mm (1") minimum extension all around, for flush-mounted pull and junction boxes.

2.6 **Switches**

2.6.1 Local switches shall be 15A or 20A, single pole, double pole, three-way, four-way, keyed, or motor rated complete with pilot light. Switches to be silent, A.C. type and C.S.A. listed, specification grade. Provide switches rated to suit system voltage.

2.6.2 Manually operated general purpose with the following features:

.1 Terminal holes approved for No. 10 AWG wire.
.2 Silver alloy contacts
.3 Urea or melamine molding for parts subject to carbon tracking
.4 Suitable for back and side wiring
.5 Toggle style

2.6.3 Toggle operated fully rated for tungsten filament and LED lamps

2.6.4 Up to 80% of rated capacity of motor loads.

2.6.5 Switches and receptacles shall be of the same manufacturer throughout except where a specified item is not made by that manufacturer.

2.6.6 Provide white colour (to be confirmed at shop drawing review).

2.6.7 Catalogue numbers listed below have been used to indicate quality standards.

.1 Single Pole Hubbell 1221/18221 Series
.2 Double Pole Hubbell 1222/18222 Series
.3 Three-Way Hubbell 1223/18223 Series
.4 Four-Way Hubbell 1224/18224 Series
.5 Keyed Hubbell HBL1221L + 2 matching keys Hubbell HBL1209
.6 Motor rated Hubbell HBL1221PL c/w pilot light (min 20A)

2.6.8 Acceptable Manufacturers:

.1 Hubbell of Canada Ltd
.2 Leviton
.3 Legrand
.4 Or Agency approved equivalent

2.7 **Receptacles**

2.7.1 Receptacles shall conform to CSA 22.2 No. 42 (latest edition).

2.7.2 Receptacles shall be specification grade of amperage and voltage indicated on the drawings.

2.7.3 Manually operated general purpose with the following features:

.1 Terminal holes approved for No. 10 AWG wire.

.2 Break-off links for use as split receptacles

.3 Urea or melamine molding for parts subject to carbon tracking

.4 Suitable for back and side wiring (eight back wired entrances, four side wiring screws)

.5 Triple wipe contacts and riveted grounding contacts

.6 Tamper resistant

2.7.4 Switches and receptacles shall be of the same manufacturer throughout except where a specified item is not made by that manufacturer.

2.7.5 Provide white colour (to be confirmed at shop drawing review).

2.7.6 Receptacles shall be as listed below:

.1 15 ampere, 120V, single phase grounded duplex tamper resistant receptacle shall be NEMA-U-ground type CSA Configuration 5-15R.

.2 20 ampere, 120V, single phase grounded duplex tamper resistant receptacle shall be NEMA-U-ground type CSA Configuration 5-20RA.

.3 15 ampere, 120V, weatherproof receptacles shall be equal to those above but complete with gasketed cast plate and hinged covers.

2.7.7 Other types of receptacles shall be provided as shown on Drawings.

2.7.8 Catalogue numbers listed below have been used to indicate quality standards.

.1	Standard Duplex	Hubbell BR15WHITR
.2	T-Slot	Hubbell BR20WHITR
.3	Controlled	Hubbell BR15C2GNTR
.4	Controlled T-Slot	Hubbell BR20C2GNTR
.5	GFI	Hubbell GFTRST15W
.6	GFI T-Slot	Hubbell GFTRST20W
.7	USB Duplex	Hubbell USB15C5W
.8	USB Only	Hubbell USB4W
.9	Twist Lock	Hubbell HBL23XX
.10	Dryer	Hubbell HBL9430A
.11	Range	Hubbell HBL9450A

2.7.9 Acceptable Manufacturers:

.1 Hubbell

.2 Legrand

.3 Leviton

.4 Cooper
.5 Or Agency approved equivalent

2.8 **Cover Plates**

2.8.1 Switch, receptacle, telephone and other plates shall be stainless steel 18-8 chrome metal alloy, Type 302, non-metallic in finished areas and pressed steel in unfinished areas. Finish brush marks shall be run in a vertical direction.

2.8.2 Cover plates shall be of the same manufacturer throughout.

2.8.3 Cover plates shall be as manufactured by:
.1 Leviton
.2 Hubbell
.3 Legrand
.4 Agency approved equivalent

2.9 **Disconnect Switches**

2.9.1 Fused or Un-fused disconnect or safety switches shall be Type "A", quick-make, quick-break construction with provision for padlocking switches in either "ON" or "OFF" position.

2.9.2 Switches throughout job shall be of same manufacture.

2.9.3 Fused switches shall have fuse clips designed for Class "J" fuses and designed to reject standard N.E.C. fuses.

2.9.4 Switches shall be as manufactured by:
.1 Eaton
.2 Siemens
.3 Schneider Electric
.4 Agency approved equivalent

2.9.5 Provide fused or un-fused safety or disconnect switches as shown and as required by Code.

2.9.6 Disconnects feeding elevator controllers must be equipped with two auxiliary contacts approved by the elevator supplier.

