RENOVATION TO CLARINGTON EMERGENCY & FIRE SERVICES STATION 1

2430 Durham Regional Hwy 2, Bowmanville, ON L1C 6C8 FOR

Clarington

GENERAL REQUIREMENTS AND ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL SPECIFICATIONS

Project Manual
Issued for Tender

ward99 architects inc.
Prime Consultant

MCW Consultants Ltd
Mechanical and
Electrical Engineers

VX ENGINEERING INC.
Structural Engineers

INDEX TO PROJECT MANUAL

GENERAL REQUIREMENTS AND ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL SPECIFICATIONS.

COMPANY SEAL

COMPANY: ARCHITECTURAL

ward99 architects inc.
7500 Highway 27, Unit 27B,
Vaughan, Ontario, L4H 0J2

Certificate of Practice Number 6045
I reviewed and take responsibility for the design work on behalf of a firm registered under subsection 1.2.2.1.
of the Ontario Building Code.

COMPANY SEAL

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of the Ontario Building Code.

GENERAL INSTRUCTIONS

1.1 CONTRACT DOCUMENTS

.1 Contract documents for work under this contract consists of the following:

.1 CCDC 2 2020 Stipulated Price Contract
.2 Agreement between the Board and Contractor
.3 Specifications as listed in Index to Project Manual
.4 Drawings as listed in List of Drawings
.5 All Addenda issued prior to closing of the Tender
.6 Amendments incorporated prior to the signing of the Contract, as agreed to between the signing parties.

1.2 PRODUCTS SUPPLIED BY OWNER

.1 Products, including appliances, indicated on the drawings as “N.I.C.”, or so noted in specifications, are not included in the Contract but will be supplied by the Owner. These are to be put in place and connected to services by the Contractor.

.2 The Owner will provide manufacturer's installation instructions for each such product, when available.

.3 The Contractor's duties with respect to products supplied by the Owner include:

.1 Unload and handle at site.
.2 Remove and dispose of packaging. Inspect delivered products notify Owner and Consultant of any damage or missing components.
.3 Temporarily store products in secure and suitable storage, if they are not to be installed immediately.
.4 Install and connect to services as applicable.
.5 Coordinate with millwork subcontractor to provide trim at items installed in cabinetry.

1.3 RELATION OF TRADES

.1 These specifications have been divided generally into sections conforming to Construction Specifications Canada Master Format 2004 for the purpose of ready reference. They must be read as a whole. The responsibility for apportioning the work or of settling disputes related to same shall rest entirely with the Contractor.

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

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

1.4 EXAMINATION OF SITE

.1 Examine site immediately prior to commencing Work to confirm that site as received by the Contractor, including adjoining Municipal lands, conform to information on tender documents.

.2 Notify Consultant immediately if site conditions are not acceptable. Commencement of the Work of this Contract will be taken as acceptance of site conditions. No extras will be considered unless accepted in advance of performance of the work, in writing, by Owner and Consultant.

.3 Contractor must be familiar with conditions on the roadway which may affect construction ie. location of services, site access, etc.

1.5 ACCEPTANCE OF WORK IN PLACE

.1 Before starting his work and from time to time as the work progresses, each subcontractor shall examine the work and materials installed by the other subcontractors insofar as it affects his own work, and shall promptly notify the Consultant IN WRITING, if any condition exists that will prevent him from giving a satisfactory result in his own work.

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

.3 All Subcontractors installing building finishes and site work shall submit written confirmation of acceptance of existing conditions, to the Consultant, prior to commencing their work. Finishing work and landscaping work may not commence without submission of this confirmation. Receipt of this confirmation will be considered a prerequisite for certification of payment to the relevant Subcontractors.

1.6 MATERIALS AND WORKMANSHIP

.1 All materials shall be new and the best of their respective kinds. Where a specific grade or brand is not indicated preference shall be given to materials of Canadian manufacture. Pre-packaged materials shall be delivered and stored in unopened containers.

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

.3 The Contractor is responsible for maintaining quality of workmanship. He shall report to the Consultant whenever the Work or material of any trade does not meet the required standard.

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

.5 Rejected materials and workmanship, and any work which is found defective, shall be removed and replaced or made good by the Contractor without cost to the Owner and to the satisfaction of the Consultant.

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

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

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

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

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

.11 Where equipment (ie roof top units) or elements (ie adjult change table) are supported by the walls or structure, shop drawings must be stamped by an Ontario Registered Professional Engineer confirming that the wall/structure is capable of supporting the equipment/element and that the anchorage provided is adequate to support the equipment/element together with any potential load or stress.

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

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

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

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

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

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

1.7 SCAFFOLDING

.1 All necessary scaffolding shall be provided and constructed according to by-law and safety regulations.

.2 Construct and maintain scaffolding in rigid, secure and safe manner.

.3 Erect scaffolding independent of building walls.

.4 Avoid interference with other trades.

.5 Move when not in use to permit installation of other work and promptly remove when no longer required.

.6 The provision of scaffolding shall be a matter of agreement between the Contractor and Subcontractors.

1.8 PROTECTION OF OTHER WORK

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

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

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

1.9 FASTENINGS

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

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

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

.4 No wood plugs and no anchorages which cause spalling or cracking will be accepted.

.5 Generally use plain washers. Where vibration may occur, use lock type washers and where fasteners are stainless steel use resilient washers.

1.10 SUPPLY AND INSTALL

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

1.11 OCCUPATION BEFORE COMPLETION

.1 If the Contractor, for any reason, does not have the job completed by the completion date and the Owner, of necessity, is forced to occupy any part of the building before the whole of the work is completed, the Contractor will not be entitled to any indemnity for interference with his operation.

1.12 GENERAL REQUIREMENTS

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

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

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

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

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

1.13 COORDINATION

.1 Coordinate all work and preparation on which subsequent work depends to facilitate mutual progress, and to prevent any conflict.

.2 Review all drawings to identify interference issues prior to commencing construction. Request and review interference drawings from all mechanical and electrical trades. Review all shop drawings, samples, product data, mock-ups, and other required submittals for potential interference issues and co-ordinate with the trades to avoid these conflicts.

.3 Where interference issues arise during construction, correct work at no expense to the Owner where the interference could have reasonably been foreseen.

.4 Ensure that each trade makes known, for the information of the Contractor and other trades, the environmental and surface conditions required for the execution of its work; and that each trade makes known the sequence of others' work required for installation of its work.

.5 Ensure that each trade, before commencing work, knows requirements for subsequent work and that each trade is assisted in the execution of its preparatory work by trades whose work depends upon it.

.6 Mechanical and electrical trades in particular, shall ensure that items, such as electrical panels, outlets, diffusers, switches, etc., are located where they will not interfere with the installation or operation of other items.

.1 Check all drawings for the location of items to be installed later, such as millwork, whiteboards and tackboards, and other wall or ceiling mounted items.
.2 Ensure items installed do not interfere with the operation of equipment or fittings, such as the swinging of doors, etc.

.7 Review all shop and layout drawings, templates, and other required submittals for coordination purposes.

.1 Ensure that all information necessary for the location and installation of materials, openings, inserts, anchors, accessories, fastenings, connections and access panels are provided by each trade whose work requires co-operative location and installation by other trades and that such information is communicated to the applicable installer.
.2 Ensure that shop drawings for aluminum and hollow metal work are coordinated with the openings for doors, frames and windows; site measurements must be indicated on the drawings.
.3 Review millwork shop drawings to ensure adequate clearance from walls, doors, windows, mechanical and electrical equipment, etc.

.8 Deliver materials supplied by one trade to be installed by another well before the installation begins.

.9 Trades giving installation information in error, or too late to incorporate in the work, shall be responsible for any extra work caused thereby.

.10 Immediately remove any work which is unsatisfactory for subsequent work, as directed by the Consultant or by the appointed inspection firms.

.11 Inform Commissioning Agent of all equipment installations and start-ups.

1.14 ACCESS TO THE PROJECT

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

.2 Cooperate fully with forces carrying out any work on behalf of the Owner.

1.15 SUB-TRADE AWARDS

.1 The Contractor shall, on notice of award of the contract, obtain the Consultant's approval of a complete list of all persons or firms to which he proposes to sublet any part of the work, the trades or divisions of work which are to be sublet to each, and the amount of each trade. He shall provide to the Consultant a financial breakdown showing all divisions of the work amounting to the full sum of the contract. Mechanical and Electrical trades shall be further broken down as required by the mechanical and electrical consultants.

1.16 SAFETY DATA SHEETS

.1 The Contractor shall submit material and safety data sheets prior to commencing installation and application of at least the following:

.1 lead-free solder
.2 sealants and caulking
.3 resilient flooring
.4 painting and finishing
.5 fertilizers
.6 pesticides
.7 herbicides
.8 all adhesives
.9 any other product which may give off air borne particles after installation

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

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

.1 An affidavit relative to the use of Lead-free solder for all domestic water lines, regardless of location.

.2 Products for which Material Safety Data Sheets have been submitted and accepted.
.3 Other Work/Products identified in the Contract Documents as requiring a Certificate of Compliance.

.4 Each Certificate of Compliance must indicate names and addresses of the project, the Owner, the date of Issue, produce description including name, number, manufacturer, with a statement verifying that the Work/Product installed meets specified requirements and, if applicable, complies with the submitted and accepted Material Safety Data Sheets.

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

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

.7 The Contractor must ensure that submissions are made to allow sufficient time for review without delaying progress of scheduled completion.

.8 WHMIS Material Safety Data Sheets (MSDS) are required to be provided before or with the first delivery of every controlled product.

.9 Ensure that worksite copies of MSDS's are available to workers wishing to consult them and to the health and safety representative and/or joint health and safety committee.

.10 Ensure that workers are instructed in the purpose and content of MSDS.

.11 WHMIS MSDS sheets to be kept on site at all times.

.12 The completion security account will not be paid to the Contractor without submission of all required affidavits and requested material and safety data sheets.

1.17 REGULATING DOCUMENTS

.1 Refer to Section 01 41 00, Regulatory Requirements. Conform to applicable Codes and Building By-Laws. Conform to the requirements of the authorities having jurisdiction, such as public utilities. Where required

under The Occupational Health and Safety Act, engage a Professional Engineer to design formwork and falsework for concrete.

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

1.18 CONTRACTOR'S RESPONSIBILTY

.1 The Contractor will be responsible to take all necessary steps to protect personnel (workers, visitors, general public, etc.) and property from any harm during the course of the contract. The list of Contractor's responsibilities identified below is by no means comprehensive, nor is it in any priority or critical order. It is here, merely to identify the most often forgotten or ignored responsibilities of the Contractor and is reproduced only as a reminder. The Consultants and the Owner advise the Contractor that it is he who is responsible for all aspects and facets of the Project, from start to completion, from compliance with Occupational Health and Safety regulations to compliance with all codes and statutes.

.2 The Owner may perform periodic monitoring to ensure that safety requirements are met, and that safety records are properly kept and maintained. Continued disregard for safety standards can cause the Contract to be cancelled and the Contractor removed from the site.

.3 All work procedures and equipment shall be in accordance with Owner and Legislation standards.

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

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

.6 The Contractor shall comply with all Federal, Provincial and Municipal Safety Codes and Regulations and the Occupational Health and Safety Act. He shall insure that all of his Subcontractors, suppliers, installers, etc. comply with all applicable codes, regulations, and acts.

.7 The Contractor shall supply competent personnel to implement his safety program and ensure that the Owner's standards, and those of the Occupational Health and Safety Act, are being complied with.

.8 The Owner may hire Commissioning Agents to perform inspections of building systems at the closing stages of the work of this contract. The Contractor shall cooperate with and coordinate the work of the Owner's Commissioning Agent on site.

.9 The Contractor shall report to the Owner and jurisdictional authorities any accident or incident involving personnel and/or property of the Contractor, Owner, or Public, arising from the Contractor's or any of his Subcontractors, execution of the work.

.10 Provide the Owner with a copy of each site visit report by the Ministry of Labour, as soon as the report is issued.

.11 The Contractor shall include all provisions of this contract in any agreement with Subcontractors and hold all subcontractors equally responsible for safe work performance.

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

1.19 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.

.2 Notify Consultant in writing of any conflict between these specifications and manufacturer's instructions. Consultant will clarify any such conflict when requested.

1.20 AIR, VAPOUR, AND THERMAL SEAL

.1 Ensure that the existing vapour barrier system is not compromised by the work of this project. Maintain air-tight and vapour-tight membrane system in exterior walls, windows, floor and roof.

1.21 SAFETY REQUIREMENTS

.1 Comply with safety requirements outlined in Section 01 35 20.

1.22 TRUCKING COSTS

.1 The Contractor is responsible for all costs related to trucking required for the Contract. No extra costs will be considered for weight load or limits due to seasonal conditions or restrictions on load capacities imposed by any authorities, or any similar limitations.

1.23 INDEPENDENT TESTS AND INSPECTIONS

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

.1 Inspection and testing required by laws, ordinances, rules, regulations or authorities.
.2 Inspection and testing performed exclusively for Contractor's convenience.
.3 Testing, adjustment and balancing of mechanical and electrical equipment and systems.
.4 Mill tests and certificates of compliance.
.5 Re-testing as described in 1.27, Quality Control,

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

.3 Where tests or inspections reveal work not in accordance with Contract requirements, Contractor shall pay costs for additional tests or inspections as Consultant may require to verify acceptability of corrected work. In the case of soil compactions, the first retest only will be considered as part of inspection allowance.

.4 The Contractor shall furnish labour and facilities to:

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

.5 Notify Inspection Firms sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

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

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

1.24 CASH ALLOWANCES

.1 Include in the Contract Price, a stipulated sum Cash Allowance in the amount of $60,000.00, to be expended as outlined below, which shall apply to the following aspects of the Work:

.1 Supply and Installation Cash Allowances as follows:
.1 Interior signage.
.2 Public address, clocks and telephone system.
.3 Door Hardware and Permanent Core for Finish Hardware Locksets.
.4 Communication (data drops and WiFi).
.5 Security, Intercom and CCTV systems.
.6 Decorative glazing film.
.7 Abatement of Hazardous Materials.
.8 Bed mattresses.

.2 Inspection and Testing Cash Allowances:
.1 Concrete and reinforcing steel inspection and testing.
.2 Structural steel inspection.
.3 Finish Hardware inspection.
.4 Masonry and mortar testing.
.5 Fire stopping and smoke seals inspection and testing.
.6 Architectural woodwork inspection.
.7 Painting inspection.
.8 Any other required Inspection and Testing.

.2 Additional cash allowances, to be carried by mechanical and electrical Subcontractors, may be included the mechanical and electrical specifications.

.3 The listing of a cash allowance in this section shall not be construed to imply the deletion from the base contract of any work which may be specified elsewhere. Where the expenditure of a cash allowance is not specifically outlined in the specifications, it shall be expended as per instructions and specifications to be provided by the Consultant at a later date.

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

.5 The Contract Price, and not the Cash Allowance, includes the Contractor's profit in connection with such cash allowance.

.6 The Contract Price will be adjusted by written order by the Consultant to provide for an excess or deficit to the Cash Allowance. Any unused portion of the allowance shall be returned to the Owner at the conclusion of the Contract.

.7 A schedule shall be prepared by the Contractor to show when items called for under Cash Allowances are required, so that the progress of the Work is not delayed.

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

.9 Material Allowances:

.1 Material allowances shall include the following:

.1 Net cost of material
.2 Applicable taxes and duties, excluding H.S.T.
.3 Delivery to site

.2 For Material Allowance, the contract shall include:

.1 Handling at site, including unloading, uncrating, storage and hoisting.
.2 Protection from elements, from damage.
.3 Labour, installation, and finishing.
.4 Other expenses required to do cash allowance work (ie contract co-ordination).
.5 Overhead and profit.

.10 Material and Installation Allowances:

.1 Material and Installation Allowances shall include the following:

.1 Net cost of material
.2 Applicable taxes and duties, excluding H.S.T.
.3 Deliver to site
.4 Handling at site, including unloading, uncrating, storage and hoisting.
.5 Labour, installation and finishing.

.2 For Material and Installation Allowances, the contract shall include:

.1 Protection from elements, from damage
.2 Overhead and profit
.3 Other expenses required to do cash allowance work (ie contract co-ordination)

.11 Testing and Inspection Allowances:

.1 Testing and Inspection Allowances shall include the following:

.1 Net cost of testing and inspection firm, and laboratory services, designated and authorized by Consultant.
.2 Applicable Taxes, excluding H.S.T.

.2 For Testing and Inspection Allowances, the contract shall include:

.1 Overhead and profit
.2 Supply of material tested
.3 Other testing and re-testing work specified
.4 Other expenses required to do cash allowance work (ie contract co-ordination)

1.25 WARRANTIES

.1 The following is a general summary of the warranties required by the contract:

	# Years
Entire Building, General Contract	2
Concrete Floors, Concrete Slabs-on-grade	3
Finish Carpentry	2
Architectural Casework	2
Plastic Laminate Work	2
Caulking and Sealants	5
Hollow Metal Doors, Frames and Screens	3
Finish Hardware	3
Glass and Glazing	10
Acoustic Ceilings	2
Resilient Flooring	5
Painting	3
Window Shades	5

Refer to specification sections for other required warranties.

1.26 ADDITIONAL DRAWINGS

.1 Consultant may furnish additional drawings to assist proper execution of the Work. These drawings will be issued for clarification only. Such drawings, however, shall have the same meaning and intent as if they were included with plans referred to in the Contract Documents.

1.27 QUALITY CONTROL

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

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

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

.4 The Consultants or the authorized Owner Staff may order any part of the Work to be examined, if such Work is suspected not to be according to the Contract Documents. If, upon examination, such work is found not to be in accordance with the Contract Documents, then the Contractor shall correct such Work and pay for cost of examinations and correction. If such Work is found to be in full accordance with the Contract Documents, the Owner shall pay for the cost of examination and making good.

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

.6 The Contractor shall provide any tools, materials or equipment that may be required by the inspection and/or testing agencies in retesting the Work.

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

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

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

1.28 START-UP

.1 Minor demolition work may start immediately upon receipt of Letter of Award from Owner, and Contractors submission of start-up documents and insurance.

.2 New work cannot commence without a building permit.

1.29 PAYMENT PROCEDURES

.1 Refer to CCDC Contract Stipulated Price Contract for procedures and conditions.

.2 Before submitting first request for payment, submit a Schedule of Values, which shall be a detailed breakdown of the Contract price, as directed by the Consultant and as per the Owner's format. Breakdown must equal Contract price. After approval by Consultant, cost breakdown will be used as basis for progress payments.

.3 Notwithstanding the amounts indicated on the Schedule of Values for the various aspects of the Work, the Owner reserves the right to retain additional funds for some items, where listed in the specifications. This includes amounts to be retained for maintenance manuals and for commissioning, as outlined in the applicable specification sections.

.4 Applications for payment shall list HST separately.

1.30 REQUESTS FOR SUBSTITUTIONS

.1 Products, materials, equipment, and methods of construction included in the Contract Documents are to be used in the execution of the Work of this Contract unless otherwise accepted by the Consultant in writing. Substitute products and materials may not be ordered or installed without written acceptance from the Consultant.

.2 Changes proposed by the Contractor are considered requests for “Substitutions”. Requests for Substitutions are to be submitted only by the Contractor.

.3 Submit a complete package, including information and documentation outlined below, for evaluation by the Consultant.

.4 A Request for Substitution must include the following information:

.1 Data sheets for both the specified item and the proposed substitution, enabling side by side comparisons.

.2 Complete description of the proposed alternative product or material, including:

.1 Laboratory tests results
.2 dimensions, gauges, weights, etc.

.3 An explanation of how the proposed substitute differs from the specified product:

.1 in physical properties
.2 in quality and performance

.4 A list of any effects the proposed substitution would have:

.1 on service connections (wiring, piping, ductwork, etc.)
.2 on the work of other trades
.3 on construction Schedules

.5 Evidence that manufacturers warranties and guarantees for the proposed substitutes are the same, or exceed those required under the Contract.

.6 Information on the availability of maintenance services and replacement materials for proposed substitute.

.7 Names, addresses, and phone numbers of fabricators and suppliers for proposed substitute(s).

.8 Confirmation that the proposed substitution, if accepted, would have no cost impact, or indication of a credit (or extra cost) associated with the substitution.

.5 Submissions of Requests for Substitution must be received by the Consultant well prior to any shop drawing submissions. The Shop Drawing process is not an acceptable means of requesting a substitution, and submission of drawings for products that have not been accepted will result in the automatic rejection of the Shop Drawing submission.

.6 The burden of proof of the merit of the proposed substitution lies with the Contractor.

.7 Substitution requests deemed incomplete or incorrect by the Consultant will be rejected.

.8 The Consultant may require the submission of further information in order to make an informed determination on the suitability of the proposed substitution. Allow a minimum of 10 working days, upon receipt of all required information, for the Consultant's decision. Substitutions requested too late, not allowing sufficient time for thorough review by the Consultant, will be rejected.

.9 The Owner's decision, based upon recommendations of the Consultant, of acceptance or rejection, of a proposed substitution shall be final.

1.31 LAWS, NOTICES, WORKPLACE SAFETY AND INSURANCE, WHMIS AND SAFETY

REGULATIONS

.1 Comply with all applicable laws, by-laws and regulations as applicable.

.2 If there are differing requirements in the regulations, best practices and guidelines noted above, comply with the requirements that are more stringent in maintaining and protecting the health and safety of people working at the Construction site.

.5 Comply with all aspects of the Workplace Hazardous Materials Information System (WHMIS) as it pertains to material handling and application.

.6 Provide evidence of compliance with all requirements of the Workplace Safety and Insurance Board, including all payments.

END OF SECTION

VALUATION OF CHANGES

PART 1 – GENERAL

1.1 GENERAL PROCEDURES

.1 Changes in the Work ordered by the Consultant in accordance with the conditions of the Stipulated Price Contract signed between the Owner and the General Contractor and as more fully specified herein.

.2 The standard documentation for effecting changes in the Work shall be as follows:

.1 Consultant's Notice of Change issued to the Contractor on standard form and accompanied by necessary Drawings, Schedule, Details and Specifications.
.2 Contractor's Quotation submitted to the Consultant showing amount by which the Contract Sum shall be adjusted by way of increase or decrease if the change is ordered, included complete breakdown of pricing.
.3 Consultant's formal Change Order issued to the Contractor on Standard Form after Owner's approval. Formal Change Order becomes valid when signed by Consultant, Contractor, and Owner.

1.2 VALUATION OF CHANGES

.1 Quotations submitted by the Contractor in response to Consultant's Notice of Change shall be fully detailed and itemized to facilitate checking and processing by the Consultant. Quotations shall be submitted to include the following:

.1 List Work proposed to be carried out by Contractor's Own Forces showing labour, material, plant and equipment charges together with quantities and costs (unit rates if applicable) in the assessment of such charges.
.2 List Work proposed to be carried out by Subcontractors showing the amount quoted by each Subcontractor as verified by the Subcontractor's quotation which shall show labour, material, plant and equipment charges together with quantities and costs (unit rates if applicable) upon which the quotation is based.

.3 In evaluating a change, the net cost shall be the net difference in quantity between the original and revised Work. For example: If the change affects the omission of 3m3 and the addition of 4m3 of an item, the value of the change will be assessed by applying the net difference of 1m3 (extra) and applying the appropriate mark-up specified herein.

.2 Unit rates are only applicable if they have been accepted by the Owner in advance and included in the Contract.

.3 Where unit rates are not established in the Contract, quote costs as follows:

.1 Material prices shall be the net price paid by the Contractor (or Subcontractor) after deduction of all trade discounts and the like other than reasonable discount for prompt payment.

.2 Plant and equipment costs shall not be more than rates quoted in the latest edition of "Rental Rates on Contractor's Equipment" published by the Canadian Construction Association.

.3 Labour costs shall be the actual rate paid to the workers in accordance with the fair wage provision of the Contract plus a “fair wage burden” mark-up of thirty-eight percent to cover Welfare contribution, Pension contribution, Vacation Pay, Trade Improvement Fund, Promotional Fund, Training Fund, Supplementary Unemployment Benefits, Check Off, Apprenticeship, Trust Fund and similar labour contract payments; Worker's Compensation Insurance, Canada Pension Scheme and other statutory charges on labour.

.4 Unless otherwise specified in the Form of Tender, unit rates quoted in Tender and incorporated in the Contract shall include the “fair wage burden” for labour as specified in paragraph 1.2.3.3 hereof but shall be exclusive of mark-up for overhead and profit.

.5 Where Contract unit rates (if applicable) are to be modified:

.1 Where a change involves an extra/credit of more than $10,000.00 (using Contract unit rates), a new unit rate must be negotiated to reflect a fair rate considering the volume of work involved.

.6 "Overhead", means all expenses to carry on work, except items included in the cost as defined above, and shall include but shall not be limited to use of Plant, tools, supervisory staff, bonds, and insurance.

.7 The following maximum mark-ups for overhead and profit may be applied, as appropriate, to the net costs assessed as above where the effect of the proposed change is an increase in the Contract Sum. If the effect of the change is a decrease in the Contract Sum no mark-up shall be applied:

.1 Mark-up on Contractor's own work will be 10% extra for overhead and 5% extra for profit.
.2 Contractor's mark-up on Subcontractor work will be 10% combined overhead and profit.
.3 Mark-up charged by Subcontractors on their own work will be 10% extra for overhead and 5% extra for profit.
.4 Main Subcontractor's mark-up on minor Subcontractor's work will be 10% combined overhead and profit.
.5 Changes involving a decrease in the contract sum will be calculated in the same way except that no overhead or profit shall be charged.

.8 When work deleted from the Contract is later added back into the Contract, additional overhead and profit will not apply to the reinstated work. Overhead and profit amounts are not included in credits and so remain included in the Contract amount.

.9 Where overhead and profit mark-ups are to be modified:

.1 Where a change involves an extra/credit of more than $20,000.00, smaller mark-up percentages must be negotiated to reflect a fair mark-up considering the volume of work involved.

.10 It shall be understood and agreed that the mark-ups specified above shall be deemed to provide for payment in full for all items that in the custom of the Construction Industry in Ontario are considered to be site or head office overhead, profit, supervision, administration and labour costs.

.11 Claims for extras will not be considered unless they can be verified by the Consultant. Site work, excavation, backfill, footings and all below grade work must be visually inspected by the Consultant and documented by an independent third party (i.e. Surveyor) BEFORE the work is hidden.