2.10 **Motor Starters**

2.10.1 Starts shall conform to CSA C22.2 No. 14 (latest edition) and EEMAC E14-1.

2.10.2 Manual motor starters shall be/have:
.1 Used for motors ½ hp or less
.2 Equal to Allen Bradley type 600 and 609
.3 Toggle operated
.4 Locking
.5 Plug-in heaters sized to suit the full load current of the motors installed
.6 Red neon pilot light

2.10.3 Magnetic motor starters shall be/have:
.1 Used for motors over ½ hp

.2 Equal to Allen Bradley IEC type
.3 Contactor solenoid operated, rapid action type
.4 Motor overload protective device in each phase, manually reset from outside enclosure
.5 Hand/off/auto push button selector switches
.6 Indicating lights: standard duty, 1 red pilot light for "stop" or "off" and 1 green light for "start" or "on".
.7 1-N/O and 1-N/C spare auxiliary contacts
.8 24V auxiliary contacts
.9 Wiring and schematic diagram inside starter enclosure in visible location

2.10.4 Combination starters shall be/have:
.1 Used where fused switch and magnetic starter are in same location
.2 Equal to Allen Bradley IEC
.3 Include fused disconnect switch with operating lever on outside of enclosure to control disconnect
.4 Locking in "OFF" position
.5 Independent locking of enclosure door
.6 Provision for preventing switching to "ON" position while enclosure door is opened.
.7 Magnetic starter features as per above.

2.10.5 Provide control transformers and auxiliary contacts as required for control connections.

2.10.6 Provide push to test lights throughout.

2.10.7 Half size and IEC starters will not be accepted.

2.10.8 Acceptable Manufacturers:
.1 Allen Bradley
.2 Eaton
.3 Siemens
.4 Schneider Electric
.5 Agency approved equivalent

2.11 **Control Transformers**

2.11.1 Control transformers shall conform to CSA C22.2 No. 66 (latest edition).

2.11.2 Auto-transformers shall conform to CSA C22.2 No. 47 (latest edition).

2.11.3 Single phase, dry type, control transformer with primary voltage as indicated and secondary voltage to suit remote control device, complete with secondary fuse, installed in with starter as indicated.

2.11.4 Size control transformer for control circuit load plus 20% spare capacity.

2.12 **Contactors**

2.12.1 Contactors shall conform to CSA C22.2 No. 14 (latest edition).
2.12.2 Electrically held and controlled by pilot devices as indicated and rated for type of load controlled. (Mechanically held style for exterior lighting control)
2.12.3 Complete with 2 normally open and 2 normally closed auxiliary contacts unless indicated otherwise.
2.12.4 Mount in CSA Enclosure 1 unless otherwise indicated
2.12.5 Include following options in cover:
.1 Red indicating lamp
.2 Hand – Off – Auto selector switch.
2.12.6 24V Control transformer: mounted in contactor enclosure.
2.12.7 Acceptable Manufacturers:
.1 Allen-Bradley
.2 Eaton
.3 Siemens
.4 Schneider Electric
.5 Or Agency approved equivalent

2.13 **Control Relays**
2.13.1 Control relays shall be equal to Allen Bradley type P, electrically held. Confirm coil voltages for relays controlling mechanical equipment with controls Vendor.

2.14 **Hangers and Supports**
2.14.1 Provide and correctly locate all hangers and inserts required for the installation of all work under this Contract.
2.14.2 Hangers for electrical conduit shall be galvanized after fabrication.
2.14.3 Conduit hangers shall be as manufactured by:
.1 Burndy Canada Ltd
.2 Canadian Strut Products Ltd.
.3 E. Myatt & Co. Ltd.
.4 Steel City Electric Co.
.5 Pilgrim
.6 Thomas & Betts
.7 B-line
.8 Agency approved equivalent
2.14.4 Do not use perforated strapping (grappler bars).

2.15 **Finishes and Painting**
2.15.1 All factory supplied equipment shall have finish coating factory applied whether finish be painted, galvanized or other, as required and as specified.
2.15.2 Repair dents and touch up all damaged finishes with matching finish, or if required by the Consultant or Agency,

completely repaint or replace damaged surface at no extra cost to the Contract.

3. EXECUTION

3.1 **General**

3.1.1 All wiring to meet Ontario Electrical Safety Code and local authorities.

3.1.2 All power, interlock and control wiring over 50V, and disconnects shall be supplied and installed by the Electrical Vendor. Coordinate with Division 22 and 23.

3.1.3 Division 22 - Plumbing and 23 - Heating, Ventilation And Air Conditioning shall install all control and low voltage interlock wiring less 50V or less for mechanical equipment unless specified.

3.1.4 All outdoor wiring to be run in liquidtight. All indoor wiring to be run in conduit. Last 1.5m (5') at final connection to equipment shall be run in flexible conduit only (not liquidtight).

3.1.5 Where wire size is not indicated, ampacity must match or exceed rating of protective device.

3.1.6 Panels are specified as sequence bussed and all branch circuit wiring from these panels shall be such that where a common neutral is used for two or three circuits, these circuits shall be fed from adjacent breakers, so that single-pole breakers may be replaced with 2 or 3 pole breakers should this be required in the future. All circuits shall be balanced. All neutrals shall be sized to meet the requirements of Section 4-018 of the Ontario Electrical Safety code and in no case smaller than 12 AWG.

3.1.7 Feeders, sub-feeders, circuit wiring and ancillary items shall be colour coded for phase identification. Neutral conductors shall be full capacity with white covering and be continuous throughout the system without fuses, switches or breakers of any kind.

3.1.8 Install wiring continuously within raceways, splices will be permitted only at outlets and junction boxes. Sufficient slack wire shall be left at these points to permit proper connection of fixtures, devices, equipment, etc.

3.1.9 Any exposed conduits or cables shall be run parallel to or at right angles to building lines and in a neat manner. Conduits shall be thoroughly reamed and each threaded termination shall be provided with two lock nuts. Running threads for rigid conduit will not be accepted.

3.1.10 Internal raceways in the building

.1 Securely cap or plug all openings in conduit and ducts during the execution of the Work to prevent dust and debris from entering the openings

.2 At completion of the installation, the service entry ducts and the conduit system in the building shall be fished to clear all blocks.

3.1.11 Outlet and pull boxes shall be cleaned out and the system left free from water and moisture.

3.1.12 Provide all conduit, wire, fittings, disconnect switches, line voltage, starters, disconnects, controls and auxiliary materials as previously defined to wire into service all 3 phase motors, single phase motors and equipment included in other Sections unless specified otherwise.

3.1.13 Install pull boxes in conduit run where required to facilitate the pulling in of cable and locate in inconspicuous accessible spaces.

3.1.14 Provide flexible connections to mechanical equipment for vibration isolation. Connections to equipment roof mounted or in other damp or wet locations shall be liquid tight.

3.1.15 Conduits and cables shall not be attached to mechanical units for support.

3.1.16 All devices in General Purpose rooms (Gym), Mechanical and/or Electrical rooms and all exterior mounted devices shall have wire guards for protection from mechanical damage. Provide wire guards elsewhere as noted on drawings.

3.2 **Wiring Methods**

3.2.1 Install wiring in conduit unless otherwise specified.

3.2.2 Flexible conduit and armoured cable will be accepted for a maximum length of 1500mm for final connection to lighting fixtures. Do not connect from fixture to fixture.

3.2.3 Use thin wall conduit (EMT), up to and including 53mm conduit size, for branch circuit and feeder wiring in ceilings, furred spaces, concrete block walls, hollow walls and partitions. Use rigid galvanized steel conduit for wiring in poured concrete, where exposed, and for conduit 65mm or larger. Use rigid PVC conduit for wiring in slabs on grade and wiring below grade.

3.2.4 Aluminum conduit may be used, in lieu of rigid steel conduit, in clean and dry locations, but shall not be used in poured concrete, or for signal and intercommunication systems wiring.

3.2.5 Conduit manufacturer’s touch-up enamel shall be used to repair all scratches and gouges on epoxy-coated conduit.

3.3 **Outlet Boxes**

3.3.1 Where 103mm square outlet boxes are installed in exposed concrete or cinder block finished areas, blocks will be cut under Masonry Division as instructed under this Section – Materials, Devices & Equipment. Opening shall be cut to provide a close fit to boxes and covers so that edges of openings are not visible after installation of plates. Mortar shall not be used to patch up openings that are cut too large or to patch ragged edges.

3.3.2 Ceiling boxes shall be 103mm octagon or square, complete with fittings, where required to support fixtures.

3.3.3 Provide a suitable outlet box for each light, switch, receptacle, or other outlet, approved for the particular area it is to be installed.

3.3.4 Support outlet boxes independently of conduit and cable.

3.3.5 Locate outlet boxes, mounted in hung ceiling space, so they do not obstruct or interfere with the removal of lay-in ceiling tiles.

3.3.6 Offset outlet boxes, shown back-to-back in partitions, horizontally a min. 150mm to minimize noise transmission between adjacent rooms.

3.3.7 Use gang boxes at locations where more than one device of the same system only, is to be mounted. Each system shall utilize separate boxes.

3.3.8 Use tile wall covers where 103mm square outlet boxes are installed in exposed concrete or cinder block in finished areas.

3.3.9 Flush mount boxes, panels, cabinets, and electrical devices, which are installed in finished areas, shall be provided with suitable flush trims and doors or covers, unless specifically noted otherwise.

3.3.10 Provide pre-formed polyethylene vapour barriers for all boxes located in walls with internal vapour barriers.

3.4 Conduit Accessories, Condulets and Fittings

3.4.1 Terminate rigid conduit entering boxes or enclosures with nylon insulated steel threaded bushings.
- .1 Thomas & Betts – 8125 Series
- .2 Or Agency Approved Equivalent

3.4.2 Terminate EMT entering boxes or enclosures with nylon insulated steel threaded bushings.

3.4.3 Terminate flexible conduit entering boxes or enclosures with nylon insulated steel connectors.
- .1 Thomas & Betts – 5332 Series
- .2 Or Agency Approved Equivalent

3.4.4 Install wall entrance seals where conduits pass through exterior walls below grade.

3.4.5 Provide expansion coupling in conduit runs at building expansion joints and in long runs subject to thermal expansion, all in accordance with manufacturer recommendations.

3.5 **Conductors, Wires and Cables**

3.5.1 Conductors shall be colour coded. Conductors No. 10 gauge and smaller shall have colour impregnated into insulation at time of manufacture. Conductors size No. 8 gauge and larger may be colour coded with adhesive colour coding tape but only black insulated conductors shall be employed in this case, except for neutrals which shall be white wherever possible.