.12 The signing of a Change Order by all parties shall be deemed to be formal acceptance by the Owner of the Contractor's quotation. Following the

issue of a Change Order the Owner will not entertain claims for extra payments due to errors alleged to have been made in the Contractor's Quotation.

.13 Under no circumstances will a claim for extra be considered if it is for work recommended by the Inspection Company unless the Consultant has been advised and his approval obtained PRIOR TO THE EXECUTION OF THE WORK.

END OF SECTION

PROJECT MANAGEMENT AND COORDINATION

PART 1 – GENERAL

1.1 SITE SUPERVISOR

.1 The Contractor shall be fully responsible for co-ordinating and expediting the work of all Subcontractors and shall employ a qualified Site Supervisor who shall be in full time attendance on this project.

.2 Prior to the Preconstruction Meeting, the Contractor shall inform the Consultant of their choice for Site Supervisors and shall provide resumes outlining qualifications and related work experiences.

Site Supervisor shall have as a minimum:

.1 Recent, previous experience with renovation and addition projects involving occupied sites, managing occupants and pedestrian and vehicular traffic.

.2 Successful completion of a multi-session Supervisor's training course conducted by a recognized Construction Association in Ontario.

.3 The Supervisors must be assigned to projects for the duration of the construction period, until the buildings are fully occupied by the Owner.

.4 The Owner and the Consultant reserve the right to reject the proposed Supervisors should they feel that they are not fully qualified to assume the responsibilities of the positions.

.5 There shall be a minimum of one full time Site Supervisor dedicated to the site.

.6 Site Supervisor must carry a mobile phone at all times during construction with the ability to be reached directly during all work hours and the ability to have voicemail recorded during all non-work hours including weekends and holidays.

.7 Once the Supervisors are confirmed, there will be no change permitted without the written consent of the Consultant.

1.2 CONSULTANT/CONTRACTOR MEETING

.1 Prior to the commencement of the Work, the Contractor together with the Consultant shall mutually agree to a sequence for holding regular "site meetings" on same day (to be determined) of every second week.

1.3 PRE-CONSTRUCTION MEETING

.1 Immediately prior to construction, upon notification, attend at location of Owner's choice, pre-construction meeting, along with authoritative representatives of certain key Subcontractors as specifically requested by the Consultant.

.2 Purpose of meeting is as follows:

.1 Review project communications procedures.
.2 Review contract administration requirements including submittals, payment and change order procedures.
.3 Identify all critical points on Construction Schedule for positive action.
.4 Identify any product availability problems and substitution requests.
.5 Establish site arrangements and temporary facilities.
.6 Review any items which, in the Owner's, Consultant's and Contractor's opinion, require clarification.
.7 Exchange names and addresses of all key personnel representing Owner, Consultant, Contractor and Subcontractors.
.8 Identify Consultant's inspection requirements.

1.4 PROJECT MEETINGS

.1 Contractor shall Chair project meetings on Site, every two weeks during the course of the work and will issue minutes to Owner's Representative, Consultants, and all other affected parties.

.2 Contractor shall take minutes of meeting showing:

.1 List of persons attending.
.2 Decisions taken.
.3 Instructions required or issued - Allocating responsibilities to action items.
.4 All matters discussed.
.5 Schedule Update - Progress, Delays.

.3 Contractor shall provide suitable on site accommodation for meeting, attend all meetings, arrange for attendance of all necessary Subcontractors, and distribute minutes of previous meeting to Subcontractors and Suppliers as appropriate.

.4 The Contractor's representatives at site meetings must include the Project Co-ordinator as well as site Supervisor.

.5 Contractor shall hold regular co-ordination meeting with Subcontractors and shall chair and minute each meeting. Copies of minutes shall be distributed to relevant Trades and Consultants and Owner.

.6 In addition to jobsite meetings, Contractor shall arrange for, chair, and record safety meetings and regular meetings with his Subcontractors and suppliers. He shall distribute copies of the minutes of these meetings to all Subcontractors, Owner and Consultant.

1.5 ON SITE DOCUMENTS

.1 The Contractor shall maintain the following documents, up to date, in the site office:

- .1 Contract Documents
- .2 Reviewed Shop Drawings - Printed in full colour or redline
- .3 All instructions and changes, i.e. Work Authorization, Jobsite Instructions, Notices of Contemplated Change, Change Orders, etc.
- .4 All inspection and test reports
- .5 Permit drawings and specifications
- .6 Authorizations, approval documents, permits, special rulings, etc., issued for the project by Authorities Having Jurisdiction.
- .7 Details of tested assemblies being used on the project; ULC, cUL, etc.
- .8 As-Built drawings.

.2 Confirm with building inspector, at the commencement of construction, what documents are required for submission both during construction and for occupancy. Keep copies of such documents on site. Refer also to Section 01 41 00, Regulatory Requirements.

.3 Documents listed above shall be printed, full size documents, not only digit format.

.4 Maintain copies of Regulating Documents referred to in the specifications, up to date, in the site office.

.5 Maintain a file of Material Safety Data Sheets (MSDS) for all materials being used on site and make available to all concerned, in the site office.

END OF SECTION

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 – GENERAL

1.1 SCHEDULE

.1 Within thirty (30) days of contract award, submit a detailed construction schedule. Base the submission on the commencement of completion dates of the Contract and indicate specified restraints and milestones, activities and durations for shop drawing submission and approval, testing, fabrication and delivery, construction sequence and timing, interdependencies and constraints. Include the procurement activities for major structural elements, and mechanical and electrical equipment. Ensure the participation of all major Subcontractors and Suppliers. Schedule must include reasonably detailed breakdown of mechanical, and electrical work.

.2 Schedule shall show:

- .1 Commencement and completion dates of Contract.
- .2 Commencement and completion dates of stipulated stages if any.
- .3 Commencement and completion dates of Trades.
- .4 Order and delivery times for materials and equipment, where possible.
- .5 Dates for submission of Shop Drawings, material lists and samples.
- .6 Any other information relating to the orderly progress of Contract, considered by Contractor to be pertinent.

.3 The schedule shall be reviewed and updated at every Site meeting.

.4 Include with each update a written report of activity progress reflected in the revised Schedule, and the corrective actions which have been made or are to be taken to maintain progress on the schedule in the future, anticipated delays, resources availability, schedule changes, and work to be completed in the next one (1) month period.

1.2 UPDATING AND MONITORING

.1 Set up format of Construction Schedule to allow plotting of actual progress against scheduled progress.

.1 Allow sufficient space for modifications and revisions to the Schedule as Work progresses.
.2 Format shall be approved by the Consultant.

.2 Display copy of Schedule in Site office during complete construction period and plot actual progress weekly.

.3 Updating:

.1 Arrange participation, on Site and off Site, with Subcontractors and Suppliers, as and when necessary for the purpose of updating schedule and monitoring progress.
.2 Conduct reviews of progress and update schedule, distributing copies to Consultant, Owner and Sub-Trades at least once a month or as directed by Consultant.

1.3 PROGRESS REPORTS

.1 Keep a permanent written report on the Site of progress of the Work. This record to be open to review by the Consultant. A copy to be furnished to the Consultant upon request.

.2 Indicate daily the number of persons engaged on the work (including subtrades) and the division and section of the work upon which each group of workers is engaged, in sufficient detail to record dates of construction of each particular section of work.

.3 Record to show dates of commencement and completion of trades and parts of the work coming under the Contract, including reports on daily weather conditions, excavation work, erection and removal or forms, and other similar pertinent information.

.4 Report delays (and potential delays) giving reason for delay and action being taken to resolve the problem.

1.4 PROGRESS PHOTOGRAPH

.1 Concurrently with monthly application for payment, submit ten (10) electronic format colour images, which shall clearly show overall progress of Work. Provide an index with printed images clearly identified with name of project, description of view and date taken.

1.5 QUALITY OF WORK / STATUS REPORTS

.1 The Contractor shall take full responsibility for the quality of work on site. The Contractor shall furthermore notify workers of deficient work immediately upon receipt of notification of deficiencies by the Consultant, Subconsultants and/or Owner.

.2 The Contractor shall provide a monthly status report on the status of deficiencies identified by the Consultant and Subconsultants. The report shall include a description of each deficiency, status of the deficiency, description of corrective action taken, value (cost) to the correct deficiency and trade (person) responsible for deficiency. The report shall be typewritten on the Contractors letterhead. Submit monthly status reports with each progress draw.

.3 After Substantial Performance, the Contractor shall continue provide the deficiency status reports on a monthly basis, including updated lists of deficiencies identified by the Owner and consultants

END OF SECTION

SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.1 BEFORE COMMENCEMENT OF WORK

.1 Obtain the documents listed under this heading and supply to Consultant within the time stipulated in the Specification, or if not so stipulated, before issue of the first Certificate.

.1 Performance Bond/Labour and Material Bond.
.2 Insurance Policies required under General Conditions of Contract - Insurance.
.3 Certificates of good standing from the Workplace Safety & Insurance Board for the Contractor and all Subcontractors.
.4 Shop Drawing Schedule.
.5 Permits required for work of Electrical Trades Divisions 26, 27 and 28.
.6 Permits for temporary structures, hoists, etc.
.7 Schedule of Values: Refer to the Conditions of Contract.
.8 Estimate of monthly progress claims (cash flow schedule).
.9 Construction Schedule.
.10 Equipment Delivery Schedule.

.2 Concurrently, with schedule of values, submit cash flow schedule broken down on a monthly basis, indicating anticipated monthly progress billings for duration of the Contract.

.3 Submit schedule in a format acceptable to the Consultant. Indicate anticipated submission dates and review periods. Highlight critical items.

.4 Submit, in a format acceptable to the Consultant, a list of manufactured equipment complete with order dates, anticipated delivery dates, and dates required on site to meet progress schedule. Update schedule at least once a month or more often if directed by the Consultant. Clearly indicate late deliveries and anticipated impact on construction schedule. Include in schedule required delivery dates for products supplied by Owner.

.5 Schedule of Values:

.1 Before submitting first request for payment, submit a detailed breakdown of the Contract price, as directed by the Consultant and as per the Owner's format. Breakdown must equal Contract price. After approval by Consultant, cost breakdown will be used as basis for progress payments.

1.2 DOCUMENTS AND ACTION REQUIRED DURING PROGRESS OF CONTRACT

.1 Perform the action and/or obtain the documents listed under this heading and supply to the Consultant, within the time stipulated in the Specification or, if not so stipulated, as soon as possible following Consultant's request.

.2 Adjust Cash Allowances by award of separate Contracts, where appropriate.

.3 Documents specified under Section 01 10 00, General Instructions and Section 01 33 23, Shop Drawings, Product Data and Samples.

.4 Progress photographs, submitted concurrently with monthly application for payment. Refer to Section 01 32 00.

.5 Any permits required from Authorities Having Jurisdiction enabling Owner to occupy the work (or part thereof) prior to Substantial Performance of the Contract.

.6 As-Built Documents:

.1 The Owner requires as-built documents for all architectural, civil, landscape, structural, mechanical and electrical changes on completion of the construction.
.2 The Contractor, and the Subcontractors shall print a complete and separate set of white prints of Contract Drawings and Project Manual to keep on the site at all times.
.3 The drawing prints shall be marked up by responsible personnel of the Contractor and Subcontractors to record clearly, neatly, accurately and promptly showing all locations of buried structural, mechanical and electrical work and deviations from the contract documents.
.4 The Project Manual shall be similarly marked up to reflect deviations from the Contract Documents, as well as indicate materials used, colours selected, etc.

.5 The accurate location, depth, size and type of each underground utility and service line shall be recorded before concealment to ensure accurately directed future access to these buried lines.

.6 The as-built documents will be reviewed at regular intervals by the Consultant and the quality of performance by the Contractor and Subcontractors in developing these records will be taken into consideration when reviewing the monthly applications for payment submitted by the Contractor.

.7 Prior to the date of Substantial Performance, request from the Consultant updated pdf drawings incorporating all changes made to the building through Change Orders and Jobsite Instructions. Transfer all recordings from the white prints to these updated drawings and return them to the Consultant, as specified in Section 01 78 00, Close-out Submittals.

.8 Mark "as-built" changes in red coloured ink.

.9 Record following information:

.1 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.

.2 Field changes of dimension and detail.

.3 Changes made by Change Order or Supplementary Instructions.

.10 Clearly mark each of the drawings, “Project As-Built Record Copy".

.11 Final completion of these Drawings shall be a condition precedent to the issuance of Consultant's final payment certificate.

.12 Refer to Structural, Electrical and Mechanical Drawings and Specification Divisions for more specific requirements regarding preparation and submission of final Record Drawings.

END OF SECTION

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 – GENERAL

1.1 SCHEDULE

.1 Within fifteen (15) working days after award of Contract, prepare and submit to Consultant for comment, a schedule fixing the dates for the submission of all Shop Drawings, product data and samples.

.2 Allow reasonable promptness for Consultant to review submissions, exclusive of time required for inter-office transmissions.

.3 All shop drawings must be reviewed and stamped by the Contractor prior to submission to the Consultant.

1.2 GENERAL

.1 Submit to Consultant, for review, Shop Drawings, Product Data, Samples, and other required submittals specified.

.2 All shop drawings and related submittals must be reviewed and stamped by the Contractor prior to submission to the Consultant.

.3 Until submittal is reviewed, Work involving relevant product may not proceed.

.4 Do not use for construction, Shop or setting Drawings or diagrams which do not bear Consultant's stamp and signature.

.5 Shop drawing reviews do not authorize changes in cost or time, which may only be accomplished by an appropriate Change Order issued through the Consultant.

.6 Shop drawings shall be for products as specified or otherwise approved by the Consultant. The shop drawing process is not a means of requesting substitutions.

.7 Submission and subsequent review of Shop Drawings constitute a service and does not entitle the Supplier or Subcontractor to the right to remuneration until the materials are supplied and installed on the Site in accordance with the Contract.

.8 The Contractor must include for delivery and pick up of shop drawings to/from the Consultant by hand or courier.

.9 The Contractor must include for reproduction of shop drawings after review by the consultants.

1.3 SHOP DRAWINGS

.1 Drawings shall be copies of original drawings prepared by Contractor, subcontractor, supplier or distributor, for the work of the Contract which illustrate appropriate portions of the Work. Shop drawing submissions shall show pertinent information for incorporation of the products and equipment, including the following, as applicable:

- .1 fabrication details
- .2 dimensioned layout drawings, including clearances, with site dimensions
- .3 relationship to adjacent work
- .4 setting or erection details
- .5 performance requirements
- .6 operating weights of equipment
- .7 installation instructions
- .8 service connection requirements, including wiring diagrams
- .9 single line and schematic diagrams
- .10 additional information as may be specified in applicable Specification Sections.

.2 Note that some shop drawings are required to be approved by a Professional Structural Engineer in the Contractor's employ.

- .1 These include: structural steel shop drawings, miscellaneous metal shop drawings, curtain wall shop drawings, storefront framing shop drawings, window shop drawings, fire-rated aluminum shop drawings and other items as required in the specifications.

.3 Submit Shop Drawings with transmittal forms listing:

- .1 the project name and number
- .2 the names of the manufacturer, supplier, subcontractor
- .3 the applicable Drawing numbers

.4 the number of copies
.5 the names of the items included the submittals
.6 number of Specification section to which the Shop Drawings refer
.7 dates and revision numbers, and submission numbers

.4 All dimensions on shop drawings must be in metric.

.5 Where approvals are required by Authorities having jurisdiction, submit Shop Drawings to those authorities and obtain the approvals required.

.6 On Shop Drawings for fire rated assemblies show required fire rating and ULC design numbers.

.7 Email Submission:

.1 Submittals are to be formatted for 11" x 17" (279 x 432mm) sheets or smaller, submitted by email.
.2 Submittals must be submitted in the same size and scale as they were originally prepared. Drawings may not be reduced in size for email transmission.
.3 If acceptable to the individual reviewers, larger format submittals and larger volume submittals may be reviewed by email submission. The Contractor must subsequently print and submit full sized, red line copies of such reviewed documents to each reviewer.
.4 Email submissions must be in pdf format and must be high quality documents, preferably generated by computer from the original documents (rather than scans of printed documents). If digital submissions are of insufficient quality, hard copies will be required.
.5 Emailed documents shall be reviewed and stamped digitally by the Contractor, or accompanied by a separate sheet from the Contractor listing the documents reviewed and bearing the Contractor's review stamp, along with copies of any revisions made.
.6 Email submission is only used as a convenient means of distributing drawings, in lieu of sending hard copies by courier. Reviewed drawings must still be printed for job site files, record copies, etc. All site copies shall be red line prints or colour prints.

.8 Drawings shall be of a size and quality which will be readily reproduced. Shop drawings must be certified to have been reviewed and corrected by

Contractor and sub-contractor responsible for forwarding to the Consultant.

.9 Shop drawings are to be to scale. Scale shall be large enough to adequately review details included. Provide site measured dimensions on drawings wherever possible.

.10 All requirements for shop drawings apply also to resubmissions of shop drawings, as may be required by the Consultant.

.11 Revise all reviewed shop drawings to incorporate Consultant's comments. One complete set of final, revised Shop Drawings, used for construction, shall be submitted to the Consultant.

.12 Shop Drawings are required for the following items:

Concrete Floor Finishing
Structural Steel
Metal Fabrications
Architectural Millwork
Door Hardware
Hollow Metal Doors and Frames
Fire Stopping and Smoke Seals
Toilet and Urinal Compartments
Washroom Accessories
Manufactured Specialties
Window Shades
Any other shop drawings as noted in the Project Manual specification sections.
Landscape Shop Drawings as per the relevant specification sections.
Mechanical and electrical equipment as listed in relevant specification sections.
Other items as may be requested within the specifications.

1.4 PRODUCT DATA

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

.2 The above will be accepted if they conform to the following:

.1 Delete information which is not applicable to project.
.2 Supplement standard information to provide additional information applicable to project.
.3 Show dimensions and clearances required.
.4 Show performance characteristics and capacities.
.5 Indicate operating weight of equipment.
.6 Show wiring diagrams and controls.
.7 Add to standard sheet the Project identification data.

1.5 SAMPLES AND MOCK-UPS

.1 Where specified, shown or considered necessary, submit duplicate samples for Consultant's approval.

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

.3 Samples must correspond in every respect to materials supplied for project.

.4 Construct field samples and mock-ups at locations acceptable to Consultant. Construct each sample or mock-up complete, including work of all trades required to finish work.

.5 Do not proceed with fabrication or delivery of materials until samples are approved.

.6 Reviewed samples or mock-ups will become standards of workmanship and material against which installed work will be checked on project.

.7 Approval of samples does not imply acceptance of finished work.

.8 Sample mock-up is required for clay masonry unit and complete exterior wall assembly.

1.6 CONTRACTOR'S RESPONSIBILITY

.1 Prior to submission to the Consultant, review all shop drawings, samples, product data, and other required submittals as follows:

.1 Verify that the submission is for products as specified, or otherwise approved by the Consultant.
.2 Ensure that the submission is complete.

.3 Note any potential interference issues and co-ordinate with the trades to avoid these conflicts.

.4 Verify:

.1 Field measurements.
.2 Field construction criteria.
.3 Catalogue numbers and similar data.

.2 Coordinate each submittal with requirements of Work and Contract Documents. Refer to Section 01 10 00, General Instructions, and the subsection on Coordination.

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

.4 Stamp, initial or sign each Drawing, certifying approval of submission, verification of field dimensions and measurements and compliance with Contract Documents, prior to submission to the Consultant(s).

.5 The Contractor shall be responsible for reproducing and distributing reviewed shop drawings, except for those copies required by the Architect and Consultants.

.6 After Consultant's review, distribute copies as follows:

.1 Job Site file (2 copies) - colour or redline copies
.2 As-built documents file.
.3 Other prime contractors.
.4 Subcontractors.
.5 Supplier.
.6 Fabricator.
.7 Authorities having jurisdiction, where required by Codes and/or By-Laws, i.e. structural steel and sprinklers.
.8 Owner’s Maintenance Manual (revised, as-built copies).

.7 Distribute samples as directed by the Consultant.

.8 Ensure that all samples are approved by authorities having jurisdiction, supplier for correct application in Project, and other parties such as Owner in time to permit approval prior to ordering of quantity delivery to Site.

.9 The Contractor shall advise all Trades, Subcontractors and suppliers of the limits of the Consultant's responsibility with respect to Shop Drawings and other submittals, as detailed below.

1.7 CONSULTANT'S RESPONSIBILITY

.1 With reasonable promptness from the receipt of samples and Architectural shop drawings, the Consultant shall review them and return them to the Contractor. Allow fifteen (15) working days for review of shop drawings.

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

.3 Shop drawing markings shall be interpreted as follows:

.1 Shop drawings marked "REVIEWED" by Consultant and/or Subconsultants are released for construction.
.2 Shop drawings marked "REVIEWED AS NOTED" by the Consultant or his Subconsultants are also released for construction, after revisions noted are made; with final copies sent to the Consultant.
.3 Shop drawings marked "REVISE AND RESUBMIT" by the Consultant or his Subconsultants are NOT released for construction and must be resubmitted after being revised in accordance with the consultants' comments.
.4 Shop Drawings marked with the Consultant's "RECEIVED" stamp only have not been reviewed by the Consultant.

.4 Review by the Architect does not in any way constitute review of the design of engineering elements, which form part of the Contract Document's prepared by others.

.5 Shop drawings for products that are not a specified item, or an approved substitution, will be rejected without being reviewed.

.6 Shop drawings which have not been requested will be returned to the Contractor with no action taken by the Consultant.

END OF SECTION

SAFETY REQUIREMENTS

PART 1 – GENERAL

1.1 CONSTRUCTION SAFETY

.1 Observe and enforce construction safety measures required by the Ontario Building Code, Canadian Construction Safety Code, Ontario Occupational Health and Safety Act, Workplace Safety & Insurance board (WSIB) and Municipal Statutes and Authorities.

.1 The Contractor is again reminded that the Contractor is responsible for Occupational Health and Safety on this project.

.2 In particular, the Ontario Construction Safety Act, the regulations of the Ontario Department of Labour and Ontario Hydro Safety Requirements shall be strictly enforced.

.3 In event of conflict between any provisions of above authorities the most stringent provisions will apply.

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

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

.6 The Contractor covenants and agrees to comply with all statutory and other obligations, including without limitation, the provisions of the Occupational Health and Safety Act (Ontario) and all Regulations thereto, and all amending and successor legislation, in connection with all work

performed by either the Contractor, Sub-contractors, or any Other Contractor on, or in connection with, the Project.

.7 Without limiting the foregoing, for the purposes of this Contract, the Contractor agrees that it shall be the "constructor" of the Project within the meaning of the Act, and as such, shall assume all the obligations and responsibilities, and observe all construction safety requirements and procedures, and duties of inspection imposed by the Act on the "constructor", as therein defined, for all work and services performed by the Contractor, Subcontractors and Other Contractors on or in connection with the Project. The Contractor further covenants and agrees that the Owner and its existing and former officers, trustees, employees and agents, and their respective heirs, executors, administrators, successors and assigns shall be released from any obligations or liabilities otherwise imposed on the Owner, or on any of them, pursuant to the Act in connection with the Project, and that the Contractor shall assume all liability and responsibility in connection with same. The Contractor agrees to save harmless and indemnify the Owner from any losses, damages, costs and expenses of any kind, or nature whatsoever, including all legal expenses, and all defense costs and related expert or consulting fees, incurred by the Owner, or any of them, arising in connection with the failure, default, or inability of the Contractor of the Owner, or any of them, to comply with any of the aforementioned statutory, or other legal requirements, or arising in connection with any breach by the Contractor of any of its covenants, agreements and obligations under this Contract.

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

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

.10 All contractors are responsible to ensure that all machinery and/or equipment are/is safe and that the workers perform their tasks in compliance with established safe work practices or procedures. Workers

must receive adequate training in their specific work tasks to protect their health and safety.

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

.12 In addition to the responsibility of all contractors as outlined in 1.1.10, above, Subcontractors will be held accountable for the health and safety of workers under their supervision.

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

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

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

.16 Where an accident, explosion, or fire causes a person injury at the work place, and the worker is disabled from performing the usual task, the Contractor shall prepare a written notice and shall forward same to the Ministry of Labour within four days of the occurrence with a copy to the health and safety representative or the Joint Health and Safety Committee, containing such information and particulars as may be prescribed.

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

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

1.2 REPORT ACCIDENTS

.1 Promptly report in writing to the Consultant all accidents which cause death, personal injury or property damage, arising out of or in connection with the performance of the work on or adjacent to the site. Where death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to the Consultant and to the relevant public authorities.

.2 If any claim is made by anyone against the Contractor or Subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Consultant giving full details of the claim.

1.3 FIRST AID FACILITIES

.1 Provide at the site the equipment and medical facilities necessary to supply first-aid service to anyone who may be injured in connection with the Work, and to conform to the requirements of the authorities having jurisdiction over the Work.

1.4 FIRE SAFETY REQUIREMENTS

.1 The appropriate clauses of the Ontario Building Code, Ontario Fire Code, National Building Code of Canada and National Fire Code relating to fire safety and protection shall be strictly followed.

.2 Provide and maintain free access to temporary or permanent fire hydrants acceptable to local fire department.

.3 Provide sufficient temporary standpipes and connections, fire hose, valves, temporary cabinets, extinguishers, etc. to comply with the requirements of the governing Municipal and Provincial authorities.

.4 Make necessary adjustments and modifications to temporary fire protection as required during progress of the work. Remove such temporary work when permanent system is installed and operating.

.5 Conform to “Guidelines for Maintaining Fire Safety During Construction in Existing Buildings”, provided by the Office of the Ontario Fire Marshal.

.1 Maintain existing exits and access to exits. Where an exit must be blocked, provide an alternate exit acceptable to Authorities Having Jurisdiction.
.2 Provide minimum 45 minute rated fire separations at junction between existing corridors in occupied spaces and new corridors under construction. Any required access through these partitions shall be with rated doors, frames with closers and latching.
.3 Maintain exiting fire department access route or provide new, or temporary, access route acceptable to the fire department.
.4 Do not store combustible materials adjacent to existing building or where such materials could pose a fire hazard to the building or the occupants.
.5 Where temporary openings are made in existing floors, pack with mineral wool insulation to create temporary fire barrier.
.6 Existing fire alarm system is to be kept operational throughout the construction period. Keep fire department informed of any temporary shutdowns and arrange for alternate fire safety measures to be implemented during that period.
.7 Refer to the Ontario Fire Code for requirements for temporary shutdown of fire protections systems, including sprinklers and standpipe systems.
.8 Modify Fire Safety Plan in accordance with the Fire Code, when required to facilitate construction. Such modifications shall be determined in cooperation with the Owner and the local fire department.