3.5.2 Colour Coding shall be as follows:

.1 Phase “A” – Red
.2 Phase “B” – Black
.3 Phase “C” – Blue
.4 Control – Orange
.5 Ground – Green
.6 Neutral – White

3.5.3 Neatly train circuit wiring in cabinets, panels, pull boxes and junction boxes and hold with nylon cable ties.

3.5.4 Splice wire, up to and including No. 6 gauge, with nylon insulated expandable spring type connectors.

.1 Thomas & Betts – Marr Max Series
.2 Or Agency Approved Equivalent.

3.5.5 Splice large conductors using compression type connections insulated with heat shrink sleeves.

.1 Thomas & Betts – 5400 Series lugs and heat shrink type #s series
.2 Or Agency Approved Equivalent

3.5.6 Where colour coding tape is utilized, it shall be applied for a minimum of 2” at terminations, junction and pull boxes and condulet fittings. Do not paint conductors under any condition. Colour coding shall also apply to bussing in panels and, switchgear, disconnects, and metering cabinets.

3.6 **Junction Boxes and Pull Boxes**

3.6.1 Install pull boxes in inconspicuous but accessible locations. Provide access doors in all drywall areas.

3.6.2 Install junction boxes and pull boxes so as not to exceed 30m (100’) of conduit run between pull boxes and in conformance with the Electrical Safety Authority.

3.6.3 Provide equipment identification in conformance with Section 26 05 01 - General Electrical Req’s.

3.6.4 Label all junction boxes with panel and circuit number.

3.7 **Switches**

3.7.1 Install single throw switches with handle in the “up” position when switch is closed.

3.7.2 Install switches in gang type outlet box when more than one switch is required in one location.

3.7.3 Confirm colour prior to ordering.

3.7.4 Refer to Section 26 05 01 - General Electrical Req’s for mounting heights.

3.8 **Receptacle**

3.8.1 Mount receptacles so long dimension is in the vertical.

3.8.2 Exact locations shall be verified to suit furniture layout.

3.8.3 Connect receptacle grounding terminal to the outlet box with a copper wire.

3.8.4 Install receptacles in gang type outlet box when more than one switch is required in one location.

3.8.5 Where split receptacle has one portion switched mount vertically and switch upper portion.

3.8.6 Weatherproof receptacles shall be equal to 20A GFI and mounted in weatherproof enclosure complete. Enclosure shall be equivalent to Hubbell RW58300.

3.8.7 Confirm colour prior to ordering.

3.8.8 Refer to Section 26 05 01 – General Electrical Req’s for mounting heights.

3.9 **Cover Plates**

3.9.1 Do not install plates until final painting of room or area is completed. Remove protective covering.

3.10 **Hangers and Supports**

3.10.1 Provide and correctly locate all hangers and inserts required for the installation of all work under this Contract.

3.10.2 Support outlet boxes, junction boxes, conduit and all electrical equipment independently with hangers and fastenings to building structural members.

3.10.3 Hangers in general shall be supported from inserts in concrete construction or from building structure using beam clamps for steel structures. Provide all additional angle or channel steel members required between beams for support of conduits, cables, luminaires, etc.

3.10.4 Use coach screws, lag screws or wood screws as appropriate in any wood construction.

3.10.5 Feeders, conduits and power ducts running vertically in a building shall be supported at each floor and between each floor if necessary.

3.11 **Mounting Heights**

3.11.1 Refer to Section 26 05 01 - General Electrical Req's.

3.12 **Conduit Sleeves and Curbs**

3.12.1 Provide conduit sleeves of galvanized steel for conduit and cable runs passing through concrete walls, beams, slabs and floor. Include for all power, communications and control wiring. All conduit sleeves shall be de-burred and have plastic bushings installed to protect wiring.

3.12.2 Extend galvanized conduit sleeves for conduit rising through slabs 4" minimum above finished floors. Provide sleeves, passing through floors having a waterproof membrane, with an integral flashing clamp.

3.13 **Finishes and Painting**

3.13.1 Primary and final painting for work, other than items specified as factory primed or finished, shall be performed by trades specializing in this type of work.

3.13.2 Repair and finish factory finished equipment, damaged or scratched during installation, in an approved manner.

3.13.3 Leave bare metal surfaces ready for painting by removing dirt, rust, grease or millscale to Consultant's approval.

3.13.4 All structural steel including hangers, brackets, supports and other ferrous metals shall be shop or factory prime painted wherever practicable. Wherever structural steel including hangers, brackets, supports, and other ferrous metals cannot be shop or factory prime painted, wire brush to remove all traces of rust, clean of all traces of dirt, oil, and grease, and apply one coat of an approved rust inhibiting primer in accordance with CGSB-GB-40d and leave ready to receive finish paint.

3.14 **Electrical Connections for Mechanical Equipment**

3.14.1 Provide all required electrical connections to apparatus provided and/or supplied by Division 22 and 23, the Agency and as part of the work of other Divisions of the Specifications.

3.14.2 All power and control wiring over 50V and disconnects shall be installed by the Vendor.

3.14.3 All control and low voltage wiring 50V and under shall be installed by the Vendor and/or a Controls subcontractor. Coordinate all low voltage wiring with the Vendor.

3.14.4 All connections to roof mounted mechanical equipment shall be installed through a gooseneck style pitch pocket equal to Thaler Metal MEF-2A/2A1/2A2. Pitch pocket supplied and

installed by the Vendor. Coordinate installation with the Vendor and/or Roofing subcontractor.