1.5 OVERLOADING

.1 Ensure no part of Work is subjected to a load which exceeds the design live loads shown on the structural drawings. Ensure that scaffolding and false work are not overloaded. Do not cut load bearing members without approval of Consultant.

1.6 FALSEWORK

.1 Design and construct falsework in accordance with CSA S269.1 latest version.

1.7 VISITORS

.1 Provide hard hats for use by all visitors.

1.8 ADDITIONAL REQUIREMENTS FOR OCCUPIED SITES

.1 The existing building site will be occupied throughout the Construction Period, additional safety requirements will apply, as outlined below:

.2 Access Control:

.1 The Contractor shall instruct all suppliers and subcontractors that they are required to contact the Site Supervisor by mobile phone prior to entering the site and await escort.

.2 Gates and construction enclosures must remain closed and locked at all times and only opened for the time required for access/egress of authorized vehicles or personnel.

.3 Existing fire route is to remain unobstructed and free from debris at all times.

.4 Access to building is only to be provided after communication and coordination and scheduling with the Owner's Project Manager.

.3 Site Communication:

.1 The Contractor shall provide the Owner with an emergency contact telephone number at which the Site Supervisor or other Contractor representative can be contacted directly during work hours and with voicemail available at all other times, including weekends and holidays, which will be checked regularly.

.2 Site Supervisor and flagman must have means of direct communication available at all times during work hours.

.3 Contractor shall be in daily communication with the Owner to determine any activities which may involve safety concerns, whether building related or construction related.

1.9 SIGNAGE

.1 Provide signage indicating " Danger - Keep Out", "Hard Hats must be worn at all times", "Safety Shoes must be worn at all times", "No Trespassing", etc., mounted on all sides of Site, and additional signs as necessary to adequately warn the public and workmen of the inherent dangers of the site and requirements to maintain personal safety. Safety Signage is also required at all construction entrances.

END OF SECTION

ENVIRONMENTAL PROCEDURES

PART 1 – GENERAL

1.1 HAZARDOUS MATERIALS

.1 The Ontario Occupational Health and Safety Act requires the Owner to provide a list of Designated Substances to all prospective Contractors and they in turn must supply the list to their sub-trades who are likely to handle or disturb the material.

.2 Typical materials that may be present in the area of construction may include any or all of the following and would be expected in normal construction:

.1 Lead: in paint films, in solder or pipe for drinking water, in solder for other pipe or electrical components.
.2 Mercury : found in elemental form in an ampoule in thermostats or in electrical soft switches, as a gas in fluorescent light tubes or in paint films and caulk.
.3 Silica: primarily as Quartz, bound in building materials including but not limited to concrete, brick and block.

.3 In accordance with the Ontario Health and Safety Act and regulations enacted under the Act the Contractor and sub-trades shall take appropriate precautions for the building and their work force. Such precautions may include, for the substances listed, the measures outlined below.

.4 Lead:

.1 Any operation involving lead-based paints may potentially produce significant exposures to lead if adequate controls are not provided. Exposure varies with the type of operation being employed.
.2 The presence of lead in building finishes left intact or found peeling in a few locations produces little exposure for workers to lead through contact, inhalation or ingestion.
.3 Operations involving the hand sanding and scraping of lead based paints can elevate exposure through inhalation. The use of a negative pressure respirator equipped with high efficiency particulate air (HEPA) filters is recommended to reduce exposure.

.4 Operations involving the machine sanding or abrasive cutting of paint and other surface coatings containing lead can elevate levels of much finer dust. The spray application of a lead bearing paint or coating produces a respirable fume. These operations increase the likelihood of exposure by inhalation. A negative pressure air-purifying respirator equipped with HEPA filters is recommended for these operations.

.5 Operations involving oxyacetylene torches or other heating operations produces the most significant exposure to lead in particular through inhalation and by contact of lead fumes solidifying on skin. A powered air-purifying respirator equipped with HEPA filters and full body covering is recommended for these operations.

.6 Lead found in solder of other pipe systems and electronic components poses no threat to the work force by inhalation, ingestion or by contact with the exception of maintenance or renovation activities. The maintenance of the pipe or electrical component may produce some exposure to lead fume during the seating on of lead solders but for a short duration of time. Inhalation is the source of entry and exposure is not very significant.

.7 All items identified in this section may be disposed of as regular non-hazardous waste unless concentrated. Metallic lead may be reclaimed through scrap metal dealers.

.5 Mercury:

.1 Fluorescent light tubes contain small quantities of mercury gas. These sealed units do not pose any harm in the workplace except in the case of breakage. There are no liquid or residue present after breakage and spill cleaning is not a concern. A recommended practice is to evacuate the work area when breakage occurs. The gas will diffuse in about five to ten minutes and cleanup of the tubes can be performed. Mercury can be taken into the body by inhalation only from this source.

.2 The same precautions as those indicated for lead-based paints would apply to mercury in paints.

.3 Elemental mercury found in ampoules in electrical equipment may be disposed of as regular waste and should be turned over to the Owner for disposal through commercial recyclers. The other forms (light tubes and painted surfaces that have been concentrated) can be disposed of as regular waste.

.6 Silica:

.1 Silica is presumed to be present in cement, cement blocks, bricks and mortar of the building. Unless the silica in these materials is reduced to respirable size (5 um or less) and the airborne concentration exceeds the time weighted average exposure of 0.2 milligrams per cubic metre in air, no adverse health effects are expected to occur. Building construction, renovation or demolition do not normally raise excessive exposure to silica with the exception of jack hammering, dry saw cutting or sand blasting. There is little likelihood for the work force to be exposed to excessive levels of respirable silica dust if the material is suppressed with water spray or flow. Respiratory protection is dependent on the type and airborne concentration of respirable silica present in the particular work environment.

.2 Prior to the disposal of building materials a leachate toxicity test in compliance with Water Management Regulation (Revised Regulation of Ontario 1990/Regulation 347) may be required by the local waster receiving site or the Ontario Ministry of Environment and Energy. Prior to disposal these authorities should be consulted with and tests performed where required.

.3 Where a friable building material enclosed in a wall, floor or ceiling such as fireproofing, insulation on pipe or ducts etc. (that is not fibrous glass) or an acoustical textured material (stucco) or a non-friable material such as cement board or cement pipe, the Contractor shall refer to the Consultant who shall contact the Owner for further direction.

END OF SECTION

REGULATORY REQUIREMENTS

PART 1 – GENERAL

1.1 REGULATING DOCUMENTS

.1 Conform to the Ontario Building Code (Ontario Reg. 332/12), Ontario Fire Code (Ontario Reg. 213/07), Accessibility for Ontarians with Disabilities Act (Ontario Reg. 191/11), National Building Code of Canada 2010, 2012 Canadian Electrical Code (CEC), CSA B44 - Safety Code for Elevators and Escalators, CSA W59 - Welded Steel Construction, The Occupational Health and Safety Act, Ontario (R.S.O. 1990), the National Fire Code, the local municipal Fire Code, and all other applicable Codes and Building By-Laws. Conform to the requirements of the authorities having jurisdiction, such as public utilities. Where required under The Occupational Health and Safety Act, engage a Professional Engineer to design formwork and falsework for concrete.

.2 Contract forms, codes, standards and manuals referred to in these specifications are the latest published editions at the date of close of tenders. Meet or exceed requirements of specified standards.

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

1.2 DOCUMENTS REQUIRED BY BUILDING INSPECTOR

.1 Confirm with building inspector, at the commencement of construction, what documents are required for submission both during construction and for occupancy. Keep copies of such documents on site.

.2 At the time of request for occupancy, submit a complete package of all required documents to the building inspector. The package shall contain all documents required for the inspector's sign off for occupancy, and should be expected to include the following documents:

.1 Copies of Consultant's General Review Reports
.2 Copies of General Review Reports of consulting engineers
.3 Consultant's and engineers' letters confirming project is ready for occupancy in accordance with the provisions of the Ontario Building Code, Division C, and section 1.3.3, Occupancy of Buildings.
.4 Verification of compliance with tested designs for rated assemblies.

.5 Verification of Fire Protection Systems.
.6 Additional documents as required by the municipality.

END OF SECTION

ABBREVIATIONS AND ACRONYMS

PART 1 – GENERAL

DESCRIPTION

.1 This section describes abbreviations and acronyms used in these specifications and on the drawings and schedules.

.2 When references are made in these specifications to the standards, specifications, or other published data of various international, national, regional, or local organizations, such organizations may be referred to by their acronym or abbreviation only.

.3 The list of abbreviations and acronyms is provided to aid in the interpretation of notations in the construction documents and shall not be used to alter the meaning of notes for which the meaning is readily inferable from the context.

.4 Abbreviations and acronyms can have more than one meaning. Their use shall be considered with respect to different subjects and disciplines where the context in which each is used makes the meaning clear.

.1 Example:

.1 CB on floor plans typically refers to a chalkboard
.2 CB on site plans typically refers to a catchbasin
.3 CB on electrical plans typically refers to a circuit breaker

.5 Where additional or alternate abbreviations and acronyms are listed and used on drawings, schedules, and in the specification sections prepared by subconsultants, those shall apply to the documents on which they are noted.

.6 Discrepancies shall be noted and brought to the Consultant's attention for interpretation.

LIST OF ABBREVIATIONS

.1 The following is a list of abbreviations used in the specifications, schedules and on the drawings:

A

A/B	ANCHORBOLT
AC	AIR CONDITIONING
ACT	ACOUSTIC CEILINGTILE
ADD	ADDENDUM
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
ALM	ALARM
ALUM	ALUMINUM
ANN	ANNUNCIATOR PANEL
ANO	ANODIZED
AUTO	AUTOMATIC
A/V	AUDIO VISUAL
AVB	AIR/VAPOUR BARRIER
AWT	ACOUSTIC WALL TREATMENT

B

BD	BOARD
BEV	BEVELLED
BF	BARRIER-FREE
BH	BORE HOLE
B/H	BULKHEAD
BIT	BITUMINOUS
BLDG	BUILDING
BLK	CONCRETE BLOCK
BM	BEAM
B/M	BENCH MARK
BN	BULL NOSED
BOT	BOTTOM
BP	BEARING PLATE
BRDG	BRIDGING
BRK	BRICK
BUR	BUILT-UP ROOFING
BV	BLOCK VENT

C

CAB	CABINET
CAP	CARPET
CB	CHALKBOARD, OR CATCHBASIN
C/B	CATCHBASIN
CBMH	CATCHBASIN MANHOLE
C/C	CENTRE TO CENTRE
CEM	CEMENT
CER	CERAMIC
CH	CABINET HEATER
CJ	CONTROL JOINT
CL	CENTRE LINE
CLF	CHAIN LINK FENCE
CLG	CEILING
CLR	CLEAR
CMU	CONCRETE MASONRY UNIT
COL	COLUMN
CONSTR	CONSTRUCTION
CONC	CONTINUOUS
CONTR	CONTRACT OR CONTRACTOR
CONV	CONVECTOR
CORR	CORRIDOR
CP	CONTROL PANEL
CPT	CARPET
CR	COAT RACK
CS	CONVENIENCE SHELF
CT	CERAMIC TILE
C-UL	UL TESTED FOR CANADA
CTR	CENTRE
C/W	COMPLETE WITH
C/S	CONCRETE, SEALED

D

DAM	DAMPPROOFING
DAT	DATUM
DBL	DOUBLE
DET	DETAIL
DF	DRINKING FOUNTAIN
DIA	DIAMETER
DIAG	DIAGONAL
DIFF	DIFFUSER
DIM	DIMENSION
DISP	DISPENSER
DL	DOOR LOUVER
DN	DOWN
DSP	DOWNSPOUT
DVTL	DOVETAIL JOINT
DRY	DRYER
DW	DISHWASHER
DWG	DRAWING

E

EF	EACH FACE
EJ	EXPANSION JOINT
EL	ELEVATION
ELEV	ELEVATOR
EQL	EQUAL
EQ/T	EQUIVALENT THICKNESS
EQPT	EQUIPMENT
EX	EXISTING
EXH	EXHAUST
EXP	EXPANSION
EXP STR	EXPOSED STRUCTURE

F

FBD	FIBREBOARD
FD	FLOOR DRAIN
F/D	FIRE DAMPER
FCD	FIRE DEPARTMENT CONNECTION
	FDNFOUNDATION
FEC	FIRE EXTINGUISHER CABINET
FFL	FINISH FLOOR LEVEL
FH	FIRE HYDRANT
FHC	FIRE HOSE CABINET
FIN	FINISH
FIX	FIXTURE
FLG	FLASHING
FLEX	FLEXIBLE
FLUOR	FLUORESCENT
FPR	FIRE PROTECTION RATING
FR	FIRE RETARDANT/RATED
FRR	FIRE RESISTANCE RATING
FSS	FIRE SEPARATION
FTG	FOOTING
FURR	FURRING

G

GA	GAUGE
GALV	GALVANIZED
GB	GYPSUM BOARD
GL	GLASS
GRB	GRAB BAR
GVL	GRAVEL
GYP BD	GYPSUM BOARD
GWG	GEORGIAN WIRED GLASS

H

HB	HOSE BIBB
H/C	HANDICAPPED
HD	HAND DRYER
HM	HOLLOW METAL

HRD	HAIR DRYER
HTD	HIGH TRAFFIC DOORS
HVAC	HEATING, VENTILATION AND AIRCONDITIONING
HWT	HOT WATER TANK
HYD	FIRE HYDRANT

I

ID	INSIDE DIAMETER
INS	INSULATION
ISOL	ISOLATION

L

LAB	LABORATORY
LAM	LAMINATE
LAT	LAY-IN ACOUSTICAL TILE
LAT -1	LAY-IN ACOUSTICAL TILE (TYPE 1)
LAV	LAVATORY
LBL	LABEL
LDBR	LOAD BEARING
LDG	LANDING
LF	LIGHT FIXTURE
LH	LEFT HAND
LHR	LEFT HAND REVERSE
LIB	LIBRARY
LINO	LINOLEUM
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LNTL	LINTEL
LONG	LONGITUDINAL
LPT	LOW POINT
LMC	LINEAR METAL CEILING
LS	LIGHT STANDARD
LVL	LEVEL
LV -1	LOUVRE (TYPE 1)
LWB	LIGHT WEIGHT BLOCK

M

M	METRES
MAT	MINERAL ACOUSTIC TILE
MAX	MAXIMUM
MDF	MEDIUM DENSITY FIBREBOARD
MECH	MECHANICAL
MEMB	MEMBRANE
MET	METAL
MEZZ	MEZZANINE
MH	MANHOLE
MIN	MINIMUM
MIRR	MIRROR
MISC	MISCELLANEOUS
MLWK	MILLWORK
MM	MILLIMETRES
MO	MASONRY OPENINGS
MR	MOISTURE RESISTANT
MTD	MOUNTED
MWP	MEMBRANE WATERPROOFING

N

NAT	NATURAL
NBCC	NATIONAL BUILDING CODE OFCANADA
NFHB	NON-FREEZE HOSE BIBB
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NSF	NON-SLIP FLOORING
NTS	NOT TO SCALE

O	
OA	OVERALL
OBC	ONTARIO BUILDING CODE
OC	ON CENTRE
OD	OUTSIDE DIAMETER
O/H	OVERHEAD
OPG	OBSCURE PLATE GLASS
OWSJ	OPEN WEB STEEL JOIST
OV	OVEN
P	
P	PAINT
PAP	PREFINISHED ALUMINUM PANEL
PA	PUBLIC ADDRESS SYSTEM
PAR	PARALELL
PB	PUSH BUTTON (DOOR OPERATOR)
PBD	PARTICLEBOARD
PC	PRECAST CONCRETE
PE	PORCELAIN ENAMEL
PERF	PERFORATED
PERIM	PERIMETER
PERP	PERPENDICULAR
PG	PLATE GLASS
PL	PLASTER
PLAM	PLASTIC LAMINATE
PLUMB	PLUMBING
PLYWD	PLYWOOD
PMF	PREFINISHED METAL FLASHING
PMS	PREFINISHED METAL SIDING
PMP	PREFINISHED METAL PANEL
PML	PANEL
POLY	POLYETHYLENE OR POLYOLEFIN
PR	PAIR
PREFIN	PREFINISHED
PRELIM	PRELIMINARY
PT	PAINT, OR PORCELAIN TILE
PTD	PAPER TOWEL DISPENSER
PTN	PARTITION
PTW	PRESERVATIVE TREATED WOOD
PVG	PAVING
PWC	PLASTIC WALL COVERING
Q	
QT	QUARRY TILE
R	
R	RADIUS
RA	RETURN AIR
RAD	RADIATOR
RB	RUBBER BASE
RD	ROOF DRAIN
REBAR	REINFORCING BAR
RCONV	RECESSED CONVECTOR
RCH	RECESSED CABINET HEATER
REC	RECESSED
REF	REFERENCE / REFER
REFR	REFRIGERATOR
REINF	REINFORCE/D/ING/MENT
REM	REMOVE/ABLE
RES	RESILIENT
REV	REVISE / REVISION
RFG	ROOFING
RH	RIGHT HAND
R/H	ROOF HOPPER
RLG	RAILING
RM	ROOM, OR RECESS MOUNTED
RMC	REINFORCED MASONRY COLUMN
RUBB	RUBBER
RUH	RECESSED UNIT HEATER
RWL	RAINWATER LEADER
S	
S -1	STAIN (TYPE) 1
SAD	SECURITY ALARM DEVICE
SAN	SANITARY
SC	SOLID CORE
SCB	SLIDING CHALKBOARD

SCHED	SCHEDULE
SD	SOAP DISPENSER
SEC	SPECIAL EPOXY COATING
SF	SHEET FLOORING
SIM	SIMILAR
SK	SINK
SL	SLATE
SND	SANITARY NAPKIN DISPENSER
SNR	SANITARY NAPKIN RECEPTACLE
SOG	SLAB ON GRADE
SP	SPANDREL PANEL
SPECS	SPECIFICATIONS
SPC	SPECIAL COATING
SPF	SPORTS FLOORING
SPKR	SPEAKER
SRCONV	SEMI RECESSED CONVECTOR
SS	STAINLESS STEEL
ST	STEEL
STAG	STAGGERED
STC	SOUND TRANSMISSION CLASS
STD	STANDARD
STIFF	STIFFENER
STOR	STORAGE
STR	STRUCTURE
SUPPL	SUPPLEMENT/AL
SURF	SURFACE
SUSP	SUSPENDED
SVF	SHEET VINYL FLOORING SIDEWALK
SWF	SPECIAL WALL FINISH
SYM	SYMBOL
T	
TB	TACKBOARD
TB	TOP AND BOTTOM
TC	TEACHER'S CLOSET, OR TOP OF CURB
TEC	TECTUM PANEL
T&G	TONGUE AND GROOVE
TEMP	TEMPERED GLASS
TERR	TERRAZZO
TEL	TELEPHONE
TEMP	TEMPORARY
TH	TEST HOLE
TM	TILT MIRROR
T/O	TOP OF
TOC	TOP OF CURB
TOCS	TOP OF CONCRETE SLAB
TOS	TOP OF STEEL
TPG	TEMPERED PLATE GLASS
TPH	TOILET PAPER HOLDER
TR	TRANSOM
TYP	TYPICAL
U	
U/C	UNDERCUT
U/G	UNDERGROUND
UH	UNIT HEATER
ULC	UNDERWRITER'S LABORATORIES OF CANADA
UL	UNDERWRITER'S LABORATORIES (USA)
UNEX	UNEXCAVATED
UNF	UNFINISHED
UNO	UNLESS NOTED OTHERWISE
U/P	UNPAINTED
UR	URINAL
U/S	UNDERSIDE
UTIL	UTILITY
V	
VAR	VARIABLE, VARIES
VB	VAPOUR BARRIER
VCT	VINYL COMPOSITION TILE
VERT	VERTICAL
VEST	VESTIBULE
VT	VINYL FACED
VR	VAPOUR RETARDER
VT	VINYL TILE
VWP	VINYL WALL PANEL

W

W/	WITH
WASH	WASHING MACHINE
WB	WHITE BOARD
WC	WATERCLOSET (TOILET)
WD	WOOD
WDF	WOOD FLOORING
WF	WASH FOUNTAIN
WG	WIRED GLASS
W/O	WITHOUT
WP	WATERPROOFING, WORKING POINT
WR	WASHROOM
W/R	WATER RESISTANT

END OF SECTION

QUALITY ASSURANCE

PART 1 – GENERAL

1.1 QUALITY ASSURANCE

.1 Refer also to the Quality Control Provisions of Section 00 10 00, General Instructions.

.2 Provide a system of quality control to ensure that the minimum standards specified herein are attained.

.3 Bring to the attention of the Consultant any defects in the work or departures from the Contract Documents which may occur during construction. The Consultant will decide upon corrective action and state recommendations in writing.

.4 The Consultant's general review during construction and inspection by independent inspection and testing agencies reporting to the Consultant are both undertaken to inform the Owner of the Contractor's performance and shall in no way augment the Contractor's quality control or relieve him of contractual responsibility.

1.2 NOTIFICATION

.1 Give the Consultant advance notice of shop fabrication, field erection and other phases of the work so as to afford him reasonable opportunity to inspect the work for compliance with contract requirements. Failure to meet this requirement may be cause for the Consultant to classify the work as defective.

1.3 DEFECTIVE MATERIALS AND WORKMANSHIP

.1 Where factual evidence exists that defective workmanship has occurred or that work has been carried out incorporating defective materials, the Consultant may have tests, concrete cores, inspections or surveys performed, analytical calculation of structural strength made and the like in order to help determine whether the work must be replaced, Test, inspections or surveys carried out under these circumstances will be made at the Contractor's expense, regardless of their results, which may indicate that, in the Consultant's opinion, the work may be acceptable.

.2 All testing shall be conducted in accordance with the requirements of the Ontario Building Code, except where this would, in the Consultant's

opinion, cause undue delay or give results not representative of the rejected material in place. In this case, the tests shall be conducted in accordance with the standards given by the Consultant.

END OF SECTION

QUALITY CONTROL

PART 1 – GENERAL

1.1 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.

.2 Tests and mix designs.

.3 Mock-ups.

.4 Mill tests.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures: Submission of samples to confirm product quality.

.2 Section 01 60 00 - Product Requirements: Material and workmanship quality, reference standards.

1.3 INSPECTION

.1 Refer to GC 2.3 - REVIEW AND INSPECTION OF THE WORK. The Contractor shall prepare agenda for meetings.

.2 Inspection and Testing is specified in the following Sections:

Section 03 30 00 Cast-in-Place Concrete
Section 03 35 00 Concrete Floor Finishing
Section 04 05 00 Masonry Procedures
Section 04 05 13 Masonry Mortar and Grout
Section 04 05 22 Concrete Unit Masonry
Section 05 10 00 Structural Steel
Section 07 13 00 Waterproofing
Section 07 27 00 Air Barriers
Section 08 71 00 Door Hardware
Section 09 91 00 Painting

1.4 INDEPENDENT INSPECTION AGENCIES

.1 Independent inspection and testing agencies will be engaged by the Owner for the purpose of inspecting and testing portions of the Work.

.2 Costs of inspection and testing will be paid by Owner.

.3 The Contractor shall provide equipment, tools, and materials that may be required for executing re-inspection and re-testing the Work by the appointed agencies.

.4 Employment of inspection and testing agencies does not relax the responsibility to perform the Work in accordance with the Contract Documents.

.5 Inspection and testing agencies shall act on a professional and unprejudiced basis and carry out inspection and testing functions to establish compliance with requirements of the Contract Documents.

.6 Inspection and testing agencies shall review work as it progresses and prepare reports stating results of tests and conditions of work and indicate in each report whether specimens tested conform to the requirements of the Contract Documents, specifically noting deviations.

.7 If defects are revealed during inspection or testing, the appointed agency will request additional inspection and testing to ascertain the full degree of deficiencies. The Contractor shall correct defects and irregularities as advised by the Consultant at no cost to the Owner. The corrected work will be retested and reinspected by the same inspection and testing agency and the costs shall be paid by the Contractor.

.8 Failure by the independent testing agency to detect defective work or materials shall not in any way prevent later rejection, when such defect is discovered, nor shall it obligate the Owner for final acceptance.

.9 The independent inspection and testing specified in this Section is not meant to replace or supplement the Contractor's own quality control nor relieves the Contractor of his contractual obligation to meet the requirements of the Contract Documents.

.10 The independent testing agency is not authorized to amend or release any requirements of the Contract Documents, nor to approve or accept any portion of the Work.

1.5 ACCESS TO WORK

.1 Allow inspection and testing agencies access to the Work and off-site manufacturing and fabrication plants.

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

1.6 PROCEDURES

.1 Notify the appropriate agency and the Consultant 48 hours in advance of the requirement for tests, in order that attendance arrangements can be made without causing delay in work.

.2 Submit samples or materials required for testing, as specifically requested in the specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.7 DEFECTIVE WORK

.1 Refer to Section 39 - DEFECTIVE WORK in the Stipulated Price Contract.

1.8 REPORT DISTRIBUTION

.1 Submit one (1) copy of inspection and test reports to the Owner.

.2 Submit one (1) copy of inspection and test reports to the Consultant within ten (10) Working Days of the date of the subject inspection or test.

.3 Provide two (2) copies of inspection and test reports to the Contractor.

.4 Provide one (1) copy of inspection and test report to Subconsultants affected.

.5 Provide one (1) copy of inspection and test report to Subcontractor of work being inspected or tested.

.6 Provide one (1) copy of inspection and test reports to Municipal Building Department.

1.9 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as may be requested.

.2 The cost of tests and mix designs beyond those called for in the Contract Documents or beyond those required by the law of the Place of Work shall be appraised by the Consultant and may be authorized as recoverable.

1.10 MOCK-UPS

.1 Prepare mock-up for work specifically requested in the specifications. Include for work of all Sections required to provide mock-ups.

.2 Construct in locations acceptable to the Consultant or as specified in specific Section.

.3 Prepare mock-up for Consultant's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in the Work. Construct mock-up from the specified materials and assemblies.

.4 Make revisions to mock-up as required by the Consultant.

.5 Mock-ups reviewed and approved by the Consultant shall become the standard against which installed work will be evaluated.

.6 Do not proceed with the work until the associated mock-up has been approved by the Consultant.