3.15 **Motors and Starters**

3.15.1 Division 26 – Electrical General Requirements shall supply and install all starters unless otherwise indicated.

3.15.2 Coordinate with Division 22 – Plumbing and 23 – Heating, Ventilation and Air Conditioning as required.

3.15.3 Install line voltage disconnect switches at each motor not within the required distance from its starter to meet code requirements.

3.15.4 All motors shall be wired and connected under this Division. The drawings do not necessarily show the exact location of wiring to motors and it shall be the responsibility of this Division to fully coordinate this work with Division 22 – Plumbing and 2323 – Heating, Ventilation and Air Conditioning.

3.15.5 Temperature Controls: Be responsible for the “line" side power connections to all control apparatus where detailed or required to make the system operational.

3.16 **Equipment Identification**

3.16.1 Refer to Section 26 05 01 – General Electrical Req’s.

3.17 **Testing**

3.17.1 Make tests of equipment and wiring at times requested.

3.17.2 Tests shall include meggered insulation values, voltage and current readings to determine balance of panels and feeders under full load, and operation of each piece of equipment for correct operation.

3.17.3 Supply meters, materials and personnel as required to carry out these tests.

3.17.4 Test electrical work to standards and function of Specification and applicable codes in an approved manner. Replace defective equipment and wiring with new material and leave entire system in complete first-class operating condition.

3.17.5 Before energizing system, check all connections and set and calibrate all relays and instruments for proper operation, obtain necessary clearances, approval and instructions from utility company.

3.17.6 Connect single phase loads so that there is the least possible unbalance of the supply phases.

3.17.7 Submit all test results in report format.

END OF SECTION

1. GENERAL

1.1 **Codes and Standards**

1.1.1 Ontario Electrical Safety Code – Current Edition
1.1.2 CSA
1.1.3 ULC
1.1.4 Local Codes and Requirements

1.2 **Submittals**

1.2.1 Submit shop drawings to the Consultant for review prior to ordering or installation.
1.2.2 Shop drawings shall include manufacturer, model numbers, electrical data, wiring diagrams, and indicate conformance to above reference standards.

2. PRODUCTS

2.1 **Fixtures**

2.1.1 Luminaires including fixtures and lamps shall conform to the light fixture schedule located on drawings.
2.1.2 Manufacturer:
.1 Acceptable Manufacturers:
1. Refer to alternates as per light fixture schedule on drawings.
.2 Alternate manufacturers must provide equal fixtures to the satisfaction of the Engineer. Any alternates that do not satisfy the specifications or the Engineer will be rejected.
.3 Alternate fixtures must be on approved DLC list if base spec fixtures is on approved list for applicable energy benefits.
.4 Where alternates alter functional or visual design, or change the space requirements or mounting details, all such information shall be clearly presented to the Consultant for consideration and any costs associated with same shall be the responsibility of the Vendor.
.5 Once shop drawings are approved, no substitutions will be considered except for special circumstances such as delivery. Delivery reasons shall only be considered if at no fault to the Vendor. the Vendor's failure to order fixtures within the schedule will not be acceptable.
2.1.3 Similar luminaires shall be products of same manufacturer.
2.1.4 Luminaires shall be completely factory assembled and delivered in cartons or in palletized form.

2.1.5 All fixtures shall be recessed type in acoustic tile or drywall ceilings unless otherwise indicated. Provide drywall trim frame for recessed drywall applications.

2.1.6 Troffers in ceiling shall be equipped with adjustable mounting brackets.

2.1.7 All fixtures shall be provided with ballasts suitable for the fixture type and application. All ballasts shall CSA approved and ULC listed and comply with CSA standard C22.2 No. 74. Ballasts shall be suitable for 120 volt application as noted.

2.1.8 Protective wire guards shall be provided for all fixtures where indicated on the drawings and where subject to damage.

2.2 **Lenses**

2.2.1 In general, lenses shall be K12 distribution acrylic 32mm (0.125") thick, shall have a recessed prismatic pattern of 5mm (3/16") square based female cones running 45 degrees to the parallel and perpendicular axis to the panel. Provide vandal lenses where specified.

2.2.2 Panel shall be made of ultraviolet inhibited injection moulded clear virgin acrylic.

2.2.3 Panels shall be strain free and uniform in production. There shall be no fade-outs or streaks to detract from job performance.

2.2.4 Lenses shall be low brightness, sparkling crystal panel that provides maximum efficiency and good brightness control in the direct glare zone.

2.3 **Solid State Drivers**

2.3.1 Drivers shall be UL/CSA approved for application required and meet all applicable CEC, NEMA and ANSI Standards.

2.3.2 Driver to provide full-range dimming, 0-10V, where indicated.

2.3.3 Drivers shall comply with NEMA limits governing electromagnetic and radio frequency interference and shall not interfere with operation of other normal electrical equipment.

2.3.4 Driver shall meet ANSI Spec C62.41 and IEEE standards regarding all applicable transient protection.

2.3.5 Frequency of operation shall be 20 kHz or greater.

2.3.6 Driver shall have an 'A' sound rating.

2.3.7 Total harmonic distortions shall be less than 10%. Meet ANSI C82.77.

2.3.8 Drivers shall have a power factor of 0.85 minimum.

2.3.9 Driver warranty shall be minimum five (5) years.

2.4 **LEDs**

2.4.1 Shall conform to ANSI C78.377 (latest edition)

2.4.2 LEDs shall be 4000K unless otherwise noted. Verify colour of LEDs before ordering.
2.4.3 LEDs shall provide a minimum 80 CRI unless otherwise noted.
2.4.4 LED life shall be minimum 50,000 hours. LEDs shall be rated for L70 life span.
2.4.5 Warranty shall be minimum 5 years.