.7 Failure to prepare mock-up in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

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

.9 Specification section identifies whether the mock-up may remain as part of the Work or must be removed.

.10 Mock-ups are specified in the following sections:

Section 03 35 00 Concrete Floor Finishing
Section 04 05 00 Masonry Procedures
Section 04 05 22 Concrete Unit Masonry
Section 04 21 00 Clay Unit Masonry
Section 07 26 00 Sheet Vapour Retarders
Section 07 27 00 Air Barriers
Section 07 42 10 Pre-finished Metal Panels
Section 08 71 00 Door Hardware

1.11 MILL TESTS

.1 Submit mill test certificates as may reasonably be requested by the Consultant or as specified in Specification Sections.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

END OF SECTION

TEMPORARY UTILITIES

PART 1 – GENERAL

1.1 MOBILE PHONE AND LAP-TOP COMPUTER

.1 Site Supervisor is to carry a mobile phone at all times and provide the telephone number to the Owner and Consultant for the ability to communicate with the Site Supervisor at all times should an emergency occur on site.

.2 Site Supervisor is to have connection to a lap-top computer and own WIFI on site for issuing of site communications.

1.2 POWER AND WATER SUPPLY

.1 Provide all temporary light and power complete with all wiring, lamps and similar equipment as required for completion of the Work. Provide adequate lighting for all workmen, sufficient for safety and for execution of good workmanship, taking particular care to observe all safety requirements. Adequate temporary lighting will be insisted upon. The Owner will not be liable for any loss, damage, delay, or claims for extra costs resulting from lack of services.

.2 Existing building services may be used, as available and noted on the drawings. This does not include emergency generators or batteries. All costs resulting from the use of these services are the responsibility of the Contractor.

.3 Water supply: The existing building water service may be used to supply potable water for construction use.

1.3 TEMPORARY HEATING AND VENTILATION

.1 Furnish heating apparatus and fuel for heating the temporary offices and sheds.

.2 Provide local exhaust ventilation to prevent harmful accumulations of hazardous substances into atmosphere of occupied areas. Dispose of exhaust materials in manner that will not result in harmful exposure to persons.

.3 Ventilate storage spaces containing hazardous or volatile materials. Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful elements. Store paints & solvents in secure, locked, ventilated room at all times.

.4 Protect existing ducting system with filters, inspect daily and replace weekly or more frequently as necessary. Finally vacuum clean ducting system and replace filters at completion of the Work.

.5 Maintain strict supervision of operation of temporary heating and ventilating equipment. Contract documents for work under this contract consists of the following:

.1 Enforce conformance with applicable codes and standards.
.2 Enforce safe practices.
.3 Prevent abuse of services.
.4 Prevent damage to finishes.
.5 Vent direct-fired combustion units to outside.

1.4 FIRE EXTINGUISHERS

.1 An adequate number of ABC type fire extinguishers shall be provided for the protection of the work during construction.

1.5 REMOVAL OF TEMPORARY UTILITIES

.1 Remove temporary utilities from site when directed by Consultant and/or at the completion of the project

END OF SECTION

CONSTRUCTION FACILITIES

PART 1 – GENERAL

1.1 CONTRACTOR'S SITE OFFICE

.1 Provide and maintain a site trailer heated to 22 C, lighted 750 Lx and ventilated, of sufficient size to accommodate 8 persons for site conference and job meetings. The site office shall be painted.

.2 The site office shall be furnished with the following as a minimum requirement:

- .1 Desk and chair
- .2 File cabinets as required for storage
- .3 Plan file for storage of drawings
- .4 Table and stacking chairs to provide seating at job meetings
- .5 Telephone or other acceptable means of communication as noted below.

.3 Mobile telephone is required and the contact number for the site is available at all times when construction personnel are on site, and subject to acceptance by Owner and Consultant.

.4 A printer and computer (or equivalent) are to be provided on site, subject to acceptance of provisions by Owner and Consultant.

.5 Locate site trailer in a suitable location to approved of the Consultant.

.6 The Contractor shall maintain the following documents, up-to-date, in site office:

- .1 Contract Documents
- .2 Reviewed shop drawings
- .3 All instructions and change documents, ie Work Authorizations, Jobsite Instructions, Notices of Contemplated Change, Change Orders
- .4 All inspection and test reports
- .5 Permit drawings and specifications
- .6 As-built drawings

1.2 STORAGE SHEDS

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

.2 Storage sheds shall be painted and doors shall be fitted with locks.

.3 Locate storage sheds adjacent to building away from road to approval of the Consultant.

.4 Material stored on site must be protected by tarpaulins until enclosed in building.

1.3 SANITARY FACILITIES

.1 Provide temporary portable toilets for use by construction workers. Location on the site to be confirmed with the Owner.

.2 Workers will not be permitted to use the existing washrooms in the building.

.3 As soon as new plumbing in the construction area is sufficiently advanced, Contractor may install temporary water closets, suitably screened off, and connected to drains and water supply. Remove and replace with new equipment before completion of project.

.4 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.4 REMOVAL OF TEMPORARY FACILITIES

.1 Remove temporary facilities from site when directed by Consultant and/or at the completion of the project.

END OF SECTION

TEMPORARY BARRIERS AND CONTROLS

PART 1 – GENERAL

1.1 PROTECTION

.1 Supply, install and maintain all guard rails, barriers, night lights, sidewalk and curb protection as may be necessary or as the by-laws may require.

.2 Supply, install and maintain all necessary temporary doors, screens and coverings to protect work areas. All such work shall be neatly painted. Doors shall have hasp and substantial padlock. Owners representative shall have key or combination where access is required.

.3 Protect existing asphalt and concrete paving and curbs from damage and make good any damage at completion of project.

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

.5 Keep floors free of oils, grease or other such materials likely to discolour them and/or affect bonding of applied surfaces.

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

.7 Provide and maintain, in good working order, appropriately labelled ULC fire extinguishers, to the approval of Authorities Having Jurisdiction.

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

.9 Should the job be stopped for any cause, the Contractor shall be responsible for and provide all necessary protection to prevent damage by weather or other cause until the cause of stoppage has been cleared.

.10 The Contractor shall be entirely responsible for supervision of project and for protection of public from vehicles in movement, stockpiled materials and construction.

.11 The Contractor is responsible for the prevention of vandalism and theft of all tools, equipment and materials.

.12 Any damage to roadways must be repaired immediately, to municipal standards.

.13 The Contractor is responsible for snow removal as required for access to site.

.14 Any damage to site by the Contractors forces, delivery vehicles, etc., must be made good at the end of the job. Similarly any damage to curbs, sidewalks, or other municipal property shall be made good by the Contractor.

1.2 TEMPORARY CONSTRUCTION FENCING AND CONSTRUCTION HOARDING

.1 Supply and install temporary construction fencing and gates to separate the construction area from the remainder of the existing building site and to separate the construction mobilization zone from the remainder of the existing site. Refer to architectural site plan drawings for location of temporary construction fencing and gates. Contractor is responsible to provide for sturdy, heavy-duty galvanized chain link panels and gates with a minimum height of 6’-0” and which is secured with sturdy steel ground stands and u-clamps. Provide fence gates as required to access the construction zone and mobilization zone. Fence gates are to be secured/lockable to prevent entry by the public. Chain link panel system by Fast Fence Inc. or equivalent is to be supplied and installed.

.2 Supply and install temporary weatherproof plywood construction hoarding at the existing exterior building openings due to the demolition work, to maintain a tight, weatherproof enclosure.

.3 The Contractor is responsible to adjust and relocate the construction fencing and construction hoarding as required to suit the progress of the construction and to maintain safe construction areas separate from the remainder of the occupied building and site areas.

.4 Install dust proof membranes, to prevent movement of dust, as required to separate finished construction areas in the building from existing building areas still under construction. Refer to specification Section 02 40 00 - Demolition for specific requirements regarding dust proof membranes.

.5 Plywood construction hoarding and construction fencing shall be erected outside of building operating hours and shall remain in place until the new Work is ready for occupancy and accepted by the Owner.

1.3 SECURITY

.1 The Contractor shall be entirely responsible for supervision of project and for protection of public from vehicles in movement, for stockpiled materials and construction. Vehicular parking and stockpile materials must be maintained on the construction staging area only. No street parking or stockpiling will be allowed on the Municipal streets.

.2 The Contractor is responsible for the prevention of vandalism and theft of all tools, equipment and materials until date of Substantial Performance of Contract.

1.4 REMOVAL OF TEMPORARY BARRIER

.1 Remove temporary barriers and enclosures from site when directed by Consultant and/or at the completion of the project.

END OF SECTION

PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

.1 Reference standards.

.2 Product quality, availability, storage, handling, protection, transportation.

.3 Manufacturer's instructions, inspection, and certification.

.4 Workmanship, coordination and fastenings.

.5 Existing facilities.

1.2 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 01 45 00 - Quality Control: Quality control and inspection of the Work

1.3 REFERENCE STANDARDS

.1 Within the text of the specifications, reference may be made to standards or documents published by the following organizations:

AA - The Aluminum Association.
AAMA-Architectural Woodwork Manufacturers Association of Canada.
ACI - American Concrete Institute.
AISC - American Institute of Steel Construction.
ANSI -American National Standards Institute.
APA - American Plywood Association.
ASTM -American Society for Testing and Materials.
AWMAC -Architectural Woodwork Manufacturers Association of Canada.
BIA - Brick Institute of America.
CEMA - Canadian Electrical Manufacturer's Association.
CGSB - Canadian General Standards Board.
CISC - Canadian Institute of Steel Construction.
CLA - Canadian Lumberman's Association.

CNTA - Canadian Nursery Trades Association.
CPCA - Canadian Painting Contractors' Association.
CPCI - Canadian Precast/Prestressed Concrete Institute.
CRCA - Canadian Roofing Contractors Association.
CSA - Canadian Standards Association.
CSDMA - Canadian Steel Door Manufacturers Association.
CSSBI - Canadian Sheet Steel Building Institute.
FGMA - Float Glass Manufacturers Association.
FM - Factory Mutual Engineering Corporation.
GANA - Glass Association of North America
IBC - Insurance Bureau of Canada
IEEE - Institute of Electrical and Electronic Engineers.
IGMAC - Insulating Glass Manufacturers Association of Canada.
IPCEA - Insulated Power Cable Engineers Association.
MTO - Ministry of Transportation of Ontario.
NAAMM - National Association of Architectural Metal Manufacturers.
NEMA - National Electrical Manufacturers Association.
NFPA- National Fire Protection Association.
NHLA - National Hardwood Lumber Association.
NLGA- National Lumber Grades Authority.
NRCC - National Research Council of Canada.
OAA - Ontario Association of Architects.
OGCA - Ontario General Contractors Association.
SMACNA - Sheet Metal and Air Conditioning Contractors National Association.
SSPC - Steel Structures Painting Council.
SWI - Sealant and Waterproofer's Institute.
TTMAC - Terrazzo, Tile and Marble Association of Canada.
ULC - Underwriters' Laboratories of Canada.
WH - Warnock Hersey (Intertek ETL Semko).

.2 Conform to these standards, in whole or in part as specifically requested in the specifications.

.3 In addition to the standards and documents issued by the above listed organizations, reference may be made to the following codes and documents:

CEC - Canadian Electrical Code (published by CSA).
OBC - Ontario Building Code, latest edition.
OPS - Ontario Provincial Standards
NBC - National Building Code of Canada, latest edition.

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

.5 The cost for such testing will be born by the Owner in the event of conformance with Contract Documents or by the Contractor in the event of non-conformance.

.6 Conform to latest date of issue of referenced standards in effect on date of submission of bids, except where a date or issue is specifically noted, including all amendments or revisions applicable at bid submission date.

1.4 QUALITY

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

.2 Unless otherwise specified, Products supplied shall be of Canadian manufacture.

.3 Defective Products, whenever identified prior to the completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility but is a precaution against oversight or error. Remove and replace defective Products at own expense and be responsible for delays and expenses caused by rejection.

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

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

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

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

1.5 AVAILABILITY AND SUBSTITUTIONS

.1 Provide products as specified in these specifications or as identified on drawings. Where several proprietary products are specified for an item, and they are not identified as alternatives, then any one of the several is acceptable.

.2 Except as noted below, no substitutions to specified products will be accepted after the Contract has been signed.

.3 Immediately upon signing the Contract, review Product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of Products are foreseeable, or if it is found that specified materials have become unavailable for incorporating into the Work, notify the Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delays in the performance of the Work.

.4 In the event of failure to notify the Consultant at the commencement of the Work and should it subsequently appear that the Work may be delayed for such reason, the Consultant reserves the right to substitute more readily available products of similar character, at no increase in the Contract Price. In every case the Contractor shall be responsible for changes in space requirements regarding substituted products.

1.6 STORAGE, HANDLING AND PROTECTION

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

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

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

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

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

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

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

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

1.7 TRANSPORTATION

.1 Pay costs of transportation of Products required in the performance of the Work.

.2 Transportation cost of Products supplied by the Owner will be paid for by the Owner. Unload, handle and store such Products.

1.8 MANUFACTURERS' INSTRUCTIONS, INSPECTION, AND CERTIFICATION

.1 Unless otherwise indicated in the Specifications, apply, install, connect, erect, use, clean, and condition Products, systems, and equipment in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with Products. Obtain written instructions directly from manufacturers.

.2 Notify the Consultant in writing, of conflicts between the Specifications and manufacturer's instructions, so that the Consultant may establish the course of action. Where specified requirements are more stringent than the manufacturer's directions, comply with specified requirements.

.3 Improper installation or erection of Products, due to failure in complying with these requirements, authorizes the Consultant to require removal and re-installation at no increase in the Contract Price.

.4 Manufacturers' Inspection and Certification:

.1 Whenever indicated on the Drawings, in the Specifications, or in manufacturers' or Suppliers' written instructions, manufacturers' representatives shall inspect work that incorporates their materials or Products.

.2 When manufacturer inspection is required, the manufacturer's representative shall be on site at the start of work that incorporates the manufacturer's Products, in order to verify that the correct Products are installed and proper installation procedures are followed.

.3 When the work incorporating the manufacturer's Products is completed, the manufacturer's representative shall carry out a final inspection in order to verify that the work as installed complies with the Contract Documents and the approved Shop Drawings.

.4 After the manufacturer's final inspection, the manufacturer shall prepare a letter of certification of inspection. This letter shall be submitted to the Contractor for inclusion with the documentation required in Section 01 77 00 - Closeout Procedures.

.5 The letter of certification of inspection shall be dated and include the following:

.1 Name of Project and the Consultant's Project number.
.2 Name of Subcontractor.
.3 Name of manufacturer's contact person, and on-site representative if different, with telephone and fax numbers.
.4 Dates of on-site inspections, including start-up and final inspection.
.5 Certification that the work as installed incorporates the correct materials and Products and satisfies the requirements of the Contract Documents and approved Shop Drawings.

1.9 WORKMANSHIP

.1 Workmanship shall be the best quality, executed by workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Consultant if the required work is such as to make it impractical to produce the required results.

.2 Do not employ any unfit person or anyone unskilled in their required duties. The Consultant reserves the right to require the dismissal from the site, workers deemed incompetent, careless, insubordinate or otherwise objectionable.

.3 Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with the Consultant, whose decision is final.

1.10 CO-ORDINATION

.1 Insure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.11 CONCEALMENT

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise. Pipes and ducts that are exposed to view are to be provided in a condition that can be painted to match the paint colour of adjacent walls and ceilings.

.2 Before installation, inform the Consultant if there is a contradictory situation. Install as directed by the Consultant.

1.12 REMEDIAL WORK

.1 Perform remedial work required to repair or replace the parts or portions of the Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with the materials affected. Perform in a manner to neither damage nor endanger any portion of the Work.

1.13 LOCATION OF FIXTURES

.1 Consider the location of fixtures, outlets, and mechanical and electrical items indicated on the Contract Documents, but not dimensioned, as approximate.

.2 Inform the Consultant of a conflicting installation. Install as directed.

1.14 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corroding hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in the affected specification Section.

.4 Space anchors within their load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

.7 Powder actuated, ram setting or similar techniques will not be permitted without the prior written approval of the Consultant.

1.15 PROTECTION OF WORK IN PROGRESS

.1 Adequately protect work completed or in progress with suitable protective coverings. Work damaged or defaced due to failure in providing such protection shall be removed and replaced, or repaired, as directed by the Consultant, at no increase in Contract Price.

.2 Protect work during periods of suspension, regardless of reason for suspension.

.3 Prevent overloading of any part of the building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Consultant.

1.16 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute work at times directed by local governing authorities, with a minimum of

disturbance to the Work, building occupants, and pedestrian and vehicular traffic.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in a manner approved by the authority having jurisdiction, stake and record location of capped service.

END OF SECTION

EXECUTION

PART 1 – GENERAL

1.1 CUTTING AND PATCHING

.1 Before cutting, drilling or sleeving load-bearing elements, obtain approval of location and method.

.2 Do not endanger work or property by cutting, digging, or similar activities. No trade shall cut or alter the work of another trade who has installed it unless approved by that trade.

.3 Cut and drill with true smooth edge to minimum suitable tolerances.

.4 Fit construction tightly to ducts, pipes and conduit to stop air movement completely. The trade performing work that penetrates a fire, air, vapour, moisture, thermal or acoustic separation element of the building shall pack voids tightly with insulation, rated where required; seal air, vapour and moisture barriers; and caulk joints as may be required to ensure that no air movement through the penetration is possible.

.5 Cutting, drilling and sleeving of work shall be done only by the trade who has installed it. The trade requiring drilling and sleeving shall inform the trade performing the work of the location and other requirements for drilling and sleeving. The Contractor shall directly supervise performance of cutting and patching.

.6 Replace and/or make good damaged work.

.7 Patching or replacement of damaged work shall be done by the subcontractor under whose work it was originally executed, and at the expense of the subcontractor who caused the damage.

.8 General Contractor is responsible for all site locates, prior to excavating and commencement of site works.

.9 General Contractor is responsible for all x-rays and scanning as required to complete both the site related work and the building related work.

1.2 CONCEALMENT

.1 Conceal all pipes, ducts and wiring in finished areas except where indicated otherwise. This includes new work in existing building.

.2 Where furring out is required, use material similar to adjacent surfaces except where indicated otherwise.

.3 All new horizontal runs of ducts, pipes and conduits shall be concealed in ceiling spaces.

.4 All new duct drops and risers shall be concealed in ceiling spaces, bulkheads or furred out duct shafts. All new pipe and conduit drops and risers shall be buried in walls. New devices in walls shall be recessed.

1.3 MECHANICAL AND ELECTRICAL EQUIPMENT

.1 Mechanical and Electrical services must be temporarily capped or terminated to permit renovation in existing areas to proceed.

.2 Cutting of holes up to 100mm in size in the existing structure and surfaces required by the trades shall be by those Subcontractors. Cutting and patching of openings greater than 100mm in size shall be by the Contractor in co-ordination with the trades. PATCHING OF ALL HOLES IN EXPOSED FINISHED SURFACES SHALL BE BY THE CONTRACTOR. Mechanical and Electrical trades shall do their own coring of existing slabs as required.

1.4 GENERAL NOTES

.1 Refer to the Door Hardware Schedule and the Room Finish Schedule, and the general notes below.

.2 Junction of different floor finishes shall occur on centre line of doors.

.3 All masonry and drywall shall be extended to u/s roof deck. Where walls run parallel and under steel roof beams or steel joists, roof structure shall be enclosed both sides with gypsum board to provide sound barrier between rooms. Fill with minimum 100 mm batt insulation.

.4 All exposed concrete floor surfaces to be sealed as specified.

.5 All exposed concrete block corners shall be bullnose block.

.6 Hardware shown on Door Schedule on the drawings refers to code requirements only.

.7 Doors and frames shall be prepared for security alarm devices and overhead barrier-free door operators, where indicated. Security alarms are to be installed by the Owner's Vendor.

.8 All finishes on walls shall be maximum 25 flame spread rating to comply with Class A rating.

CLEANING AND WASTE MANGEMENT

PART 1 – GENERAL

1.1 GENERAL

.1 Conduct cleaning and disposal operations to comply with local ordinances, anti-pollution laws, and recommendations of Construction Safety Association.

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

.3 Prevent accumulation of wastes which create hazardous conditions.

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

.5 Provide instructions designating proper methods and materials to be used in final cleaning of Work.

.6 Do not burn any rubble, waste or packaging, or surplus materials. No dumping of waste, such as oil or paint, into sewers will be permitted.

1.2 MATERIALS

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

1.3 POLLUTION CONTROL

.1 Cover dry materials and rubbish to prevent blowing dust and debris.

.2 Prevent dust nuisance to adjacent properties, existing building and general public by taking appropriate pollution control measures as directed by Consultant.

1.4 FIRES

.1 Fires and burning of rubbish on Site are not permitted.

1.5 CLEANING DURING CONSTRUCTION

.1 Maintain entire site and adjoining municipal and/or private property free from accumulations of waste materials and rubbish. Do not allow rubbish to accumulate in work under construction or on roofs. Clean site daily.

.2 Provide on-site containers for collection of waste materials, and rubbish. Empty containers on a regular basis in conformance with Municipal and Provincial Regulations.

.3 Cleaning operations shall include those areas used for temporary site access or used on a temporary basis to facilitate the Work.

.4 Broom clean and vacuum areas as required for application of finishes. Continue to clean on an “as needed” basis and insure that areas which receive paint, floor tile and other critical finishes are kept dry, dust free, and at acceptable temperatures.

.5 Keep all areas of the Work clean and orderly, free from accumulation of dirt, debris, garbage, oily rags, excess material, or such other trash items. Remove such items from all areas of the Work on a daily basis.

.6 Vacuum and/or broom interior building areas when ready to receive painting and other finishes. Continue cleaning on an “as needed” basis until the building is ready for inspection and take-over.

.7 Schedule cleaning operations so that resulting dust and other contaminants do not affect wet, newly painted surfaces, or newly installed equipment, or devices.

1.6 CLEANING AT COMPLETION OF WORK

.1 In addition to the progressive removal of rubbish from the entire building and Site, and leaving the buildings broom clean, the Contractor shall perform the following work in preparation for Substantial Performance.

.2 Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from all exposed interior and exterior finishes, including glass and other polished surfaces. Clean glass both sides, and replace broken glass. Vacuum inside all cabinets and drawers and leave millwork ready

for use. Remove paint spots and smears from all surfaces, including hardware.

.3 Remove stains, spots, marks and dirt from decorated work, electrical and mechanical fixtures, and the like. Remove protective materials.

.4 Remove all protective film from switchplates and hardware, particularly kick plates. Clean hardware, aluminum, stainless steel and the like.

.5 Clean resilient and sheet flooring and all floor and wall tile, as per manufacturer's instructions.

.6 Clean lighting reflectors, lenses and other lighting surfaces.

.7 Replace heating, ventilation and/or air conditioning filters at Substantial Performance, whether or not the units were operated during construction operations.

.8 Vacuum clean all building interiors affected by construction operations before occupancy.

.9 Broom clean paved surfaces and rake clean other disturbed surfaces in the area of the Work, to remove site debris caused by the Work of this Contract. Inspect for damages and make good.

.10 Clean exterior walkways, driveways and the like. Remove snow from walks and paved areas if necessary, prior to occupancy.

.11 Conduct final inspection of interior and exterior surfaces, and concealed spaces.

.12 Leave premises ready for immediate occupation without further cleaning, all to the Consultant's approval.

END OF SECTION

CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.1 TAKEOVER PROCEDURE

.1 Subject to detailed instructions included in these specifications, conform to OAA/OGCA document 100, Take-Over Procedures, current version.

1.2 OCCUPANCY REQUIREMENTS

.1 Review occupancy with the building inspector well in advance of required occupancy date, and ensure that the requirements are met for occupancy, including all document submissions. Refer also to Section 01 41 00, Regulatory Requirements.

.2 An occupancy permit is required for any project that is not deemed complete prior to the date of occupancy.

.3 Refer to OBC Division C, section 1.3.3, Occupancy of Buildings, for occupancy requirements. The designated building official is required to issue an occupancy permit only under the conditions outlined therein.

.4 In addition to the OBC requirements for occupancy, the spaces must be complete for the purposes of occupancy by the Owner.

.5 The issue of an occupancy permit shall not imply Substantial Performance of the Contract. Determination of Substantial Performance is defined by lien legislation.

1.3 ACTION REQUIRED AT OCCUPANCY

.1 When of the opinion that the Occupancy Requirements have been met, perform an inspection of the work, accompanied by the major subcontractors. Submit an inspection report, confirming that the occupancy requirements have been met, to the Consultant and the Owner.

.2 Arrange for and pay related fee for all necessary inspections required for occupancy such as Fire Department and Building Department.

.3 Confirm with the building inspector that the occupancy requirements of the municipality have been met and submit evidence of such to the Consultant and Owner.

.4 Next, arrange for a review of the Work with the Consultants and Owner. The Consultant will determine whether the Work is Fit for Occupancy.

.5 Request letters confirming General Review from Consultant, and Civil, Landscape, Structural, Mechanical and Electrical Engineers, for submission to Authorities Having Jurisdiction.

.6 Upon receipt of the required documents, confirm that occupancy of the Work is accepted by the Authorities Having Jurisdiction. Submit evidence of the permission for occupancy to the Consultant and Owner.

.7 When partial occupancy of uncompleted project is required by the Owner, co-ordinate the Owner's uses, requirements and access with the construction requirements to complete project.

1.4 ACTION REQUIRED AT SUBSTANTIAL PERFORMANCE

.1 Perform the actions listed below prior to issue of the Certificate of Substantial Performance of the Contract.

.2 Submit the documents and material detailed in section 01 78 00 - Closeout Submittals. Deliver all required submittals to the Consultant for approval PRIOR to Substantial Performance of the Work. Final payment will not be made until all these items have been received and approved.

.3 Prior to applying for a Certificate of Substantial Performance, perform an inspection in accordance with OAA/OGCA Document 100, current version, regarding Contractor's Inspection for Substantial Performance. Submit a copy of the deficiency list to the Consultant.

.4 Ensure all sub-systems ie fire alarm, security, are fully operational prior to Substantial Performance.

.5 When of the opinion that the requirements for Substantial Performance have been met, submit an application for a Certificate of Substantial Performance to the Consultant. The application shall be as outlined for Stage 3 of the OAA/OGCA Take-Over Procedures, most current version.

.6 Expedite and complete deficiencies and defects identified by the Consultant. Final Certificate for Payment will not be issued until all deficiencies are satisfactorily corrected, inspected, and approved by the Consultant, and all documentation has been handed to the Consultant.

.7 Remove all protection erected, and make good all damage to the Work and adjoining Work due to the lack or failure of such protection. In addition, all debris, surplus materials tools equipment shall be removed from the work areas and the site, and the Project shall be left clean and tidy to the full and complete satisfaction of the Consultant and Owner.

.8 Perform final adjustment of Cash Allowance, specified in Section 01 10 00 - General Instructions.

.9 At time of Substantial Performance, instruct the Owner's personnel in operation, adjustment and maintenance of equipment and systems, using operation and maintenance manuals as the basis for instruction.

.10 Prior to final site review, start up and demonstrate operation of all systems to the Owner and the Consultant.

.11 Review cash allowances in relation to contract price, change orders, hold-backs and other contract price adjustments.

.12 Review inspection and testing reports to verify conformance to the intent of the documents.

.13 Review condition of all equipment, which has been used in the course of the Work to ensure turnover at completion in "as new condition" with warranties, dated and certified from time of Substantial Performance of the Contract.

.14 When partial occupancy of uncompleted project is required by the Owner, co-ordinate the Owner's uses, requirements and access with the construction requirements to complete project.

.15 Provide on-going review, inspection, and attendance to building call back, maintenance and repair problems during the warranty periods.

.16 Continue to submit monthly deficiency status reports, as specified in Section 01 32 00 - Construction Progress Documentation.

1.5 TOTAL PERFORMANCE

.1 Upon completion of all items noted on the deficiency list, clean all areas, surfaces, and components affected by corrections and completion of deficient items.

.2 Ensure that all services, equipment, and apparatus are properly tested and adjusted.

.3 Letter of Completion:

.1 Submit a Letter of Completion to the Consultant stating that the Contract is complete, that all deficiencies identified by the Consultant, Subconsultants, Inspectors and Owner have been rectified, and requesting final reviews by Consultant and Subconsultants.

.2 Sign and return deficiency lists, issued by Consultant and Subconsultants, to confirm completion of all deficiencies identified thereon.

.4 Final Site Review:

.1 Consultant will conduct one (1) site review for Total Performance, within ten (10) working days of the request by the Contractor. Should the Contractor fail to provide the Letter of Completion, the Consultants will be under no obligation to perform a site review within the above noted time.

.5 Submit a final request for payment, incorporating all approved changes to the Contract price, and adjustments to the Cash Allowance.

.6 Final Certificate for Payment will not be authorized until all deficiencies are satisfactorily corrected, reviewed and signed off by the Consultant, and required submittals have been completely and accurately provided.

1.6 WARRANTY PERIOD

.1 The Warranty Period on this Project will expire twenty-four (24) months from the date of Substantial Performance of the Work, except for extended warranties as called for throughout the Specifications or equipment not certified by Consultant at time of Substantial Performance.

1.7 UTILITY CHARGES

.1 The Owner will assume responsibility for utility service billing.

.2 Contractor to arrange for reading of meters at completion of Work.

END OF SECTION

CLOSEOUT SUBMITTALS

PART 1 – GENERAL

1.1 SUBMITTALS REQUIRED FOR OCCUPANCY

.1 Refer to Section 01 41 00, Regulatory Requirements for documents required to be submitted to Authorities having Jurisdiction, for occupancy.

1.2 SUBMITTALS REQUIRED AT SUBSTANTIAL PERFORMANCE

.1 Prior to Substantial Performance of the Contract, perform the actions detailed in section 01 77 00 - Closeout Procedures, and submit the following documents and materials:

- .1 Deficiency list prepared by Contractor for all areas of the project.
- .2 Certificates of good standing from the Workplace Safety & Insurance Board for the Contractor and all Subcontractors
- .3 Operations and Maintenance Manuals, including warranties
- .4 One complete set of final approved Shop Drawings (bound separately) indicating corrections and changes made during fabrication and installation, plus one digital copy of the same (on CD).
- .5 Keys and construction cores
- .6 Maintenance materials
- .7 As-Built Documents as specified in Section 01 33 00 - Submittal Procedures
- .8 Electrical panel directories (typed and mounted in panels); refer to electrical specifications.
- .9 Balancing Report for Ventilation System.
- .10 Inspection Certificates required by Provincial, Municipal and other authorities having jurisdiction.

.2 Deliver all required submittals to the Consultant for approval prior to Substantial Performance of the Work. Final payment will not be made until all these items have been received and approved. These submittals include:

1.3 MAINTENANCE MANUALS

.1 At Substantial Performance submit to Consultant one digital copy, of Architectural, Civil, Landscape, Structural, Mechanical, and Electrical Operations Data and Maintenance Manuals made up as follows:

.1 Enclose title sheet, labelled "Operation Data and Maintenance Manual - Architectural", project name, date and list of contents. Enclose similar sheet labelled Mechanical and Electrical in applicable manuals. Include the following information:

.1 name of project
.2 name of Owner
.3 name of Consultant
.4 name of Contractor
.5 date of Substantial Performance.

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

.3 All data related to a section of work or product shall be grouped together, except for shop drawings, unless otherwise requested by the Owner. Confirm method of organization with Owner prior to assembling manuals. Typically, each section shall be organized, as applicable, as follows:

.1 General information; identify section of work, subcontractor(s) responsible
.2 Warranty
.3 Guarantees, Bonds
.4 Schedules (hardware, paint)
.5 Product data sheets
.6 Material safety data sheets (MSDS)
.7 Operating manual
.8 Maintenance instructions
.9 Receipts for maintenance materials, keys, etc.,
.10 Maintenance contracts (applicable to wheelchair lift, planting, sod, etc.)
.11 Inspection and testing reports

.2 Provide one copy of each of the following:

.1 Contractor's final statutory declaration on CCDC form 9A-2001
.2 Major Subcontractor's final statutory declarations on CCDC form 9B-2001
.3 Workers' Compensation and Insurance Board (WSIB) certificate
.4 Certificates of approval of the work by the Building Department (if available)

.3 Provide a digital link and a CD or memory stick containing all construction progress photos submitted; refer to Section 01 32 00 – Construction Progress Documentation. Provide an index with printed images clearly identified with name of project, description of view and date taken. Disks are to be clearly labelled.

.4 Include the following information, plus any additional data required within the specifications.

.1 List of all Subcontractors, major suppliers, and local equipment service representatives, their addresses and telephone numbers.
.2 Date of Substantial Performance (commencement of warranty periods) and termination dates of warranties.
.3 Operating manuals including lubricating, repair and other instructions to keep all mechanical and electrical/electronic equipment in good working order. Reviewed shop drawings of same. Refer to Mechanical and Electrical Specifications for further requirements.
.4 Door and Frame Schedule (as-built); insert in front of Division 08 – Openings section in manuals.
.5 Final hardware schedule, revised to include all changes during construction, including local manufacturer's descriptive and service literature. Include AHC's final inspection report.
.6 Final finish/colour schedule; insert in front of Division 09 - Finishes section in manuals.
.7 Provide paint schedule indicating paint brand and formulas used.
.8 Maintenance instructions for all types of floor finish and other special finishes. Include instructions for cleaning, repairing, refinishing and freshening, and warnings of damaging or dangerous practices where necessary.
.9 Maintenance and service instructions and manufacturer's literature for all special architectural features: i.e. windows, wheelchair lift, adjustable adult change table etc.

.10 Description, operations and maintenance instructions for equipment and systems, including complete list of equipment and parts list.

.11 All warranties, guarantees, bonds, etc., properly completed and signed, which extend beyond the general warranty period, for all work and equipment as specified or as otherwise supplied and installed, from manufacturers and trades. Warranties, guarantees and bonds shall include:

.1 Name and address of project.
.2 Warranty commencement date.
.3 Duration of warranty.
.4 Clear indication of what is being warranted and what remedial action will be taken under warranties.
.5 Signature and seal of Contractor.

.5 List additional material used in project showing name of manufacturer and source of supply.

.6 Neatly type lists and notes. Use clear drawings, diagrams or manufacturer's literature.

.7 Supply copies of inspection and testing reports, inspection and acceptance certificates, balancing reports, all bound in all three copies of manuals.

.8 Supply Operations and Maintenance manuals, and other required documentation as specified for Mechanical and Electrical work.

.9 Manuals must bear seal and signature of Contractor.

.10 Maintenance Manuals must be delivered, complete and in one package, to Consultant. The final Certificate for payment will not be issued until ALL documentation has been received, reviewed, and approved, by Consultant.

.11 Due to the high value to the Owner of these manuals, for the purpose of project administration and calculation of Substantial Performance, the manuals will be assigned a value of $4,000.00 (architectural / civil / landscape / structural / mechanical / electrical).

1.4 SHOP DRAWING MANUAL

.1 Provide one complete set of final approved Shop Drawings, bound separately. Shop drawings shall be the drawings reviewed and stamped by the consultants. Mark-up shop drawings to indicate corrections and changes made during fabrication and installation.

.2 Provide a complete set of the same documents in digital format also.

.3 Refer to the Index to Shop Drawing Manual included in the Appendix to this Project Manual.

1.5 MAINTENANCE MATERIALS

.1 Where supply of maintenance materials is specified, deliver items as follows:

.1 Materials in unbroken cartons or, if not supplied in cartons, they shall be strongly packaged.
.2 Clearly mark as to content.
.3 If applicable give colour, room number of area where material used.
.4 Obtain signed receipt from the Owner's designated representative and store in an assigned, lockable room.

.2 Copies of signed receipts for maintenance materials are to be included in the maintenance manuals.

.3 Replacement materials are for the sole use of the Owner and must not be used by Contractor to replace deficient work.

1.6 AS-BUILT DRAWINGS AND RECORD DOCUMENTS

.1 Provide As-Built Drawings, as specified in Section 01 33 00 – Submittal Procedures and Record Documents (electronic files).

.2 Prior to the date of Substantial Performance, request updated pdf drawings from the Consultant. Transfer all "as-built" markups from the on-site drawings to these updated drawings and return them to the Consultant for preparation of architectural Record Drawings.

.3 Record documents shall consist of the original documents altered to reflect all changes and information indicated on as-built documents.

.4 Refer to Mechanical and Electrical Specification Divisions for specific requirements regarding preparation and submission of final mechanical and electrical Record Drawings.

1.7 REVIEW OF MANUALS BY CONSULTANT

.1 Submit all manuals for review by the Consultant. Mechanical and electrical manuals may be forwarded directly to the consulting engineers for review.

.2 The Contractor is responsible for confirming the completion of the manuals prior to forwarding to the Consultant for review. If any items are outstanding, provide tabs at the appropriate locations and indicate the nature of the outstanding documents to be inserted.

.3 Do not submit partially complete manuals to the Consultant; only documents which cannot be provided at the time of Substantial Performance are permitted to be flagged for later insertion. The Consultant will review manuals once for completion and will then review only one resubmission. If additional reviews are required, the Contractor will be invoiced for the Consultant's time at a rate of $280/hour.

END OF SECTION

FIRE RATING AND ASSEMBLIES

PART 1 – GENERAL

1.1 GENERAL

.1 Test methods used to determine fire hazard classification and fire endurance rating shall be as required by Ontario Building Code.

.2 Upon request, furnish the Consultant with evidence of compliance to fire protection requirements as noted in documents or specified codes, etc.

.3 Materials and components used to construct fire rated assemblies and materials requiring fire hazard classification shall be listed and labelled, or otherwise approved, by fire rating authority. Labelled materials and their packaging shall bear fire rating authorities label showing product classification.

.4 Fire and time rated door assemblies shall include doors, frame, anchors, and hardware and shall bear label of fire rating authority showing opening classification and rating.

.5 Construct fire rated assemblies in accordance with applicable fire test report information issued by fire rating authority. Deviation from fire test report will not be allowed.

.6 Construct fire rated assemblies as continuous, uninterrupted elements except for permitted openings. Extend fire rated walls and partitions from floor to underside of structural deck above.

.7 Materials which have a fire hazard classification shall be applied or installed in accordance with fire rating authority's printed instructions.

.8 Provide firestopping as specified in Section 07 84 00.

.1 Firestopping shall be a tested system consisting of non-combustible materials, smoke sealant, and means of support, used to fill gaps between fire-rated separations or between fire separations and other assemblies, and used around items that penetrate a fire separation.

.2 Fill and patch voids and gaps around openings and penetrations in and at perimeter of assemblies so as to maintain continuity and to

produce a fire resistant, smoke tight seal, acceptable to jurisdictional authorities.

.9 Provide fire blocks to compartmentalize concealed spaces as required by the OBC.

.1 Fire block means a material, component or system that restricts the spread of fire within a concealed space or from a concealed space to an adjacent space.
.2 Fire blocks are also referred to as fire stops in the OBC.

.10 The Contractor shall ensure that all fire safety features called for in the Contract Documents are supplied and installed to meet fire safety standards established by those authorities having jurisdiction. The Contractor shall ensure that the work of Subcontractors is properly coordinated to achieve the intent of this Specification.

.11 Nothing contained in the Drawings or Specifications shall be construed as to be in conflict with any law, by-law, or regulations of municipal, provincial, or other authorities having jurisdiction. Work shall be performed in conformity with all such laws, by-laws, and regulations.

END OF SECTION

DEMOLITION

PART 1 – GENERAL

1.1 RELATED WORK

.1	Temporary Barriers and Controls	Section 01 56 00
.2	Execution	Section 01 73 00

1.2 REFERENCES

.1 Conform to all laws, By-Laws and regulations of the authorities having jurisdiction and, in particular, the Ontario Occupational Health and Safety Act; The Environmental Protection Act; The Ontario Building Code, Ontario Regulation 332/12; The Ontario Fire Code; The National Building Code, 2010; and the National Fire Code.

.2 CSA S350-M, code of practice for safety in demolition of structures.

.3 Ontario regulations under the Environmental Protection Act:

- .1 O.Reg. 102/94 Waste Audits and Waste Reduction Work Plans
- .2 O.Reg. 103/94 Industrial, Commercial and Institutional Source Separation Programs
- .3 O.Reg. 347/90 General - Waste Management; refer to "Definitions"

.4 Ontario regulations under the Occupational Health and Safety Act:

- .1 O.Reg. 213/91 Construction Projects
- .2 All regulations regarding “Designated Substances”
- .3 O.Reg. 860/90 Workplace Hazardous Materials Information System (WHMIS)

.5 Conform to “Guidelines for Maintaining Fire Safety During Construction in Existing Buildings”, provided by the Office of the Ontario Fire Marshal.

.6 RFCI Recommended Work Practices for Removal of Resilient Floor Coverings

1.3 EXAMINATION OF EXISTING SITE AND STRUCTURE

.1 Examine the existing site and building before tendering to be familiar with the detailed extent of demolition, dismantling, relocation and reassembly required.

.2 No allowance will be made for failure to obtain complete information prior to close of tenders.

1.4 SUMMARY OF WORK

.1 Carry out all alteration and demolition work required to accommodate new work indicated on drawings. Make good any damage caused by alterations required.

.2 Remove HVAC equipment, electrical fixtures and all other items so noted on drawings as required for the addition, unless otherwise noted.

.3 Unless noted otherwise, building materials resulting from demolition under this contract shall become the property of the Contractor, and shall be removed by the Contractor.

.4 Supply and install temporary dust proof membranes at junctions between completed work and ongoing construction demolition work, at all adjoining doorways and wall openings as required to ensure that dust and debris does not penetrate into completed work areas. Dust proof membranes shall be minimum thickness of 10 MIL polyethene sheet. Sheets are to be overlapped a minimum of 300mm and taped at complete perimeter of openings and provided at a height from top of finished floor to underside of ceiling and or exposed roof deck. At doorways where access is required, provide double layer of membranes with zippers to accommodate access.

.5 Plywood construction hoarding is to be provided at demolished openings in the building exterior and to separate the construction phasing areas, as required to maintain the safety of the existing building materials and occupants. Hoarding is to be constructed as follows;

POLYETHYLENE SHEET TAPED AND SEALED AT COMPLETE PERIMETER AND TO EXISTING BUILDING WALLS, FLOORS AND CEILING ASSEMBLY ABOVE. LAP SHEET UNDERNEATH STUD FRAMING AT EXISTING CONCRETE FLOOR SLAB AND LAP SHEET ON TOP OF STUD FRAMING AT UNDERSIDE OF EXISTING CONCRETE FLOOR ABOVE.

- 2 LAYERS OF TYPE X 16mm GYPSUM BOARD, UNFINISHED.

- 152mm STEEL STUD FRAMING AT 600mm O.C.

- BATT INSULATION FULL THICKNESS OF STUDS

- 13mm PLYWOOD PANELS ON CONSTRUCTION SIDE.

TOTAL PARTITION WIDTH = 197mm WITH STEEL STUD FRAMING

NOTE: EXTEND PARTITION TO UNDERSIDE OF EXISTING ROOF ASSEMBLY ABOVE. PARTITION TO BE CONSTRUCTED TIGHT TO EXISTING STRUCTURE, MECHANICAL DUCT WORK, PIPING AND ACCESSORIES AND ELECTRICAL FIXTURES AND ACCESSORIES. SEAL ALL GAPS TO PREVENT THE PENETRATION OF DUST. PROVIDE HOLLOW METAL FRAME AND DOOR IN THE CONSTRUCTION HOARDING AS REQUIRED TO ACCESS THE CONSTRUCTION AREA. WHEN THE HOARDING IS REMOVED UPON COMPLETION OF THE WORK, PATCH, REPAIR AND MAKE GOOD ALL EXISTING AND/OR NEW CEILING, WALL AND FLOOR FINISHES.

.6 Plywood construction hoarding shall be erected outside of building operating hours and shall remain in place until the work is fully commissioned and accepted by the Owner. Membranes and hoarding shall be removed, reconfigured and relocated as required to maintain the security of the site and the existing building. Provide a hollow metal door and frame within construction hoarding, where access is required.

1.5 SCHEDULE OF WORK

.1 The building will be occupied during construction. Safety and required exiting from the existing site and the building must be maintained at all times.

.2 Any work that is required to be completed in the existing building (ie. connection of services, new work to accommodate the water and gas connections, electrical connections etc.), must be coordinated and scheduled with the Owner.

1.6 PROTECTION

.1 Protect adjacent properties against damage which might occur from falling debris or other cause. Make good damage to adjacent public or private properties resulting from Work of this Contract.

.2 Protect existing building from damage and contamination during demolition activities. All openings must be made weatherproof. Provide temporary barriers, dust control measures, security controls, supports, and such additional protection as may be required by specific demolition work.

.3 Prevent movement, settlement, and damage to existing building to remain, including services, paving, landscaped areas to remain, and adjacent structures. Provide temporary supports, including shoring and bracing, as required. All shoring must be designed by a professional engineer licensed in the Province of Ontario. All shoring design, shop drawings and work are the responsibility of the Contractor.

.4 Employ licensed rodent and vermin exterminators to destroy all discovered vermin and rodents.

.5 Remove contaminated and dangerous material from the site and dispose of safely and legally. Meet all M.O.E. requirements.

.6 Take precautions to guard against movement or settlement of adjacent land, existing building, and remaining services and utilities. Provide and place bracing or other means of support.

.7 Take precaution against contamination of air and adjacent properties.

1.7 MAINTAINING FIRE SAFETY IN EXISTING BUILDING

.1 Maintain all required exiting for safe operations within the existing building. Where an exit is closed off due to construction activities, provide alternate exit acceptable to both the Consultant and to Authorities Having Jurisdiction. Any temporary exits must be clearly identified with appropriate signage.

.2 Maintain access roadways for fire department vehicles, acceptable to the fire department. Access must be approved prior to commencement of construction activities.

.3 Store all combustible materials in accordance with the Fire Code and the Occupational Health and Safety Act. Do not store combustible materials within the existing building or against the building. All combustibles shall be stored in a manner which minimizes risks to building and occupants.

.4 Maintain dust proof membranes and construction hoarding partitions and protection at openings, as specified above, with fire separation ratings as required by Authorities Having Jurisdiction.

.5 Maintain fire alarm system in operating condition in existing building. Notify the fire department and Owner of any temporary shutdowns of service and provide alternative measures during such periods of time.

.6 Coordinate with Owner and Authorities Having Jurisdiction for all changes to fire emergency procedures as may be required during construction.

1.8 SERVICES

.1 Seal and cap mechanical and electrical services in order to facilitate removals indicated on drawings. Mark location and type of service of all capped services at the site. Submit record drawing showing locations and dimensions of all capped services.

PART 2 – PRODUCTS

2.1 Not Used

PART 3 – EXECUTION

3.1 GENERAL

.1 Remove and dispose of any remaining furniture, fixtures, fittings and equipment remaining in the work area, which are not shown to be relocated or reused in the completed project.

.2 Protect all items indicated to be removed and later reinstalled. These items shall be removed prior to demolition work wherever possible. It will be the responsibility of the Contractor to repair or replace any such items damaged by careless handling.

.3 Refer also to demolition and alteration notes on drawings.

3.2 DEMOLITION

.1 Demolish any concrete and masonry walls in small sections. Do not permit masonry to fall in mass.

.2 Remove and carefully lower wood or steel framing as applicable.

.3 Remove interior masonry walls, partitions, ceilings and bulkheads as indicated on drawings, and as required to accommodate new construction.

.4 Cut concrete floor slab as required to accommodate installation of new services.

.5 Remove glass, metals and combustible materials from walls being demolished.

.6 Remove all items not indicated or noted to remain or be re-used.

.7 Remove mechanical and electrical equipment and piping indicated to abandoned. Refer to mechanical and electrical demolition drawings.

.8 Any items noted to be re-used or re-located are to be removed carefully, cleaned, packaged appropriately, and handed over to Contractor.

.9 Upon discovery of mold or moldy materials remove and dispose of these separately.

.10 If any materials suspected to contain asbestos and other designated substances are encountered, do not disturb these materials. Inform the Consultant of the location and extent of suspect material. Do not resume work in this area until it has been cleared by an Abatement Consultant.

.11 At the end of each day's work, leave work in a safe condition so that no part of the remaining structure is in danger of collapse.

.12 Do not burn any refuse or debris at the site.

3.3 NEW OPENINGS IN EXISTING WALLS

.1 Where new openings are shown to be cut into existing walls, break open the wall to the sizes required, provide new lintels over the opening, and patch all adjacent materials.

3.4 REMOVAL OF EXISTING FLOOR FINISHES

.1 Existing floor finishes shall be removed and old adhesive removed from the existing concrete slab by scraping or solvent, in accordance with Health & Safety requirements. In addition, grind existing concrete floors as required to remove old adhesive and mastics.

.2 Existing concrete floors shall be prepared according to manufacturer's instructions for new applied finishes where new flooring finishes are indicated on the drawings.

3.5 REMOVAL OF CEILINGS

.1 Remove existing ceilings and bulkheads within the existing building, where new ceilings and bulkheads are indicated, and as shown on the drawings.

.2 Temporarily remove, protect and store existing ceilings and bulkheads, removed from inside the existing building, as required to accommodate the installation of mechanical and electrical services. Reinstall existing ceiling assemblies and provide new bulkheads to match existing bulkheads, after all connection work is completed.

.3 Ceilings to be demolished shall be removed complete with all finishes, framing, suspension system, trim, fasteners, and accessories.

3.6 MECHANICAL AND ELECTRICAL WORK

.1 Mechanical and Electrical services must be temporarily capped or terminated to permit renovation in existing areas to proceed and to accommodate connections between existing building and new building addition.

.2 Refer to mechanical and electrical drawings for the extent of removals, relocations, and alterations required.

.3 Ceiling mounted mechanical and electrical equipment which is to be removed and reused is to be carefully removed and stored as specified above.

.4 Cutting of holes up to 100mm in size in the existing structure and surfaces required by the mechanical and electrical trades shall be by those

Subcontractors. Cutting and patching of openings greater than 100mm in size shall be by the Contractor in co-ordination with those trades. PATCHING OF ALL HOLES IN EXPOSED FINISHED SURFACES SHALL BE BY THE CONTRACTOR. Mechanical and Electrical trades shall do their own coring of existing slabs as required.

3.7 COMPLETION OF WORK

.1 Remove all surplus materials, equipment and rubbish from the site.

.2 Leave site in condition to meet approval of the Consultant.

.3 On completion of demolition work, thoroughly clean all existing surfaces to remain, including ceiling space. No debris or dirt shall remain to be enclosed by new construction.

END OF SECTION

CONCRETE FORMWORK
PART 1 - GENERAL

1.1 WORK INCLUDED

.1 All formwork for cast-in-place concrete including falsework.

.2 Reshoring of concrete slabs and beams.

.3 Shoring existing construction to carry concrete construction loads.

.4 Pullout Testing.

.5 Waterstops.

.6 Dovetail anchor slots.

1.2 RELATED WORK SPECIFIED ELSEWHERE

.1 Concrete Reinforcement, Section 03 20 00

.2 Cast-in-Place Concrete, Section 03 30 00

.3 Precast Structural Concrete, Section 03 40 10

1.3 REFERENCES

.1 CSA-A23.1, Concrete Materials and Methods of Concrete Construction.

.2 CSA-A23.2, Methods of Test and Standard Practices for Concrete.

.3 CSA O121, Douglas Fir Plywood.

.4 CAN/CSA-O141, Softwood Lumber.

.5 CSA S269.1, Falsework for Construction Purposes.

.6 CAN/CSA-S269.3, Concrete Formwork.

.7 ASTM C900, Standard Test Method for Pullout Strength of Hardened Concrete.

.8 ASTM D412-98a, Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.

.9 ASTM D624-00e1, Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.

.10 ASTM D746, Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 30 00 - Submittals.

.2 Submit to the Consultant for review before the start of Work, 4 white prints of shop drawings. Leave room on drawings for the stamps of the Consultant and the Structural Engineer. Check and sign before submission. Only 2 copies will be returned to General Contractor.

.3 For multi-storey construction, ensure that sufficient reshoring is provided to prevent overloading of the structure while constructing the work above.

.4 Provide seal and signature of qualified professional engineer registered in Ontario on each shop drawing.

.5 Structural design of formwork, falsework and reshoring will not be reviewed by the Consultant.

1.5 TOLERANCES

.1 Conform to CSA A23.1 unless more stringent tolerances are specified for interfacing materials, in which case the more stringent tolerances apply.

PART 2 - MATERIAL

2.1 MATERIALS

.1 Falsework materials: to CSA S269.1.