3. EXECUTION

3.1 General

3.1.1 Luminaires shall be stored in a dry and protected area. Confirm acceptable storage area prior to luminaire being delivered to site.
3.1.2 Lenses for fixtures shall be stored on site and installed separately from the fixtures at a time to be directed by the Consultant.

3.2 Installation of Lighting Fixtures

3.2.1 Provide all lighting fixtures and lamps as shown on the drawings and schedules.
3.2.2 Include for assembly, and mounting of all fixtures, complete with all wiring, connections, fittings, hangers, aligners, box covers and accessories which may be required for any fixture to provide a complete, safe, fully operational assembly.
3.2.3 Install fixtures in accordance with applicable reflected ceiling plans and/or as directed by the Consultant.
3.2.4 In Equipment Rooms, shafts and similar secondary areas, install fixtures after the mechanical and other major work is roughed-in and adjust fixture locations as required at no cost to the Agency. Fixtures in these areas shall be installed at the same height unless otherwise directed.
3.2.5 At the discretion of the Consultant, site test and demonstrate the operation of special application fixtures and adjust their locations within a reasonable distance to obtain the effects desired. Assist in the aligning and positioning of all adjustable fixtures, and ensure that fixtures with adjustable lamp holders are properly positioned to correspond with the lamps specified.
3.2.6 Thoroughly review all ceiling types, construction details and mounting arrangements before placing fixture orders and ensure that all mounting assemblies, frames, rings and similar features are included for and match the required installation.
3.2.7 Mount luminaires perfectly level and plumb. Luminaires shall fit tightly to ceiling without showing a space or light leak

between frame and ceiling. Re-install improperly installed fixtures at no expense to the Agency.

3.2.8 All fixtures and fixture assemblies shall be properly secured and supported. Support fixtures independent of the ceiling construction complete with all fasteners, framing and hangers as required. Do not secure fixtures to mechanical ductwork or other vibration producing apparatus.

3.2.9 Where fixtures are suspended from the structure they shall utilize self aligning box covers with an additional ground wire from the outlet through the hanger for continuity of ground.

3.2.10 Carefully co-ordinate the fixture installation with the work of other trades ensuring that the necessary depths and mounting spaces are provided. Do not alter fixture locations unless approved by the Consultant.

3.2.11 All lamps shall be new and intact when the project is complete, and ready for acceptance. Replace lamps used for testing fixture assemblies at the discretion of the Consultant. Include a full lamp listing in the Operating and Maintenance Instructions.

3.2.12 Provide safety chains on all surface mounted, T-bar mounted or suspended light fixtures. Light fixtures shall have two chains, each supporting two corners of the luminaire (all four corners supported). Chain shall be #10 tensile jack chain, bright inc coated, with a strength of 400 lbs (180 kg). Attachments shall be made using a No. 10 “S” hook. Caddy fasteners may be used where applicable. “S” hooks must be closed after installation.

3.2.13 Industrial luminaires, where suspended, shall have ½” (12mm) conduit hangers and ARB cylinder ball aligners. Length and location shall clear equipment, ducts and pipes. Metal strut (Flexibar or equal) may be used for mounting of luminaires in mechanical areas or electrical rooms.

END OF SECTION

1. GENERAL

1.1 **General Requirements**

1.1.1 Conform to Division 01 General Conditions.

1.1.2 All material, labour, equipment, and services required under this section shall be the full responsibility of the Vendor including any material, labour, equipment, and services provided by their sub-Vendors.

1.1.3 Complete and submit the Supplemental Tender Form including list of equipment and materials to be used on this project and forming part of the tender documents.

1.2 **Summary of Work**

1.2.1 Refer to Division 1, Section 01 30 00 – Instruction to All Trades.

1.3 **Action and Informational Submittals**

1.3.1 Submit in accordance with Section 01 30 00 - Instruction to All Trades.

1.3.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for communication raceway systems and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 **Delivery, Storage and Handling**

1.4.1 Deliver, store and handle materials in accordance with Health and Safety regulations.

1.4.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

1.4.3 Storage and Handling Requirements:

Store materials indoors in dry location and in accordance with manufacturers recommendations in a clean, dry, well-ventilated area.

.1 Doran protect communication Raceway systems from nicks, scratches, and blemishes.

.2 Replace defective or damaged materials with new.

2. PRODUCTS

2.1 **System Description**

2.1.1 Empty telecommunications raceways system consists of outlet boxes, cover plates, conduits, cable trays, pull boxes, sleeves and caps, fish wires.

2.2 **Material**

2.2.1 In accordance with Division 26, Electrical.

3. EXECUTION

3.1 **Examination**

3.1.1 Verification of Conditions: verify that conditions of substrate previously installed under other sections or contracts are acceptable for communication Raceway systems installation in accordance with manufacturer's written instructions.

.1 Informed consultant of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Consultant.

3.2 **Installation**

3.2.1 Install empty raceway system, including overhead distribution system, fish wire, outlet boxes, floor boxes, pull boxes, cover plates, conduit, sleeves and caps, cable tray, miscellaneous and positioning material constitute complete system.