.2 Formwork materials: to CAN/CSA S269.3 and as follows
- .1 For concrete without special architectural features, use plywood and wood formwork materials to CSA O121 and CAN/CSA O141.
- .2 For architectural concrete use high density overlay plywood to CSA O121. Not required if concrete is to be sandblasted.

.3 Circular forms for architectural concrete and no spiral pattern:
.1 Redline Poli-Permaform with poli-liner by Perma Tubes Ltd.
.2 Burke Smooth Tube with PVC liner by Aluma International
.4 Circular forms when not architectural concrete: spirally wound laminated fiber forms internally treated with release material.
.5 Square fiber forms:
.1 Sonotube Square Fiber Forms by Sonoco Ltd. with square fiberboard insert locked with polystyrene inside round form.

.3 Form ties:
.1 For concrete not designated architectural, use removable or snap ties, fixed or adjustable length, free of devices leaving holes larger than 25mm dia. in concrete surface.

.2 For architectural concrete, use galvanized ties complete with temporary plastic cones and permanent light grey concrete plugs recessed 6mm.

.3 Form ties to be metal designed to act as ties and spreaders and having a minimum working strength of 13 kN (3000 pounds).

.4 Snap ties to snap cleanly at least 25mm from concrete surface without damage to the concrete.

.5 Cone ties to be internal disconnecting types that snap cleanly at least 38mm from concrete surface without damage to the concrete.

.4 Form liner: High density overlay plywood to CSA O121 or other special materials to achieve the required concrete finish.

.5 Form release agent: Chemically active release agents containing compounds that react with free lime in concrete resulting in water insoluble soaps.

.6 Form stripping oil: Colourless mineral oil, free of kerosene, with viscosity between 15 to 24mm²/s (70 and 110 s Saybolt Universal) at 40°C, flashpoint minimum 150°C, open cup.

.7 Grooves, reglets and chamfers: White pine selected for straightness and accurately dressed to size.

.8 Void Form: Cellular cardboard with minimum compressive strength of 62 kPa (9 psi) designed to carry weight of wet concrete and loads associated

with placing concrete and also designed to disintegrate and create an air space below the fully hardened concrete.

2.2 ACCESSORIES

.1 PVC Waterstops:
- .1 CPD PVC Waterstop by CPD
- .2 Sealtight PVC Waterstop by W.R. Meadows of Canada
  Use 100mm wide in construction joints and 225mm wide with 31mm O.D. centre bulb in expansion joints.

.2 Bentonite Waterstops:
- .1 Waterstop RX 101 by CETCO (distributor: DRE Industries)

.3 Dovetail anchor slots: minimum 0.6 mm thick galvanized steel with insulation filled slots.

.4 Weep hole tubes: plastic.

PART 3 - EXECUTION

3.1 CONSTRUCTION REVIEW

.1 Review of construction by Consultant is to ascertain general conformity with contract documents. It does not relieve the Contractor of his contractual responsibilities. The review is based on representative samples of the work and does not relieve the Contractor from carrying out his own quality control and making the work in conformity with the drawings and specifications.

.2 Construction reviews are undertaken by the Consultant and the Inspection and Testing Agency so that the Owner may be informed in writing as to the quality of the Contractor's performance and for the protection of the Owner. They will be carried out by examination of representative samples of the Work.

.3 The Contractor will receive copies of the construction review reports and the results of material tests. He will thereby be informed of any defects or deficiencies found.

.4 Bring to the attention of the Consultant, any defects or deficiencies in the Work, which may occur during construction together with a proposal for

remedy. The Consultant will decide what corrective action may be taken and will issue the necessary instructions.

3.2 FABRICATION AND ERECTION

.1 Conform to CSA A23.1.

.2 Fabricate and erect falsework in accordance with CSA S269.1. Do not place falsework and reshores on frozen ground.

.3 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within required tolerances.

.4 Make formwork tight and flush faced to prevent the leakage of mortar and the creation of unspecified fins or panel outlines.

.5 Form sides of footings unless otherwise noted on the Structural Drawings.

.6 See drawings for any camber required in hardened concrete. Measure cambers relative to member supports.

.7 Obtain Consultant's approval for formed openings not indicated on Structural Drawings.

.8 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.9 Clean forms before placing concrete.

.10 Provide water stops and keys around temporary openings in basement and retaining walls for shoring rakers or similar purposes.

.11 Use internal form ties.

.12 Do not permit loads from formwork to be transmitted to adjacent existing structure.

.13 Apply a form coating and release agent uniformly to the contact surface of formwork panels before reuse.

.14 Construction joints:

.1 Provide construction joints where specified or shown on the drawings. Locate and make other joints so as not to impair the required strength of the structure. Joints are subject to the review of the Consultant.

.2 Locate construction joints near third of spans of slabs, beams and girders unless a beam intersects a girder at this point. In that case offset the girder joint twice the beam width and provide additional shear reinforcement to the acceptance of the Consultant.

.3 Slabs on steel deck: Locate construction joints in slabs at centre of supports unless there are composite beams.

.4 Walls: Provide vertical construction joints in walls at 30m (100 feet) maximum. Provide vertical control joints in walls at 9m (30 feet) maximum.

.5 Outside walls: Provide vertical keyed expansion joints in walls at 14.6m (48 feet) maximum. Provide vertical control joints in walls at 4.8m (16 feet) maximum**.**

.6 Slabs: Provide construction joints in slabs at 30m (100 feet) maximum in both directions.

.15 PVC Waterstops:

.1 Install waterstops in all expansion, construction and control joints in exterior walls, basement walls, retaining walls, slabs supporting earth, and other locations shown. Locate construction joints with waterstops at least 300mm away from corners and wall intersections.

.2 Heat splice all sections of waterstops for continuity over the full length of runs. Use prefabricated splice sections where two runs intersect.

.3 Securely wire waterstops to reinforcing bars at 1m (3 feet) maximum centres to keep them in alignment when concrete is placed.

.16 Bentonite Waterstops:

.1 Install bentonite waterstops in all construction joints in exterior walls, basement walls, retaining walls, slabs supporting earth, and other locations shown. Use PVC waterstops at expansion joints.

.2 Locate bentonite waterstops 75 mm from outside face of concrete to avoid spalling of concrete due to swelling pressure of bentonite.

.3 Butt strips together. Do not overlap.

.4 Fasten to concrete at 600 mm maximum.

.17 Void form: Conform to recommendations of manufacturer. Place on sand leveling bed. Protect from moisture until concrete is about to be placed. Protect from excessive construction loads. If void form collapses during construction, remove and replace affected area.

.18 Dovetail anchor slots: Provide vertical dovetail anchor slots at 600 mm on centre where masonry covers face of concrete. Provide vertical dovetail slots at centre of masonry wythe where masonry abuts concrete.

3.3 REMOVAL AND RESHORING

.19 Conform to CSA A23.1.

.20 Survey tops of slabs and submit survey plan to Consultant before removal of supporting falsework. Survey slabs at supports, at midspans between supports and at centres of bays.

.21 Remove falsework supporting beams and slabs only after concrete has reached at least 75% of its specified 28 day strength. For beams and slabs exceeding 6 m span, reshore at least until concrete has reached its 28 day strength.

.22 Construction gaps: Do not remove falsework supporting beams and slabs adjacent to construction gaps until the gaps are filled and concrete in gaps has reached at least 75% of its specified 28 day strength.

.23 Use pullout tests to determine in-situ strength of concrete prior to removal of falsework. Retain a testing company to supply, locate and test the inserts in accordance with ASTM C900. See CSA A23.2 Appendix A.

.24 For multi-storey construction, reshore beams and slabs to prevent overloading of the structure while constructing the work above.

3.4 FIELD QUALITY CONTROL

.25 Obtain field review of falsework and reshoring by a professional engineer registered in Ontario prior to each pour. The Consultant will not field review the formwork, falsework or reshoring

3.5 PITS, CURBS, BASES

.26 Construct all concrete sumps, pits, trenches, curbs and machinery bases forming part of floor construction that are required within the building by other trades.

3.6 MECHANICAL AND ELECTRICAL WORK

.27 Construct all concrete underground electrical duct banks, underground water service thrust blocks and supports for underground piping in unstable fill. Also construct all concrete pads for pipes passing through foundation

walls, manholes and catch basins. See mechanical and electrical drawings and specifications for details and extent of work**.**

END OF SECTION

CONCRETE AND MASONRY REINFORCEMENT
PART 1 - GENERAL

1.1 WORK INCLUDED

.1 All reinforcement for cast-in-place concrete.
.2 Supply of reinforcing bars for masonry.

1.2 RELATED WORK

.1 Concrete Formwork, Section 03 10 00.
.2 Cast in Place Concrete, Section 03 30 00.
.3 Precast Structural Concrete, Section 03 41 00.
.4 Masonry, Division 4.

1.3 REFERENCES

.1 Reinforcing Steel Manual of Standard Practice published by the Reinforcing Steel Institute of Canada.
.2 ACI SP-66, ACI Detailing Manual published by the American Concrete Institute.
.3 CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
.4 CSA-A23.3, Design of Concrete Structures.
.5 ASTM A82, Standard Specification for Steel Wire, Plain, for concrete reinforcement.
.6 ASTM A185, Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
.7 CSA G30.18, Billet-Steel Bars for Concrete Reinforcement.
.8 CAN/CSA G40.21, Structural Quality Steels.
.9 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.
.10 ASTM D3963/D3963M, Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars.

1.4 SOURCE QUALITY CONTROL

.1 Upon request, provide the Consultant with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis.
.2 Upon request, inform the Consultant of proposed source of material to be supplied.
.3 Upon request, provide the Consultant with a copy of plant certificate by the Concrete Reinforcing Steel Institute for epoxy coating of reinforcement.

.4 Upon request, provide the Consultant with a copy of manufacturer's instructions for patching factory applied epoxy coating.

.5 Use welding firm certified by the Canadian Welding Bureau under the requirements of CSA W186.

1.5 SHOP DRAWINGS

.1 Submit shop drawings including placing of reinforcement in accordance with Section 01 33 00 - Submittals. This applies to all reinforcement including reinforcing bars for masonry to be installed by the Masonry Trade.

.2 Submit to the Consultant for review before the start of Work, 4 white prints of shop drawings. Leave room on drawings for the stamps of the Consultant and the Structural Engineer. Check and sign before submission. Only 2 copies will be returned to General Contractor.

.3 Allow a minimum of 10 working days for review of each submission of shop drawings in the Structural Engineer's office. Shop drawings received after noon will be date-stamped as received the following working day.

.4 If required, CAD diskettes of the Structural Drawings are available "as-is", and at cost, for use in the preparation of shop drawings provided that the title blocks are removed and provided that the Owner and the Owner's Consultants are not held responsible for any errors or omissions on the drawings. These CAD drawings are not to be scaled.

.5 Submit plans, elevations, sections, and bar lists necessary to show reinforcing and to facilitate review and placing. Show location of construction joints and detail reinforcement at joints. Dimension strips for flat slabs and flat plates. Draw elevations of walls including reinforced masonry walls. Show concrete cover on the diagrams. Draw to scale not smaller than 1:50.

.6 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacings, locations of reinforcement and splices with identifying code marks to permit correct placement without reference to Structural Drawings.

.7 Conform to CSA A23.1 and the Reinforcing Steel Manual of Standard Practice, unless the Contract Documents contain a more stringent requirement, in which case the latter shall govern. Provide accessories as required by the Standard. Conform to ACI, SP-66 Detailing Manual whenever a detail condition is not covered by any of the above, but is covered by the ACI Manual.

.8 Design and detail lap lengths and bar development lengths to CSA-A23.3, unless otherwise indicated. Provide standard hooks at ends of hooked bars.

.9 Do not release for fabrication reinforcing bars whose length may be affected by field conditions, such as the final elevation of footings, until the governing field dimensions have been ascertained.

.10 Review of shop drawings by the Consultant is on a sampling basis for general conformity with contract documents. It is not a detailed check and must not be construed as relieving the Contractor of responsibility for making the work accurate and in conformity with the Contract Documents.

.11 Design for which the Contractor is responsible under the contract will not be reviewed. Work done prior to the receipt of the reviewed shop drawings will be at the risk of the Contractor. Review comments are not authorization for changes to the contract price.

.12 After review, drawings will be returned to the Contractor stamped to show one of the following:

.1		Reviewed	- Released for fabrication.
.2		Noted	- Released for fabrication after revisions noted are made. Submit revised drawing for Consultant's records.
.3	Resubmit	-	Correct and resubmit for review.

Conform to the requirements of each authority that has reviewed the drawings.

.13 Keep on site at all times a set of reviewed shop drawings and use only these drawings and the Structural Drawings to place reinforcing steel. Neatly mark on the Structural Drawings changes issued during the course of construction.

1.6 TOLERANCES

.1 Conform to CSA A23.1.

.2 Cover to be not less than required for fire rating.

1.7 SUBSTITUTES

.1 Substitute different size bars only if permitted in writing by the Consultant.

1.8 ALLOWANCE

.1 Include an allowance of five tonnes of additional reinforcing bars in the Contract. Allowance to include all costs including supply, detailing,

fabricating and placement of rebars. Provide detailed records of use. Provide credit for unused portion based on unit prices.

PART 2 - MATERIALS

2.1 MATERIALS

.1 Reinforcing steel: billet steel, grade 400 MPa, deformed bars to CSA-G30.18, unless otherwise indicated.

.2 Weldable reinforcing steel: weldable steel, grade 400MPa, deformed bars to CSA G30.18. Required only where welding is indicated.

.3 Cold-drawn annealed steel wire ties: to CSA G30.3.

.4 Welded wire fabric: to CSA G30.5. Provide in flat sheets only.

.5 Epoxy coated reinforcement: Apply fusion bonded epoxy coating conforming to the requirements of ASTM D3963/D3963M. Provide colour which contrasts sharply with reinforcing steel and rust colours. Brown is not acceptable. All bars must be supplied by plants certified by the Concrete Reinforcing Steel Institute for epoxy coated steel. Certified plants include:

.1 Harris Rebar - Stoney Creek, Ontario

.2 Teme Rebar Concepts - Fruitland, Ontario

Provide patching material for areas where the epoxy coated is damaged or omitted in accordance with the coating manufacturer's written instructions using material supplied by the manufacturer.

.6 Bar supports and side form spacers: to CSA-A23.1. For exposed concrete surfaces and for floor and roof slabs with directly applied ceiling finish: use either plastic bar supports or plastic tipped bar supports for at least the bottom 25mm; use plastic side form spacers; and use plastic with colour to match concrete. For epoxy coated reinforcement, use plastic bar supports, epoxy coated support bars and plastic coated tie wires.

.7 Epoxy coating of existing reinforcement: Amerlock 400 High-Solids Epoxy by Amercoat Canada Inc. or an equivalent material acceptable to the Consultant. Provide colour which contrasts sharply with steel and rust colours.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA-A23.1, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Obtain Consultant's approval for locations of reinforcement splices other than shown on placing drawings.

.3 Where indicated, weld reinforcement in accordance with CSA-W186. Use weldable reinforcing steel.

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar lists.

PART 3 - EXECUTION

3.1 PLACING REINFORCEMENT

.1 Handle epoxy coated bars in accordance with CSA S413.
.2 Place reinforcing steel in accordance with CSA-A23.1.
.3 Concrete cover to be not less than required for fire rating.
.4 Use only reviewed shop drawings and the Structural Drawings for placing of reinforcement. Report discrepancies to the Consultant before proceeding.
.5 Before placing, remove all loose scale, dirt, oil or other coatings, which would reduce bond.
.6 Turn the ends of tie wire towards the interior of the concrete.
.7 Use bar supports for beams and slabs. Use precast concrete chairs where supports rest on the ground. Where welded wire fabric is used in slabs-on-grade, place precast concrete chairs at 600 mm on centre each way. Use side form spacers for walls and columns.
.8 No splicing of reinforcement is permitted other than shown on the Structural Drawings.
.9 Do not cut reinforcement without written approval of Consultant.
.10 Ensure concrete cover to reinforcement is maintained during concrete pour.

3.2 FIELD BENDING

.1 Do not field bend reinforcement except where indicated or authorized by the Consultant. Do not field bend epoxy coated reinforcement.
.2 When field bending is authorized, bend without heat, applying a slow and steady pressure. Replace bars, which develop cracks or splits.

3.3 FIELD WELDING

.1 Do not field weld reinforcement except where indicated or authorized by the Consultant. Do not weld epoxy coated reinforcement.
.2 Conform to CSA A23.1 and CSA W186.

3.4 PATCHING FACTORY APPLIED EPOXY COATING

.1 If factory applied epoxy coating is damaged or omitted, patch in accordance with coating manufacturer's written instructions using material supplied by manufacturer.

3.5 REVIEW OF CONSTRUCTION

.1 Provide the Consultant with a minimum of 24 hrs notice of intended concrete pours to allow review of reinforcement.

.2 Review of construction by Consultant is to ascertain general conformity with contract documents. It does not relieve the Contractor of his contractual responsibilities. The review is based on representative samples of the work and does not relieve the Contractor from carrying out his own quality control and making the work in conformity with the drawings and specifications.

.3 Reviews are undertaken so that the Owner may be informed in writing as to the quality of the Contractor's performance and for the protection of the Owner.

.4 The Contractor will receive copies of the construction review reports and the results of material tests. He will thereby be informed of any defects or deficiencies found.

.5 Bring to the attention of the Consultant, any defects or deficiencies in the Work, which may occur during construction together with a proposal for remedy. The Consultant will decide what corrective action may be taken and will issue the necessary instructions.

3.6 REINFORCED MASONRY

.1 Supply reinforcing bars required for the construction of masonry lintels, beams, walls, columns and piers. Provide shop drawings. Note that Structural Drawings do not show all openings. Refer to lintel notes on structural drawings.

3.7 PITS, CURBS, BASES

.1 Construct all concrete sumps, pits, trenches, curbs and machinery bases forming part of floor construction that are required within the building by other trades.

.2 Unless otherwise shown on drawings, reinforce curbs with 10M @ 400 dowels plus 2 - 10M continuous horizontal.

.3 Unless otherwise shown on drawings, reinforce bases with 10M at 300 each way placed 50 mm below top of concrete.

CAST IN PLACE CONCRETE

PART 1 – GENERAL

1.1 WORK INCLUDED

.1 All cast-in-place concrete including supply, placing, finishing and curing.

.2 Installing embedment.

.3 Grouting under base plates and bearing plates.

.4 Installing shelf angles/plates and wall plates that bear on or are attached to concrete.

1.2 RELATED WORK

.1	Concrete Formwork	Section 03 10 00
.2	Concrete Reinforcement	Section 03 20 00
.3	Precast Structural Concrete	Section 03 41 00
.4	Structural Steel	Section 05 12 10

1.3 REFERENCES

.1 ASTM C260, Standard Specification for Air-Entraining Admixtures to Concrete.

.2 ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C494/C494M, Standard Specification for Chemical Admixtures for Concrete.

.4 ASTM D1751, Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

.5 CSA A5, Portland cement.

.6 CSA-A23.1, Concrete Materials and Methods of Concrete Construction.

.7 CSA-A23.2, Methods of Test and Standard Practices for Concrete.

.8 CAN/CSA A3000, Cementitious Materials for Use in Concrete.

.9 CAN/CSA S448.1, Repair of Reinforced Concrete in Buildings.

.10 CSA A283, Qualification Code for Concrete Testing Laboratories.

1.4 QUALITY ASSURANCE

.1 Concrete supplier to have a valid “Certificate of Ready Mixed Concrete Production Facilities” as issued by the Ready Mixed Concrete Association of Ontario.

1.5 PROJECT RECORDS

.1 Batch Logs: Concrete supplier to keep record of each batch delivered to site.

.2 Concrete Delivery Slips: Keep all concrete delivery slips (“driver’s tickets”) on site until building is completed. Record on delivery slip where concrete was placed including time and date.

.3 Record Drawings: Record on a set of Structural Drawings extent of each pour including pour date and falsework removal date. Also record all changes to that shown on drawings including footing elevations.

.4 Keep project records up to date and make available to Consultant at all times.

1.6 SUBMITTALS

.1 Submit to the Consultant for review before the start of Work, 4 white prints of shop drawings. Leave room on drawings for the stamps of the Consultant and the Structural Engineer. Check and sign before submission. Only 2 copies will be returned to General Contractor.

.2 Minimum 2 weeks prior to starting concrete work, submit certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA-A23.1.

.3 Minimum 2 weeks prior to starting concrete work, submit all concrete mix designs, including pump mixes, and indicate where each concrete mix is to be used. Where Class C1, C2 or F1 mix designs are required, submit test data to confirm that air-void system conforms to CSA A23.1 for each mix design.

.4 Minimum 2 weeks prior to starting concrete work, submit a written confirmation that all admixtures used in concrete will not have any adverse impact on the long term durability and performance of concrete, or any other materials embedded or in contact with concrete. Also provide a written statement that any admixtures used in concrete will not have any adverse effect on human health and the environment.

.5 Minimum submission requirements for each concrete mix design shall include the following:

- .1 minimum specified compressive strength at 28 days.
- .2 maximum aggregate size
- .3 aggregate type (if not normal density)
- .4 alkali-aggregate resistance

.5 concrete density range, wet and dry (if not normal density)
.6 CSA exposure class
.7 cement type (if not type 10)
.8 maximum water/cement ratio
.9 plastic air content range air-void system test data
.10 assumed method of placement of concrete
.11 slump range
.12 percentage and type of any supplementary cementing materials
.13 admixtures (type and name only)
.14 certificate of compatibility between admixtures unless all admixtures are supplied by same manufacturer

.6 Minimum 2 weeks prior to starting concrete work, submit proposed quality control procedures for Consultant's approval for following items:
.1 Finishing, curing and protection
.2 Hot weather concreting
.3 Cold weather concreting

.7 Minimum 4 weeks prior to placing any slabs-on-grade, submit drawings showing proposed locations of construction joints and control joints in slabs-on-grade.

PART 2 – MATERIAL

2.1 CONCRETE MIX MATERIALS

.1 Portland cement: to CSA-A5.

.2 Cementitious hydraulic slag: to CSA-A363

.3 Fly ash: to CSA-A23.5, Type CI

.4 Water: to CAN/CSA-A23.1

.5 to CSA-A23.1. Coarse aggregates to be crushed stone or gravel which is suitable for type N concrete as defined by Supplementary Guidelines to OBC 2012, SG-2, . Do not use recycled concrete as aggregate.

.6 To ensure compatibility, all admixtures to be supplied by a single manufacturer or certificate of compatibility to be provided with mix design.

.7 Air entraining admixture: to ASTM C260.

.8 Chemical admixtures: to ASTM C494. Do not use admixtures containing chlorides.

.9 Corrosion inhibiting admixture: Containing calcium nitrite:
.1 DCI by W.R. Grace (use DCI-S with ambient temperatures above 20°C)
.2 Rheocrete CNI by Master Builders (add set retarder with ambient temperatures above 20°C).

.10 Shrinkage reducing admixture: Eclipse Floor for non-air entrained concrete and Eclipse Plus for air entrained concrete by W.R. Grace. Confirm compatibility with superplasticizer if being used.

.11 Plastic fiber additive: fibrillated polypropylene fibers at least 19mm in length:
.1 Fibremesh by Master Builders
.2 ConLoc Fibres by Pro Technologies
.3 Fiberforce by Ampro
.4 Promesh by Canada Cordage

2.2 OTHER MASTERIALS

.1 Grout: Premixed, non-metallic, non-shrink:
.1 Euco NS Grout by Eulicd Admixture Canada
.2 Masterflow 713 by Chemrex (M.B.T.)
.3 V-3 Grout by W.R. Meadows of Canada
.4 Sikagrout 212 by Sika Canada
.5 M-Bed Standard by Sika Canada
.6 CPD Non-Shrink Grout by CPD

.2 Dry pack grout: Use 1:2 mix of Portland cement and concrete sand. Add sufficient water for the mixture to retain its shape when made into a ball by hand. When thickness of grout exceeds 50mm, use 1:1½:2 mix of Portland cement, concrete sand and 10mm pea gravel instead. Compressive strength at 28 days to be 30 MPa.

.3 Liquid curing/sealing compound: to ASTM C309 Type 1, Class B, water based acrylic, compatible with surface hardener where hardener is used: Sealtight CS 309 by W.R. Meadows of Canada. Apply two (2) coats where exposed concrete floor is called for in Room Finishing Schedule. Apply

first coat as soon as concrete sets - Apply second coat just prior to occupancy by Owner.

.4 Premoulded joint fillers: Bituminous impregnated fibre board: to ASTM D1751.

.5 Evaporation reducer: Confilm by Chemrex (M.B.T.).

.6 Bonding agent: synthetic latex:
- .1 Surfacrete Concentrate by Sika Canada
- .2 Intralok by W.R. Meadows of Canada
- .3 Acryl-Set by Chemrex (M.B.T.)
- .4 CPD Concentrated Latex Adhesive by CPD

.7 Drilled concrete expansion anchors:
- .1 Kwik-Bolt by Hilti
- .2 Wedge Anchor by Ucan Fastening Products

.8 Drilled concrete adhesive anchors:
- .1 HVA Adhesive Anchor by Hilti
- .2 ADH Adhesive Anchor by Ucan Fastening Products

.9 Epoxy for bonding anchors and dowels into predrilled holes in concrete:
- .1 HIT -HY-150 by Hilti
- .2 Epcon Ceramic 6 by ITW Construction Products
- .3 Flo-Rok FR1-22 & FR3-22 by Ucan Fastening Products

.10 Non-slip nosing insert for concrete stairs: Fine aluminum oxide strips, 6mm (¼") wide x 10mm (d") deep.

.11 Vapour barrier for slab on grade:
- .1 Refer to DIV.7

.12 Rigid insulation: Extruded polystyrene boards:
- .1 Styrofoam SM by Dow Chemical
- .2 Styrofoam HI-100 by Dow Chemical

.13 Control joint filler: semi-rigid filler to protect against slab edge breakdown:
- .1 For sawcuts and joints in interior slabs:
  - .1 Rezi-Weld Flex by W. R. Meadows
  - .2 Loadflex by Sika Canada
- .2 For sawcuts and joints in exterior slabs:
  - .1 Sikaflex 2C NS/SL by Sika Canada

.14 Elastomeric bearing pads: Virgin natural polyisoprene or virgin polychloroprene conforming to CAN/CSA-S6

.15 Sliding bearing assembly: Galvanized top steel plate with a type 304 stainless steel highly polished lower surface and bottom elastomeric pad with a polytetrafluoroethylene (Teflon) upper surface. Static and kinetic coefficients of friction not to exceed 5% under working stress. Assembly to have a working stress capacity of 7 MPa on lower pad. Elastomeric bottom pad to allow a 2% rotation of upper plate and still maintain a substantially uniform bearing pressure between plate and pad. For concrete work, provide two 12 dia. anchor studs for top plate and provide water tight polyethylene wrapping for assembly, except for anchor studs, which can be left in place during construction. Manufactured by:
- .1 Fabreeka Canada Ltd.
- .2 Goodco Ltd.
- .3 Structural Tech Corp. Ltd.