3.3 **Cleaning**

3.3.1 Progress cleaning; clean in accordance with Division 01, General Requirements.

3.4 **Protection**

3.4.1 Protect installed products and components from damage during construction.

3.4.2 Repair damage to adjacent materials caused by pathways for communication system installation.

END OF SECTION

1. GENERAL

1.1 **General Requirements**

1.1.1 Conform to Division 01, General Conditions.

1.1.2 All material, labour, equipment, and services required under this section shall be the full responsibility of the Vendor including any material, labour, equipment, and services provided by their sub-contractors.

1.1.3 Complete and submit the Supplemental Tender Form including list of equipment and materials to be used on this project and forming part of the tender documents.

1.2 **Summary of Work**

1.2.1 Refer to Division 1, Section 01 30 00 – Instruction to All Trades.

1.2.2 Provide additional speaker and strobe devices into new Universal and Barrier Free washrooms as indicated on plans.

1.3 **Action and Informational Submittals**

1.3.1 Submit in accordance with Section 01 30 00 - Instruction to All Trades.

1.3.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for communication raceway systems and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 **References**

1.4.1 CAN/ULC-S524 (latest edition), Installation of Fire Alarm Systems.

1.4.2 ULC-S525 (latest edition), Audible Signal Appliances for Fire Alarm Systems.

1.4.3 CAN/ULC-S526 (latest edition), Visual Signal Appliances, Fire Alarm.

1.4.4 CAN/ULC-S527 (latest edition), Control Units, Fire Alarm.

1.4.5 CAN/ULC-S528 (latest edition), Manual Pull Stations.

1.4.6 CAN/ULC-S529 (latest edition), Smoke Detectors.

1.4.7 CAN/ULC-S530 (latest edition), Heated Actuated Fire Detectors, Fire Alarm.

1.4.8 CAN/ULC-S531 (latest edition), Smoke Alarms.

1.4.9 CAN/ULC-S536 (latest edition), Inspection and Testing of Fire Alarm Systems.

1.4.10 CAN/ULC-S537 (latest edition), Verification of Fire Alarm Systems.
1.4.11 OBC-2006, Ontario Building Code.

1.5 **System Description**
1.5.1 Existing System includes:
.1 Control panel to carry out fire alarm and protection functions including receiving alarm signals, initiating general alarm, supervising system continuously, actuating zone annunciators, and initiating trouble signals.
.2 Trouble signal devices.
.3 Power supply facilities.
.4 Addressable manual alarm stations.
.5 Addressable automatic alarm initiating devices.
.6 Audible and visual signal devices.
.7 End-of-line devices.
.8 Annunciators.
.9 Ancillary devices.
.10 Interface and zone modules.

1.6 **Requirements of Regulatory Agencies**
1.6.1 This system is subject to review by local building department officials, local fire department officials. Therefore, submission of verification certificate and field technical device verification sheets is required prior to inspection by these officials. Schedule accordingly.

1.7 **Shop Drawings**
1.7.1 Submit in accordance with Division 26.
1.7.2 Include:
.1 Layout of Equipment
.2 Zoning
.3 Complete wiring diagram

1.8 **Operation and Maintenance Data**
1.8.1 Provide operation and maintenance data for Fire Alarm System for incorporation into manual specified in Section 26 05 01 – General Electrical Req's and 26 05 02 – Documentation and Manuals.
1.8.2 Include:
.1 Operation and maintenance instructions for complete fire alarm system to permit effective operation and maintenance.

.2 Technical data – illustrated parts list with parts catalogue numbers.
.3 Copy of approved shop drawings.

1.9 **Material**
1.9.1 Refer to specifications on drawings.

1.10 **Demonstration**
1.10.1 Arrange for on-site demonstrations by fire alarm equipment manufacturer to operational personnel. Refer to drawing E801 for details.

1.11 **System Operation**
1.11.1 Refer to drawing E801.

1.12 **Performance Criteria**
1.12.1 These specifications describe the minimum functional requirements for an electronically supervised, microprocessor based, fully integrated system. The initial installation shall include all the necessary electronic hardware, software and memory for a completely operable system in accordance with these specifications.

1.13 **Quality Assurance**
1.13.1 Each and all items of the fire alarm system shall be listed as the products of a single manufacturer under the appropriate category by the Underwriter's Laboratories of Canada and shall bear the "ULC" label.
1.13.2 Each and all items of the fire alarm system shall be covered by a one-year parts and labour warranty covering defects resulting from faulty workmanship and materials. The warranty shall be deemed to begin on the date the system is accepted by the Project Manager on issuance of the substantial performance certificate for the project.
1.13.3 All control equipment must have Transient Protection Devices to comply with ULC requirements.

2. PRODUCTS

2.1 **Fire Alarm System**
2.1.1 Refer to drawing E801 for New Fire Alarm System specification.

2.2 **Devices**

2.2.1 Provide all new materials, devices and wiring required for contract work in conformance with all codes.

2.2.2 All signal devices shall have field adjustable DB settings for low, medium and high.

2.3 **Standard Detector Mounting Bases**

2.3.1 Provide standard detector mounting bases suitable for mounting on North American 1-gang, 85mm (3-1/2") or 100mm (4") square box. The base shall, contain no electronics, suppo0rt all detector types and have the following minimum requirements:

2.3.2 Removal of the respective detector shall not affect communications with other detectors.

2.3.3 Terminal connections shall be made on the room side of the base. Bases which must be removed to gain access to the terminals shall not be acceptable.