.16 Controlled density concrete fill, f'c = 4 MPa:
- .1 K-Crete by Dufferin Concrete Products or equivalent

.17 Prefabricated Seepage Protection System:
- .1 Terradrain 200 by Terrafix Geosynthetics Inc.
- .2 Weeperwick by Subsurface Systems Inc.

.18 Bentonite Geotextile Waterproofing:
- .1 Voltex by CETCO (distributor : DRE Industries)

.19 Crack Filler Epoxy: Capweld 524 by Cappar Ltd.

.20 Base under concrete Slabs on Grade: Clean, crushed stone, 20 to 22mm.

2.3 CONCRETE MIXES

.1 Use ready-mix concrete. Proportion concrete in accordance with CSA A23.1, Use a water-reducing agent in all concrete. Obtain approval of the Consultant for the use of admixtures other than water-reducing and air entraining agents.

.2 Supplementary cementing materials: Conform to the directions of the slag and fly ash manufacturers for the proportioning and mixing of concrete. Except as otherwise required, limit supplementary cementing materials to

no more than 25% of total cementitious content and limit the fly ash component to no more than 10% of total cementitious content. The limit on supplementary cementing materials may be increased for Class N exposure concrete provided that the effects of the resulting concrete properties, including finishing, rate of early-age strength gain, curing and protection, are considered by the Contractor and a letter describing these effects and any special construction procedures is submitted for review with the mix design. Do not use supplementary cementing materials in architectural concrete.

.3 For columns less than 300mm in least dimension and for walls less than 200mm thick, reduce nominal size of coarse aggregate to 10mm.

.4 Interior slabs, beams, walls and columns: Provide normal density concrete to give following properties unless otherwise noted:
- .1 Class of exposure N
- .2 Cement: Type 10
- .3 Minimum compressive strength at 28 days: 25MPa unless specified otherwise on Structural Drawings
- .4 Nominal size of coarse aggregate: 20mm. See also clause 2.3.3.
- .5 Slump at time and point of discharge: 50mm to 110mm

.5 Footings, piers, and foundation walls : Provide normal density, frost resistant concrete to give following properties:
- .1 Class of exposure F-2
- .2 Cement: Type 10
- .3 Minimum compressive strength at 28 days: 25MPa unless specified otherwise on Drawings
- .4 Maximum water/cementing material ratio: 0.55
- .5 Nominal maximum size of coarse aggregate: 20mm. See also clause 2.3.3.
- .6 Slump at time and point of discharge: 50mm to 110mm
- .7 Air content: 4 to 7%

.6 Lean concrete and mud slabs: Provide normal density concrete to give following properties:
- .1 Class of exposure N
- .2 Cement: Type 10
- .3 Minimum compressive strength at 28 days: 10MPa
- .4 Nominal maximum size of coarse aggregate:20mm.
- .5 Slump at time and point of discharge: 50mm to 110mm

.7 Exterior, exposed walls and columns exposed to freezing and thawing, but not exposed to chlorides: Provide normal density, frost resistant concrete to give following properties:
- .1 Class of exposure F-2
- .2 Cement: Type 10
- .3 Minimum compressive strength at 28 days: 25MPa unless specified otherwise on Structural Drawings
- .4 Maximum water/cementing material ratio: 0.55
- .5 Nominal size of coarse aggregate: 20mm. See also clause 2.3.3.
- .6 Slump at time and point of discharge: 50mm to 110mm
- .7 Air content: 5 to 8%

.8 Structurally reinforced concrete exposed to chlorides, including exterior reinforced slabs: Provide normal density concrete to give following properties:
- .1 Class of exposure C-1
- .2 Cement: Type 10
- .3 Minimum compressive strength at 28 days: 35MPa
- .4 Maximum water/cementing material ratio: 0.40
- .5 Nominal size of coarse aggregate: 20mm. See also clause 2.3.3.
- .6 Slump at time and point of discharge: 50mm to 110mm
- .7 Air content: 5 to 8%

.9 Interior slabs-on-grade: Provide normal density concrete to give following properties:
- .1 Class of exposure:N
- .2 Cement: Type 10
- .3 Minimum compressive strength at 28 days: 25MPa unless specified otherwise on Structural Drawings
- .4 Maximum water/cementing material ratio: 0.55
- .5 Nominal maximum size of coarse aggregate: 20mm. Increase to 40mm where slab-on- grade thickness exceeds 130mm.
- .6 Slump at time and point of discharge: 50mm to 110mm
- .7 Plastic fiber additive: apply at rate of 0.9 kg/m³. Add sufficient water reducing agent to restore slump loss
- .8 Slump at time and point of discharge, after addition of fibers and plasticizer: 50mm to 110mm
- .9 Provide curing/sealing coat to all slabs-on-grade; two coats where slab exposed-refer to 2.2.3.above.

.10 Interior slabs-on-grade with resilient floor finishes: Provide normal density concrete to give following properties:
- .1 Class of exposure:N

.2 Cement: Type 10
.3 Minimum compressive strength 25MPa
.4 Nominal maximum size of coarse aggregate: 40mm
.5 Water/cementing material ratio: 0.55
.6 Slump at time and point of discharge: 50mm to 110mm

.11 Construction Method:
.1 Place & compact 200mm of clean, crushed stone, 20 to 22mm size.
.2 Construct slab-on-grade on 15 mil polyolefin sheet vapor barrier placed directly below concrete. Terminate vapor barrier by extending vertically up the abutting concrete walls
.3 Saw cuts should be done with a dry process (soft-cut on the same day of a pour).
.4 Curing: Apply 24 hours of wet curing. Start curing immediately after finishing slab. Cover slab-on-grade for at least 72 hours using plastic sheets with joints taped and free edges covered.
.5 Protection: Protect finished and cured slab from surface water (i.e. rain, snow).
.6 Refer to Architectural Specifications for acceptable moisture content and testing methods prior to placing floor finishes.

.12 Interior and roof concrete toppings, curbs and bases: Provide normal density concrete to give following properties:
.1 Class of exposure:N
.2 Cement: Type 10
.3 Minimum compressive strength 25MPa
.4 Nominal size of coarse aggregate for:
.1 Toppings between 25 and 35mm thick:10mm
.2 Toppings between 35 and 50mm thick:14mm
.3 Thick toppings: 20mm
.5 Slump at time and point of discharge: 20mm to 60mm

Where topping is less than 25mm thick, no coarse aggregate is allowed and a bonding agent shall be provided within the mix and to bond the topping to the substrate.

.13 Exterior unreinforced slabs, driveways, sidewalks, curbs and gutters, parking slabs on grade: Provide normal density, chloride resistant concrete to give following properties:
.1 Class of exposure C-2
.2 Cement: Type 10
.3 Minimum compressive strength at 28 days: 32MPa
.4 Maximum water/cementing material ratio: 0.45

.5 Nominal maximum size of coarse aggregate: 20mm
.6 Slump at time and point of discharge: 50mm to 110mm
.7 Air content: 5 to 8%

.14 Exterior, unreinforced pavements: Provide normal density concrete to give following properties:
.1 Class of exposure C-2
.2 Cement: Type 10
.3 Minimum compressive strength at 28 days: 32MPa
.4 Maximum water/cementing material ratio: 0.45
.5 Nominal maximum size of coarse aggregate: 20mm
.6 Slump at time and point of discharge: 40mm to 80mm. Use plasticizer if necessary to increase slump for placement.
.7 Air content: 5 to 8%

PART 3 – EXECUTION

3.1 CONSTRUCTION REVIEW

.1 Construction reviews are undertaken by the Consultant and the Inspection and Testing Agency so that the Owner may be informed in writing as to the quality of the Contractor's performance and for the protection of the Owner. They will be carried out by examination of representative samples of the Work.
.2 The Contractor will receive copies of the construction review reports and the results of material tests. He will thereby be informed of any defects or deficiencies found.
.3 Bring to the attention of the Consultant, any defects or deficiencies in the Work, which may occur during construction together with a proposal for remedy. The Consultant will decide what corrective action may be taken and will issue the necessary instructions.

3.2 PREPARATION

.1 Obtain written approval of each footing bearing surface by Geotechnical Engineer prior to placing concrete for footings/mud slabs.
.2 Confirm that subgrade and backfill meets specifications and is free of frost and surface water before placing slab-on-grade.
.3 Provide vapor barrier under all slabs placed on the ground including slabs-on-grade and framed slabs.
.4 Grout column base plates and beam bearing plates as soon as steelwork is completed. Do not add load on steelwork until grouting is completed and grout strength has reached at least 20 MPa.

3.3 SLEEVES, OPENINGS AND EMBEDMENTS

.1 Ensure that sleeves and openings do not impair the required strength of the member, and unless shown on the Structural Drawings, are accepted by the Consultant for size, location, and reinforcement before concrete is cast. No trade shall cut holes through existing concrete unless acceptable to the Consultant.

.2 Do not embed in slabs and walls any conduit or pipe whose outside diameter is greater than one- quarter the concrete thickness. Do not space less than 3 diameters on centre. Locate so as not to impair the required strength of the member. Do not install in or below columns, conduit which displaces more than 3 percent of the cross-section.

.3 Cooperate with any trade applying finishes to concrete surfaces to obtain a surface, which will ensure adequate bond. Provide chases, chamfers and reglets where required.

.4 No sleeves, ducts, pipes or other openings shall pass through joists, beams, column capitals or columns, except where indicated on Structural Drawings or approved by the Consultant.

.5 Where approved by Consultant, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere. Unless indicated on the Structural Drawings, sleeves and openings greater than 100 x 100 mm must be approved by Consultant.

.6 Do not eliminate, cut or displace reinforcement to accommodate openings or hardware. If openings or hardware cannot be located as specified, obtain approval of modifications from Consultant before placing of concrete.

.7 Check locations and sizes of sleeves and openings shown on Structural Drawings with Architectural, Mechanical and Electrical Drawings. Notify Consultant of any discrepancies.

.8 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

.9 Anchor bolts: Set anchor bolts using templates under supervision of appropriate trade prior to placing concrete. Locate each anchor bolt group to within 6 mm of required location with no accumulation of tolerances allowed between groups

3.4 PLACING CONCRETE

.1 Notify Consultant 24 hours before placing concrete and 24 hours before closing wall forms.

.2 Do cast-in-place concrete work in accordance with CSA-A23.1.

.3 Remove water and disturbed soil from excavations before placing concrete therein.

.4 Do not overload forms.

.5 Use rubber tipped vibrators for concrete containing epoxy coated reinforcement.

3.5 FINSIHING FLATWORK

.1 Finish flatwork in accordance with CSA-A23.1, and following clauses.

.2 Protect concrete during finishing process in accordance with CSA-A23.1. Also use evaporation reducer during severe drying conditions.

.3 Cast slabs with a top surface that is level or sloping as required by the Drawings. Allow for cambering where required. Set top of slab below finished floor level by the distance required for the type of applied finish.

.4 Provide final finish in accordance with proposed use and as follows:
- .1 Screeded and bull floated for: mud slabs and footings.
- .2 Screeded and bull floated with scratch finish for: base slabs, which receive mortar setting beds or bonded toppings.
- .3 Powered float finish for: roofs and slabs, which receive a membrane.
- .4 Wood float finish with brooming for: exterior exposed slabs.
- .5 Powered steel trowel finish for: interior exposed slabs; slabs which receive resilient flooring, carpet, epoxy-based finishes, thin-set tiles, etc.

.5 Steel trowel exposed interior concrete floors at least twice. Provide final spin trowelling when non-slip finish is required.

.6 Except as noted, conform to finish tolerance Class A for floors and Class B for exterior slabs and base slabs for toppings. For wood flooring, conform to finish tolerance Class C. Compliance will be considered satisfactory if 80% of the measurements, using the straightedge method, are less than or equal to the tolerance and no measurement exceeds the tolerance by more than 25%. When requested by Consultant, make measurements within 3 days of placing concrete and before falsework is removed and submit results to Consultant.

3.6 CURING AND PROTECTION

.1 Cure and protect concrete in accordance with CSA A23.1. In addition to Cold-Weather Protection requirements in A23.1, provide protection so that temperature of concrete surfaces is maintained at not less than 21 degrees C for 3 days after placement, not less than 10 degrees C for the next 2 days and above freezing for the next 2 days. Vent exhaust gases from combustion type heaters to atmosphere outside heated enclosure.

.2 Cure slab surfaces immediately after finishing is completed. Use a curing compound compatible with applied finishes except where bonded topping to be applied. Where curing compound is not used, cover slab surfaces with absorptive mat or fabric and keep continuously wet.

.3 Extend basic curing period until concrete has reached following strength levels for structural safety:

.1 Framed slabs and beams: 75% of specified 28 day strength.
.2 Columns, piers and footings: 75% of specified 28 day strength.
.3 Walls: 50% of specified 28 day strength.

3.7 FINISHING FORMAED SURFACES

.1 Finish formed surfaces in accordance with CSA A23.1. Completely fill holes left by through-bolts with grout.

.2 Do not patch surfaces until instructed in writing by Consultant.

.3 Where honeycombing has cut out in accordance with CSA A23.1. do not patch until reviewed by Consultant.

.4 Provide smooth-form finish for all exposed concrete surfaces.

.5 Provide smooth-rubbed finish to all concrete surfaces exposed to public view. Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.

3.8 BONDED TOPPINGS

.1 Not more than 24 hours prior to applying concrete toppings, clean base slab of dirt, laitance, loose material and grease. Scrub with 10 percent solution of muriatic acid and rinse clean. Four to six hours before laying topping, saturate surface with clean water. Surface shall have reached a damp condition at the time the new concrete is placed. Apply a slurry coat of cement and water to the surface and immediately follow with the topping or apply approved and compatible bonding agent in accordance with manufacturer's instructions.

.2 Do not allow the temperature difference between base slab and new concrete to exceed 6 degrees C when concrete is placed.

.3 Make mix consistency as stiff as can be worked with a sawing motion of the strike-off board. Consolidate concrete by rolling and tamping. Float with a power floating machine weighing at least 90 kg. Finish and cure as specified for floors.

.4 Locate joints in top course directly over joints in base course.

.5 Minimum thickness of topping over cambered base slab shall be 38 mm at high point.

.6 Remove any concrete which seeps through joints of precast units and clean surface before concrete sets

3.9 SLABS ON GRADE

.1 Determine that the compacted granular fill supporting slabs-on-grade has been approved before starting work.

.2 Over compacted granular fill, place & compact 200mm of clean crushed stone, 20 to 22mm size.

.3 Over crushed stone, vapour barrier as per Architectural Specification. Seal all joints and punctures with tape. Repair all tears or holes with layers of sheeting, tapping all seams.

.4 Provide and install joint filler between slab and masonry walls.

.5 See Drawings for thickness of concrete and slab reinforcing.

.6 Provide slab depressions and slopes as indicated on the Architectural Drawings. Slope floors to drain.

.7 Testing & Inspection Company must inspect vapour barrier and reinforcing just prior to placement of concrete and Contractor must rectify any deficiencies noted prior to pour.

3.10 GROUTING UNDER BASE PLATES AND BEARING PLATES

.1 Grout under base plates and bearing plates using procedures in accordance with manufacturer's recommendations which result in 100% contact over grouted area.

.2 Grout column base plates and beam bearing plates as soon as steelwork is completed. Do not add load on steelwork until grouting is completed and grout strength has reached at least 20 Mpa.

3.11 JOINTS

.1 Slabs-on-grade: Provide joints in both directions. Maximum spacing of construction joints to be 30m with sawcut joints in-between spaced at 30 times slab thickness maximum, but not more than 5m maximum. Locate joints on column centre lines wherever possible and on intermediate lines, which result in approximately square panels. Protect edges of sawcuts from breakage. Clean out sawcuts in exposed slabs and fill with control joint filler after concrete is at least 120 days old. At construction joints in exposed slabs, sawcut top 25 mm for a width of 5 mm and fill with control joint filler after concrete is at least 120 days old. Clean out sawcuts in other slabs and fill with a sand-cement paste one month prior to installing floor coverings.

.2 Construction Joints and Control Joints: See Section 03 10 00.

.3 Expansion Joints: See Structural Drawings for widths, locations and details. Remove all forming and filler material used during construction and provide clear space between structural elements equal to width specified.

.4 Construction Gaps: See Structural Drawings for widths, locations and details. Do not place concrete in gaps in beams and slabs until all concrete at that level is at least 28 days old. Do not fill wall gaps until all adjoining framed slabs, above and below, are at least 28 days old.

.5 Isolation Joints: Provide 10mm thick premoulded joint filler of the same depth as the thickness of the concrete wherever slabs-on-grade abut foundation walls, columns and piers. Omit if slab is chased or dowelled into structure.

3.12 DRILLED ANCHORS

.1 Conform to requirements of manufacturer. Use hammer drill to make holes. Hole diameters must never exceed those required by manufacturer. Tighten all expansion anchors using a torque wrench unless finger-tight is required by the Drawings to allow for movement. Unless otherwise noted on drawings, provide manufacturer's standard embedment length into solid concrete.

.2 Do not cut reinforcement to accommodate anchors. Relocate anchors, at no extra cost to the Contract, when obstructions prevent drilling holes to required depth in locations specified. Obtain Consultant's approval of new location before drilling hole. Fill all abandoned holes with grout.

.3 Arrange for manufacturer's technical representative to be present during installation of first few anchors of each size and type. Submit site reports by manufacturer to Consultant within one week of each visit. Reports to indicate anchor sizes and types installed, locations, and names of those present during installation.

.4 Retain an inspection and testing company to randomly select and pull test 5% of all types and sizes of anchors installed on a weekly basis, but not less than one anchor of each type and size. Pull test to twice the design tension capacity of the anchor given by the manufacturer. Submit reports to Consultant within one week of testing. Reports to indicate each anchor location, test load and mode of failure, if applicable. Notify Consultant immediately if any anchor fails the pull test.

3.13 CRACKS IN SLABS-ON-GRADE

.1 Extensive cracking of slabs-on-grade or cracks in excess of 3 mm in width shall be cause for rejection of slab or portion of slab at the discretion of the Consultant.

.2 Protect edges of cracks in slabs-on-grade from breakage.

.3 Unless slab is rejected, repair cracks that are over 0.4 mm wide in exposed slabs-on-grade in unfinished areas after concrete is at least 120

days old. Repair by filling crack with a sand-cement grout and then, after 7 days, cutting out top 20 mm of crack for a width of 5 mm and filling with control joint filler.

3.14 INSPECTION AND TESTING

.1 Inspection and testing of concrete and concrete materials will be carried out in accordance with A23.1 by a Testing Agency designated by Consultant. Testing agency shall be certified under CSA A283 with category to suit testing provided.

.2 Agency will review all submittals pertaining to concrete mix designs and certification of plant, equipment and materials.

.3 Agency will take additional test cylinders during cold weather concreting. Assist Agency by curing these cylinders for 7 days on site adjacent to the work which they represent and under the same conditions as the concrete which they represent.

.4 Samples will be taken prior to the addition of steel fiber reinforcement or superplasticizers to the mix on site.

.5 Methods for testing concrete will be in accordance with CSA-A23.2.

.6 Inspection or testing by Agency will not augment or replace Contractor quality control nor relieve him of his contractual responsibility.

.7 Assist the Agency in its work. Notify Agency as to the concreting schedule and before each pour. Provide concrete samples.

.8 The Agency will report to the Consultant, with copies to the Structural Engineer, Contractor, Concrete Supplier and Municipal Authorities. Reports will include the locations in structure to which tests relate, comments on abnormal results and conditions, and the Supplier’s mix design numbers. Test reports shall be provided within five working days.

3.15 PITS, CURBS, BASES

.1 Construct all concrete sumps, pits, trenches, curbs and machinery bases forming part of floor construction that are required within the building by other trades.

.2 Provide isolation joints between machinery bases and slabs-on-grade.

3.16 EXTERIOR SALBS AND SIDEWALKS

.1 Exterior slabs shall be finished with a spin trowel finish followed with a fine broom and the edges shall be rounded with an edging tool. Slab thickness shall be 125mm except as noted on drawings. Reinforce slab with one layer of welded wire mesh in flat sheets or as otherwise noted on drawings and apply one coat of curing sealing compound as soon as the concrete will support a workman without damage to the finish. Saw cut slab into areas as indicated on drawings but not exceeding 9 square meters.

3.17 MUNICIPAL SIDEWALKS

.1 Construction of concrete sidewalks, curbs, gutters, materials and finishes shall be in compliance with OPSS 351 and all other related OPSS. Contractor shall obtain specifications and approvals from the Municipality prior to start of work.

.2 Thickness of sidewalk to be 125mm and 175mm across driveways. The top surface of concrete shall receive a broom finish. Provide dummy joints, contraction joints and expansion joints as specified in OPSS. Sidewalks within the Municipal road allowance shall also comply with the Municipal requirements.

3.18 MECHANICAL AND ELECTRICAL WORK

.1 Construct all concrete underground electrical duct banks, underground water service thrust blocks and supports for underground piping in specified fill. Also construct all concrete pads for pipes passing through foundation walls, manholes and catch basins. See mechanical and electrical drawings and specifications for details and extent of work.

3.19 REJECTED WORK

.1 Do not deliver to the site materials which are known not to meet the requirement of the Specifications. If rejected after delivery, they shall be immediately removed.

.2 Where review reveals materials or workmanship which appear to have failed to meet the specified quality or tolerances, the Consultant shall have the authority to order additional curing; to have tests made of in-situ concrete, concrete cores, reinforcement or other materials; to order a structural analysis of the existing elements; and to load test the structure. All such work will be carried out in order to assist in determining whether the structure may, in the opinion of the Consultant be accepted, with or without strengthening or modification. Testing shall meet the requirements of the Ontario Building Code. All expenses incurred shall be chargeable to the Contractor regardless of the results.

END OF SECTION

CONCRETE FLOOR FINISHING

PART 1 – GENERAL

1.1 SECTIONS INCLUDES

.1 Finishing concrete floor surfaces.

1.2 RELATED SECTIONS

.1	General Requirements	Division 01
.2	Cast in Place Concrete	Section 03 30 00
.3	Waterproofing	Section 07 13 00
.4	Sealants	Section 07 92 00
.5	Ceramic Tiling	Section 09 30 00
.6	Resilient Flooring	Section 09 65 00

1.3 REFERENCES

.1 ACI-302.IR-96, Guide for Concrete Floor and Slab Construction.

.2 ASTM-C171-97a, Sheet Materials for Curing Concrete.

.3 ASTM-C309-98a, Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete.

.4 CSA-A23.1/A23.2-00, Concrete Materials and Methods of Concrete Construction I Methods of Test for Concrete.

1.4 SUBMITTALS

.1 Submit Product data and Shop Drawings under provisions of Section 01 33 00 - Submittals.

.2 Provide list of Products proposed for use on Project where such Products are not specified by trade name or where Specification permits choice or alternatives. Include descriptive manufacturer or Supplier literature.

.3 Include application instructions for concrete curing compound.

1.5 QUALITY ASSURANCE

.1 Conform to CSA-A23.1/A23.2 and ACI 302.IR.

1.6 QUALIFICATION

.1 Concrete Finishes Company specializing in commercial floor finishing with a minimum of five years documented experience, approved by the Consultant.

.2 Submit references two (2) months before concrete work commences.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Deliver Products to site under provisions of General Requirements Division 01.

.2 Store and protect Products under provisions of General Requirements Division 01.

.3 Take delivery of and store packaged materials on site in original undamaged condition with manufacturers' packing, labels and seals intact.

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Temporary Lighting: Minimum one 200 W light source, placed 2.5m above the floor surface, for each 40m2 of floor being finished.

.2 Temporary Heat: Ambient temperature of 10 degrees C minimum.

.3 Ventilation: Sufficient to prevent carbon monoxide or high levels of carbon dioxide and other injurious gases from affecting concrete.

.4 Electrical Power: Sufficient to operate equipment normally used.

.5 Work Area: Water-tight protection against rain and detrimental weather conditions.

1.9 WARRENTY

.1 Provide a warranty for the work of this section in accordance with the General Conditions but for a period of three years.

.2 The warranty shall cover defects in concrete floor finishing due to faults in workmanship or materials provided in this section.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Water: clean, potable and not detrimental to quality of concrete.

.2 Concrete Materials: Conform to Section 03 30 00 - Cast in Place Concrete.

.3 Concrete Sealer (SLC): pigmented, resin, copolymer curing compound and sealer. The Euclid Chemical Company: Super Floor Coat Colored.

PART 3 – EXECUTION

3.1 EXAMINATION

.1 Verify that substrate surfaces are ready to receive work and elevations are as indicated on Shop Drawings and as instructed by the finish flooring manufacturer.

.2 Beginning of installation shall mean acceptance of substrate and site conditions.

.3 Ensure that underslab vapour retarder specified in section 07 13 00 – Waterproofing is installed and ready to receive the work of this section for slabs-on-grade except as specified below.

3.2 PREPARATION

.1 Steel trowel concrete slabs left exposed or to receive resilient flooring, and applied floor finishes.

.2 Where concrete slabs are to receive ceramic tile, screed off to true lines and levels and leave ready to receive finish. Depress slabs to accommodate finish thickness.

.3 Where floor drains occur, floors shall be level around walls with a minimum 5mm per meter uniform pitch to drains, unless indicated otherwise.

3.3 FINISHING CONCRETE FLOORS

.1 Finish concrete to CSA-A23.1/A23.2.

.2 When concrete is placed, strike off or rod surface with a straight edge. Darby or bull float the surface to smooth and level the concrete.

.3 When the concrete has hardened enough to leave only slight footprints on the surface, float the surface with metal floats and power finishing machines and bring surface to a true elevation. Do not over float. Avoid bringing water and fines to the surface.

.4 Standard Exposed Concrete Floors:

.1 After floating, allow bleed water or sheen to disappear.
.2 Steel trowel the surface by means of power and hand trowels.
.3 Allow slight interval for concrete to harden further and repeat troweling operation, increasing the tilt of the power trowel blades.
.4 Leave the surface with a smooth, level, burnished finish.
.5 Cure by any of the curing methods specified below.
.6 Where indicated on Drawings apply concrete sealer in accordance with the manufacturer's printed instructions.