2.4 **Conduit and Wire**

2.4.1 Refer to Drawing E801.

2.5 **End-of-Line Devices:**

2.5.1 Provide new end-of-line devices mounted within outlet boxes as required.

2.5.2 Provide on the cover plate for each such device on approved nameplate, engraved "END-OF-LINE RESISTOR" or with an approved symbol. Provide red lamacoid plate with white 6mm letters identifying zone.

3. EXECUTION

3.1 **Installation**

3.1.1 The entire system shall be installed in accordance with CAN/ULC-S524 (latest edition) and approved manufacturers manuals and wiring diagrams. The Vendor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation. All wiring shall be of the type recommended by the Electrical Safety Code, approved by local authorities having jurisdiction for the purpose, and shall be installed in dedicated conduit throughout.

3.1.2 Locate and install detectors and connect to alarm circuit wiring.

3.1.3 Fire detectors shall not be located closer than 1000mm horizontally from tip of a ceiling suspended (paddle) fan or

ceiling mounted unit heater measured to the edge of the detector.

3.1.4 Fire detectors shall not be located closer than 450mm from any supply or exhaust air outlet as measured to the edge of the detector.

3.1.5 Locate duct type detectors in straight portions of ducts.

3.1.6 Connect alarm circuits to main control panel.

3.1.7 Locate and install signal devices and connect to signalling circuits.

3.1.8 Connect signalling circuits to main control panel.

3.1.9 Locate and install remote relay units to control fan shut down.

3.1.10 All junction boxes shall be painted 'red' and identified as signal or initiating.

3.2 **Mounting Heights**

3.2.1 Refer to mounting heights on E801.

3.3 **Field Quality Control**

3.3.1 The system shall be installed and fully tested under the supervision of trained manufacturer's representative. The system shall be demonstrated to perform all the functions as specified.

3.4 **Acceptable Installer**

3.4.1 The fire alarm/life safety system specified herein shall be installed by an Authorized Electrical subcontractor if required who is CFAA Certified.

3.5 **Examination**

3.5.1 Prior to the commencement of any of the work detailed herein, an examination and analysis of the area(s) where the Fire Alarm/Life Safety System and all associated components are to be installed shall be made.

3.5.2 Any of these area(s) which are found to be outside the manufacturer's recommended environments for the particular specified products shall be noted on a Site Examination Report which shall be given to the Agency's Representative, and the Consultant.

3.5.3 Any shorts, opens, or grounds found on existing wiring shall be corrected prior to the connection of these wires to any panel component or field device.

3.6 **Demonstration**

3.6.1 Arrange for on-site demonstrations by fire alarm equipment manufacturer to operational personnel, the Agency, the consultant and building official as requested.

3.7 **System Test and Verification**

3.7.1 Perform tests in accordance with Section 28-31-00 and CAN/ULC-S537 (latest edition) Standard for the Verification of Fire Alarm Systems.

3.7.2 Submit complete report and test letter to the Consultant.

3.7.3 Fire Alarm System:

3.7.4 Test each device and alarm circuit to ensure noted devices transmit alarm to control panel and actuate general alarm ancillary devices.

3.7.5 Check annunciator panels to ensure zones are show correctly.

3.7.6 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of system.

3.7.7 Class A Circuits:

.1 Test each conductor on all circuits for capability of providing alarm signal on each side of single open-circuit fault condition imposed near middlemost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

.2 Test each conductor on all circuits for capability of proving alarm signals during ground-fault condition imposed near middlemost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

3.7.8 Class B Circuits:

.1 Test each conductor on all circuits for capability of providing alarm signal on line side of single open-circuit fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

3.7.9 The control panel shall continuously perform as automatic self-test routine on each sensor, which will functionally check the sensor electronics and ensure the accuracy of the valves being transmitted to the control panel.

3.7.10 Automatic testing will occur at a rate of one sensor every four minutes.

3.7.11 The sensor’s average analogue value is he average of the last 2000 recorded analogue entries of its chamber.

3.7.12 Any sensor that fails this test shall indicated a 'SELF-TEST ABNORMAL' trouble condition with the sensor's address at the control panel.

3.7.13 The system shall automatically indicate when an individual sensor needs cleaning. When the sensor's average value reaches a predetermined value, a 'DIRTY SENSOR' trouble condition shall be audibly and visually indicated at the local control panel for that sensor. IF a 'DIRTY SENSOR' indication is left unattended and its average value increases to a second predetermined value, an 'EXCESSIVELY DIRTY SENSOR' trouble condition shall be indicated at the local control panel for that sensor. To prevent false alarms, these 'DIRTY' conditions shall in no way decrease the amount of smoke obscuration necessary to generate an alarm condition.

3.7.14 Verify fan shut down for all air handling equipment and include in verification report.

3.7.15 An operator having a proper access level, shall have the capability to manually access the following information from the control panel:

.1 Primary Status
.2 Device Type
.3 Present Average Value
.4 Present Sensitivity Selected*
.5 Highest Peak Detection Values (HVP) *
.6 Sensor Range (Normal, Dirty, Excessively Dirty)

* Values shall be in 'percent of smoke obscuration' format so that no interpretation is required by the operator.

END OF SECTION