.5 Concrete Floors for Applied Thin-set Ceramic Tile Finish:

.1 After floating, allow bleed water or sheen to disappear.
.2 Steel trowel the surface by means of power and hand trowels.
.3 Do not bring water and fines to the surface by over trowelling.

.4 Surface shall have a fine even textured steel finish. Do not leave any hard smooth polished or burnished surface areas.
.5 Cure by the moist curing or sealed surface methods only.

.6 Concrete Floors for Applied Resilient Flooring Finish:

.1 After floating, allow bleed water or sheen to disappear.
.2 Steel trowel the surface by means of power and hand trowels.
.3 Do not bring water and fines to the surface by over trowelling.
.4 Allow slight interval for concrete to harden further and repeat trowelling operation.
.5 Leave the surface with a smooth, level, extremely fine textured but not burnished finish.
.6 Cure by any of the curing methods specified below. Ensure that any curing and sealing compounds used are compatible with the resilient flooring adhesive.

.7 Sprinkling of dry cement or dry cement and sand mixture over concrete surfaces is not acceptable.

.8 Saw cut control joints to CSA-A23.1 24 hours maximum after placing of concrete.

.9 Place expansion joint devices in accordance with details, 24 hours maximum after placing of concrete.

.10 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges.

3.4 CURING

.1 Cure concrete in accordance with CSA-A23.1/CSA-A23.2.

.2 Moist Curing Method:

.1 Cover the concrete with burlap or canvas coverings.
.2 Keep the surface continuously wet by sprinkling or fog spray.
.3 Concrete shall be kept moist for a minimum of seven consecutive days when normal Portland cement is used, and for a minimum of three consecutive days when high early strength Portland cement is used.

.3 Sealed Surface Curing Method:

.1 Cover the concrete with waterproof paper or polyethylene sheets. Lap all joints and tape.
.2 Coverings shall be sufficiently heavy to be resistant to tearing and puncturing.
.3 Coverings shall be kept in place for a minimum of seven consecutive days when normal Portland cement is used, and for a minimum of three consecutive days when high early strength Portland cement is used.

.4 Liquid Applied Curing Compound Method:

.1 Apply liquid curing compounds in strict accordance with the manufacturer's instructions.
.2 Ensure that curing compounds are compatible with applied floor finish adhesives.

.5 After curing and when concrete is dry, seal control joints and joints at junction with vertical surfaces with sealing compound.

.6 Concrete Sealer Application:

.1 Ensure concrete surface is clean and free of standing water. Remove all material that may prevent sealer adhesion.
.2 Prime concrete surface as recommended by the concrete sealer manufacturer.
.3 Apply concrete sealer at a uniform coverage by spray or roller application as recommended by the concrete sealer manufacturer.
.4 Apply second coat of concrete sealer, as recommended by the manufacturer, within 24 hours of first coat application.

3.5 TOLERANCES

.1 Exposed High Wear Resistance Surface Dense Trowelled: 6mm in 3000mm.

.2 Exposed Smooth Non-slip Surface Trowelled and Broomed: 8mm in 3000mm.

.3 Level concrete slab to achieve the following tolerances:

.1 Under vinyl composition flooring - 7mm in 3000mm
.2 Under sheet flooring - 3mm in 3000mm
.3 Under thin-set ceramic tile - 3mm in 3000mm and 1.5mm in 305mm maximum

.4 Correct defects in the floor only by grinding or removal and replacement of the defective slabs. Areas requiring corrective work will be identified by the Consultant. Re-measure corrected areas. Costs of corrective work shall be borne by the Contractor.

3.6 FIELD QUALITY CONTROL

.1 Field inspection and testing will be performed under provisions of Section 01 43 00 - Quality Assurance.

.2 The cost of inspection and testing will be paid from the cash allowance specified in General Requirements - Division 01. Allow 24 hours before proceeding with concrete enhancer application.

3.7 PROTECTION

.1 Protect finished installation in accordance with the requirements of General Requirements – Division 01.

END OF SECTION

MASONRY PROCEDURES

PART 1 – GENERAL

1.1 SECTION INCLUDES

.1 Procedures for unit masonry work.

.2 Procedures for incorporating products to be built into unit masonry.

1.2 RELATED SECTIONS

.1	General Requirements	Division 01
.2	Cast-in-Place Concrete	Section 03 30 00
.3	Masonry Mortar and Grout	Section 04 05 13
.4	Masonry Anchorage and Reinforcement	Section 04 05 19
.5	Concrete Unit Masonry	Section 04 05 22
.6	Masonry Accessories	Section 04 05 23
.7	Clay Unit Masonry.	Section 04 21 00
.8	Structural Steel	Section 05 12 00
.9	Steel Deck	Section 05 31 00
.10	Metal Fabrications	Section 05 52 00
.11	Board Insulation	Section 07 21 13
.12	Air Barriers	Section 07 27 00
.13	Metal Flashing and Trim	Section 07 62 00
.14	Firestopping and Smoke Seals	Section 07 84 00
.15	Sealants	Section 07 92 00
.16	Hollow Metal Doors and Frames	Section 08 11 13
.17	Glazed Aluminum Curtain Walls	Section 08 44 13

1.3 SAMPLES

.1 Submit samples in accordance with Section 01 33 00 – Submittals.

.2 Submit samples:

.1 One of each type of masonry unit specified.
.2 One of each type of masonry accessory specified.
.3 One of each type of masonry reinforcement, tie and connector proposed for use.

.4 As required by inspection and testing company for testing purposes.

1.4 TEST REPORTS AND REFERENCES

.1 CAN/CSA-A179-04 (latest edition): Mortar and Grout for Unit Masonry.

.2 CAN/CSA-A371-04 (latest edition): Masonry Construction for Buildings.

.3 Submit laboratory test reports in accordance with Section 01 45 00 – Quality Control.

.4 Submit laboratory test reports certifying compliance of masonry units and mortar ingredients with specification requirements.

.5 For clay units, in addition to requirements set out in referenced CSA and ASTM Standards include data indicating initial rate of absorption.

1.5 QUALITY ASSURANCE AND JOB MOCK-UP

.1 Masonry work shall be carried out by experienced masons under the continuous supervision of a competent foreman with a minimum of 5 years' experience with work of similar size and complexity.

.2 Construct mock-ups in accordance with Section 01 45 00 – Quality Control. Construct mock-up panel stepped-back to expose each material used.

.3 Construct mock-up panel of exterior masonry wall construction 1600mm high by 2400mm wide showing masonry colours and textures, use of reinforcement, ties, through-wall flashing, air barrier membrane, insulation, jointing, coursing, mortar and workmanship.

.4 Construct mock-up panel where directed by the Consultant.

.5 Allow 48 hours for inspection of mock-up panel by the Consultant before proceeding with work.

.6 Construct 3000mm wide by full height mock-up of interior concrete masonry unit partition with wall opening and complete with masonry lintel. Notify the Consultant 48 hours prior to construction of lintel mock-up. The structural consultant will be present during the mock-up construction to

review the methods employed. Construct lintel mock-up where directed by the Consultant.

.7 When accepted, mock-ups will demonstrate minimum standard for this work. The approved mock-up panels may remain as part of the finished work.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to job site in dry condition.

.2 Keep materials dry until use except where wetting of bricks is specified.

.3 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Cold Weather Requirements: Supplement Clause 5.16.2 of CAN/CSA-A371 with following requirements:

.1 Maintain temperature of mortar between 5°C and 50°C until batch is used.

.2 Protect masonry work from cold weather in accordance with clause 5.16.3 of CAN/CSA-A371, but for a minimum of 72 hours after construction.

.2 Hot Weather Requirements: Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.

.3 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.

.4 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

.5 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Masonry materials are specified in related Sections indicated in Article 1.03.

PART 3 – EXECUTION

3.1 INSTALLATION

.1 Do masonry work in accordance with CAN/CSA-A371 except where specified otherwise.

.2 Build masonry plumb, level, and true to line, with vertical joints in alignment.

.3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

.4 Extend walls and partitions to underside of deck unless noted otherwise on Drawings.

.5 Construct portions of walls and partitions above doors, screens, windows and other openings to match adjacent wall and partition construction unless noted otherwise on Drawings.

.6 Refer to Structural Drawing for load-bearing masonry structural requirements.

3.2 CONSTRUCTION

.1 Exposed Masonry: Remove chipped, cracked, and otherwise damaged units in exposed masonry and replace with undamaged units.

.2 Jointing:

.1 Allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, true to line, compressed, uniformly concave joints unless other jointing is indicated or specified.

.2 Where raked joints are indicated allow joints to set just enough to remove excess water, then rake joints uniformly to 6mm depth and

compress with square tool to provide smooth, compressed, raked joints of uniform depth.

.3 Strike flush all joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.

.4 Wall surfaces and joint treatment for concealed portions of walls above ceilings and behind wall mounted fitments shall match exposed surfaces.

.3 Cutting:

.1 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects.

.2 Make cuts straight, clean, and free from uneven edges.

.4 Building-In:

.1 Build in items required to be built into masonry including items supplied under Section 05 52 00 – Metal Fabrications and Section 07 62 00 – Metal Flashing and Trim.

.2 Prevent displacement of built-in items during construction. Check for plumb, location and alignment frequently, as work progresses.

.3 Build-in hollow metal frames. Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar. Set frame anchors as specified in Section 08 13 13 – Hollow Metal Doors and Frames.

.4 Where structural steel members penetrate masonry walls fill-in spaces with neatly cut pieces of masonry units set in event mortar beds with tooled joints. Do not use rubble or broken pieces and mortar combinations as in-fill.

.5 Wetting of Bricks:

.1 Except in cold weather, wet bricks having an initial rate of absorption exceeding 1g/minute/1000mm², wet to uniform degree of saturation, 3 to 24 hours before laying, and do not lay until surface dry.

.2 Wet tops of walls built of bricks qualifying for wetting, when recommencing work on such walls.

.6 Support of Loads:

.1 Use concrete specified in Section 03 30 00 –Cast-in-Place Concrete, where concrete fill is used instead of solid units.
.2 Use grout to CAN/CSA-A179 where grout is used instead of solid units. Cells with reinforcement shall be grouted.
.3 Install building paper below voids to be filled with concrete or grout; keep paper 25mm back from faces of units.

.7 Provision for Movement:

.1 Leave 10mm space below shelf angles.
.2 Leave 25mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges.
.3 Build masonry to tie in with stabilizers, with provision for vertical movement.

.8 Loose Steel Lintels: Install loose steel lintels supplied by Section 05 12 00 – Structural Steel Framing. Centre over opening width.

.9 Bearing Plates and Anchors: Install loose steel bearing plates and anchors supplied by Section 05 12 00 - Structural Steel Framing and Section 05 31 00 – Steel Decking.

.10 Control Joints for Non-loadbearing Masonry Walls:

.1 Construct continuous full height control joints as indicated.
.2 Fill void at control joint with 20 MPa concrete grout to form continuous key.
.3 Locate exterior wall control joints as indicated on elevations.
.4 Locate interior wall control joints at a maximum spacing of 6000mm, and where non-loadbearing walls meet loadbearing walls.

.11 Provide control joints in loadbearing masonry walls only at locations approved by the structural consultant or where shown on Structural Drawings.

.12 Expansion Joints: Build-in continuous expansion joints as indicated.

3.3 SITE TOLERANCES

.1 Tolerances in notes to Clause 5.3 of CAN/CSA-A371 apply.

3.4 RE-INSTALLATION

.1 Cut openings in existing work as indicated.
.2 Openings in walls to be approved by Consultant.
.3 Make good existing work. Use materials to match existing.

3.5 FIELD QUALITY CONTROL

.1 Inspection and testing of masonry work will be carried out by an inspection and testing company designated by the Consultant.
.2 Cost of masonry inspection and testing will be paid by the Owner.

END OF SECTION

MASONRY MORTAR AND GROUT

PART 1 – GENERAL

1.1 SECTION INCLUDES

.1 Mortar for Unit Masonry

1.2 RELATED SECTIONS

.1	General Requirements	Division 01
.2	Cast in Place Concrete	Section 03 30 00
.3	Masonry Procedures	Section 04 05 13
.4	Masonry Anchorage and Reinforcement	Section 04 05 19
.5	Concrete Unit Masonry	Section 04 05 22
.6	Clay Unit Masonry	Section 04 21 00

1.3 SAMPLES AND REFERENCE STANDARDS

.1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures. Submit two 75MM size samples of each mortar type and colour.

.2 Reference Standards:

CAN/CSA A179 (or latest edition): Mortar and Grout for Unit Masonry.

CAN/CSA A371 (or latest edition): Masonry Construction for Buildings.

CSA A3000 (or latest edition): Cementitious Materials Compendium.

ASTM C 780: Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.

ASTM C 1357: Standard Test Methods for Evaluating Masonry Bond Strength.

1.4 QUALITY ASSURANCE

.1 Mortar prepared on-site based on proportion specifications:

.1 Prior to the commencement of masonry work prepared on-site, under the supervision of the inspection and testing company, mortar mixes for each mortar type specified.

.2 The inspection and testing company will sample and test the mortar mixes to determine a site aggregate/cement ratio Control Value for each mortar type.

.3 Once Site Control Values are established these will form the basis of acceptance for all subsequent Sample Ratio Tests conducted during the course of the work.

.2 Mortar prepared off-site based on property specifications:

.1 Prior to the commencement of masonry work the inspection and testing company will sample and perform laboratory test for each mortar type prepared off-site to verify compliance with the specifications.

.2 Testing shall consist of the determination of:

.1 Aggregate/cement ratio.

.2 Water retention.

.3 Compressive strength.

.4 Air Content

.3 Once acceptable values are established these will form the basis of acceptance for tests conducted during the course of the work.

.3 Arrange for representative of mortar manufacturer to meet with mason on site prior to commencement of masonry work, to review proper mixing procedures of mortar. Mixing must conform to instructions from supplier of pre-mixed mortar materials.

.4 Submit test data as specified below.

1.5 COLD WEATHER REQUIREMENTS

.1 During cold weather, lower than 5 degrees C, when danger of freezing exists, heat all masonry materials using methods accepted in the industry, in conformance to CSA-A371, and approved by the Consultant.

1.6 SUBMITTALS

.1 Submit digital copies of performance data sheet for mortar mixtures. Indicate related standards and mortar properties in terms of compressive strength, water retention and air content. Provide all test certificates required for mortar mixture lots delivered to site.

1.7 WARRANTY

.1 Mason shall warrant that only mortar containing integral water-repellent mortar admixture, added at the manufacturer's recommended rate, has been placed in exterior concrete masonry walls.

1.8 TESTING

.1 Testing of mortar materials will be carried out by Testing Laboratory designated by Consultant.

.2 Inspection and testing to be paid by Owner.

.3 Submit samples of sand and water for testing to ensure that mortar will not produce efflorescence.

.4 Test for compliance with the performance requirements for integral mortar water-repellence. Mortar shall be capable of achieving a Class E Rating when evaluated using
ASTM E 514 with the test extended to 72 hours, using the rating criteria specified in ASTM E 514.

.5 Perform compressive strength tests on all mortar and grout in accordance with the requirements of CSA S304.1. Compressive strengths must conform to the property specifications of CSA-A179.

.6 Perform tests for flexural bond strength of masonry in accordance CSA S304.1. Flexural bond strengths shall not be less than 0.20MPa, in conformance with CSA-A179.

PART 2 – MATERIAL

2.1 MATERIALS

.1 Sand: Fine grain aggregate, graded in accordance with CSA A179.
.2 Water: Potable, free off ice and any contaminants, to CSA A179.
.3 Portland cement: To CAN/CSA-A5 normal Type 10.
.4 Hydrated lime: Type 'S', in accordance with ASTM C207.

2.2 MORTAR

.1 Mortar:

.1 Betomix Plus by Daubois or bulk preblended silo mix as supplied by Max-Mix, or equal approved by Consultant. Colourants to be premixed with mortar materials. Colour to be selected by Consultant.

.2 Mortars for clay brick and concrete unit masonry to be Portland cement/ hydrated lime/ sand mortars to the property standards of CSA A179. Colour to be selected by consultant to match the existing clay brick mortar.

.3 Mortar for masonry foundations, load bearing walls and partitions to be Type 'S' as per property specifications of CSA A179.

.4 Mortar for non-load bearing walls and partitions to be Type 'N' as per property specifications of CSA A179, unless indicated otherwise on the Structural Drawings.

.5 Compressive strengths of mortars shall conform to the values indicated on Tables 8 and 9, for solid brick and concrete block respectively, of CSA Standard A179. Compressive strength of mortars must not exceed the compressive strength of the masonry units with which they are being used.

.6 Except where specified otherwise, the basis of acceptance for mortar prepared on-site shall be the proportion specifications in CAN/CSA-A179

.7 The basis of acceptance for mortar prepared off-site shall be the property specifications in CAN/CSA-A179

2.3 GROUT

.1 Grout:

.1 Coarse grout to CSA A179, with maximum aggregate size of 12.5mm.
.2 Use fine grout where least dimension of void is less than 50mm.
.3 All grout to CSA A179, with sufficient water to produce pouring consistency without segregation of ingredients, but to retain cohesiveness.
.4 Slump is to be 200mm to 250mm. Minimum compressive strength is to be 20 MPa. Refer to structural drawings for additional grout requirements at reinforcing steel.

2.4 SOURCES

.1 Use same manufactured brands and sources of mortar materials for entire project, in order to ensure uniformity of mix and coloration.

2.5 PARGING

.1 Cement mortar parging: 1 part cement, 1 part lime to 6 parts sand by volume with sufficient water for a trowelable mix.

PART 3 – EXECUTION

3.1 CONSTRUCTION

.1 Do masonry mortar work in accordance with CAN/CSA-A179 except where specified otherwise.

.2 Apply parging in uniform coating coating not less than 8mm thick, where indicated and where dampproofing is to be applied on masonry walls.

.3 Cove parging at junction of foundation wall with footing.

3.2 FIELD QUALITY CONTROL

.1 As masonry work progresses, the inspection and testing company will test and report on mortar properties as follows:

.1 Mortar prepared in accordance with proportion specifications: Aggregate/Cement ratio.

.2 Mortar prepared in accordance with property specifications: Compressive strength.

.2 Provide six 50mm by 50mm by 50mm mortar samples taken at random for each test when requested by inspection and testing company.

3.3 MIXING OF MORTARS

.1 Mason to review mixing procedures with mortar manufacturer.

.2 Mix mortar thoroughly, in quantities only as needed for immediate use.

.3 Mix mortar in mechanical mixer operated until homogeneously blended, but not less than 3 minutes after all materials are in mixer.

.4 Obtain manufacturer's approval for any additives.

END OF SECTION

MASONRY ANCHORAGE AND REINFORCEMENT

PART 1 – GENERAL

1.1 SECTION INCLUDES

.1 Reinforcement for masonry walls and lintels

.2 Connectors for masonry walls

1.2 RELATED SECTIONS

.1	General Requirements	Division 01
.2	Masonry Procedures	Section 04 05 00
.3	Masonry Mortar and Grout	Section 04 05 13
.4	Concrete Unit Masonry	Section 04 05 22
.5	Masonry Accessories	Section 04 05 23
.6	Clay Unit Masonry	Section 04 21 00
.7	Structural Steel	Section 05 12 00
.8	Wind Load Bearing Steel Stud System	Section 05 41 00

1.3 REFERENCES

.1 ASTM-A153/A153M-95 Standard Specified for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.2 CAN/CSA-A23.1-04 Concrete Materials and Methods of Concrete Construction.

.3 CAN/CSA-A370-04 (R2009) Connectors for Masonry

.4 CAN/CSA-A370-04 (R2009) Masonry Construction for Buildings

.5 CAN/CSA-G30.18-M92 (R2007) Billet-Steel Bars for Concrete Reinforcement.

.6 CSA-S304.1-04 Design of Masonry Structures

.7 CSA-W186-M1990 (R2007) Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.4 DESIGN REQUIREMENTS

.1 Seismic Loads: Design size and spacing of masonry reinforcement and masonry veneer connectors to withstand seismic loads in accordance with the Ontario Building Code, Subsection 4.1.8.

.2 Structural Design of masonry reinforcement and masonry veneer connectors shall be by a qualified Professional Engineer licensed to practice in the Province of Ontario and engaged by the Contractor.

1.5 SUBMITTALS

.1 Submit product data sheets for all reinforcement types proposed for use in this project, in accordance with Section 01 33 00 – Submittal Procedures.

.2 Include a copy of the data sheets in the shop drawing manual at the conclusion of the project.

.3 Submit samples of anchors, ties, and fasteners for approval of Consultant.

1.6 SOURCE QUALITY CONTROL

.1 Upon request, provide the Consultant with a certified copy of mill test report of reinforcement steel and connectors, showing physical and chemical analysis, minimum 5 weeks prior to commencing reinforcement work.

.2 Upon request inform Consultant of proposed source of material to be supplied.

1.7 SHOP DRAWINGS

.1 Submit Shop Drawings in accordance with Section 01 33 00 – Submittal Procedures.

.2 Shop Drawings shall consist of bar bending details, lists and placing drawings.

.3 On placing Drawings, indicate sizes, spacing, location and quantities of reinforcement and connectors.

.4 Shop Drawings shall bear the seal and signature of the Professional engineer providing structural design for reinforcement and connectors.

PART 2 – MATERIAL

2.1 REINFORCEMENT

.1 Bar reinforcement: to CAN/CSA-A371 and CAN/CSA-G30.18.

.2 Wire Joint Reinforcement - Single Wythe Walls: to CAN/CSA-A371, ladder type, 4.76mm diameter wire, size to suit wall thickness.

.1 Blok-Lok Limited: BL-10 Ladder Reinforcement.
.2 Dur-O-Wal: DA3200 Single Wythe Ladur.

.3 Wire Joint Reinforcement - Cavity Walls: to CAN/CSA-A371, ladder type, 4.76mm diameter wire, size to suit wall thickness. Blok-Lok Limited: BL-42 Ladder Reinforcement.

.4 Wire Joint Reinforcement - Double Wythe Foundation Walls: to CAN/CSA-A371, ladder type, 4.76mm diameter wire, size to suit wall thickness.
.1 Blok-Lok Limited: BLll Ladder Reinforcement.
.2 Dur- O-Wal: DA3200TR Ladur Trirod.

.5 Cavity Wall Connectors: to CAN/CSA-A370. Hot dip galvanized, to ASTM-A153/A153M, Class B2, 458g/ m2 minimum coating.
.1 Concrete masonry unit backings:
.1 Blok-Lok Limited: 4.76mm diameter, System 2000 Tie installed at 400mm on centre vertical spacing and used in conjunction with wire joint reinforcement specified in

subparagraph 2.01.3 for cavity walls and Blok-Lok Limited, Wedge-Lok cavity-wall insulation fasteners.

.2 Fero Corporation: Block Shear Connector complete with V-Tie and insulation supports, installed at 800mm on centre horizontal spacing and 400mm on centre vertical spacing and used in conjunction with wire joint reinforcement as specified in sub-paragraph 2.01.2 installed at 400mm on centre vertical spacing.

.2 Cast-in-Place Concrete Backings:

.1 Install dovetail anchor slots at 800mm on centre spacing and dovetail anchors at 400mm on centre.

.2 Blok- Lok Limited, BL-305 Dovetail Anchor Slot with BL-303 Dovetail Anchors, complete with Blok-Lok Limited, Wedge-Lok cavity wall insulation fasteners.

.3 Steel Stud Backings: Fero Corporation, Stud Shear Connector, 1.6mm thick in appropriate size for wall studs used, complete with four screws for each connector, and 4.76mm diameter V-Tie Lateral Tie-Clip, and cavity wall insulation fasteners. Install at 800mm on centre horizontal spacing and 400mm on centre vertical spacing.

.6 Corrosion Protection for Wire Joint Reinforcement: galvanized to ASTM-A153/A153M.

.1 Exterior Wall: Hot dip galvanized, Class 82, 458g/m 2 minimum coating.

.2 Interior Wall: Mill galvanized.

.3 Foundation Walls: Hot dip galvanized, Class 82, 458g/m2 minimum coating.

2.2 FABRICATION

.1 Fabricate reinforcing in accordance with CAN/CSA-A23.1 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Ontario.

.2 Fabricate connectors in accordance with CAN/CSAA-370.

.3 Obtain the Consultants approval for locations of reinforcement splices other than those shown on placing drawings.

.4 Upon Consultants approval, weld reinforcement in accordance with CSA-W186.

.5 Ship reinforcement and connectors, clearly identified in accordance with drawings.

PART 3 – EXECUTION

3.1 GENERAL

.1 Do masonry connector and reinforcement work in accordance with CAN/CSA-A370, CAN/CSA-A371, CAN/CSA-A23.1 and CSA-S304.1 unless indicated otherwise.

.2 Accurately place reinforcement, support, and secure against displacement as indicated on structural drawings and in accordance with CAN/CSA-A371

.3 Prior to placing grout, obtain Consultant’s approval of placement of reinforcement and connectors.

.4 Do additional reinforcement of masonry as indicated.

.5 Supply dovetail anchor slots for casting into concrete work where required as indicated on the structural drawings and specifications.

3.2 INSTALLATION OF MASONRY ANCHORAGE AND REINFORCEMENT

.1 Refer to Section 04 05 19 for installation of masonry anchorage and reinforcement.

.2 Refer to structural drawings for additional requirements. All reinforcing shall conform to structural requirements as a minimum. Where structural requirements differ from these specifications, the most stringent requirements shall apply.

.3 Note that “solid wall” describes a masonry wall consisting of 1 or more wythes of brick and/or block (which may be solid or hollow core) with mortar joint only between wythes - no air space.

.4 Install reinforcement as indicated above for the materials specified, in conformance with structural drawings and manufacturer’s instructions.

.5 For single wythe interior masonry walls, truss type reinforcing is required at every second course for walls 190mm wide or less, and ladder type reinforcing is required at each course at walls wider than 190mm.

.6 Provide and install prefabricated tees and corners at wall corners and intersections.

.7 Install ties in accordance with Ontario Building Code.

.8 Pre-drill for anchors using appropriate type and size of bit. Provide two anchors per tie with minimum embedment of 25mm. Conform to manufacturers specifications.

.9 Test at least two anchors to failure. Test must be carried out by a Professional Engineer and must certify tension load test to anchor failure. Cost of test will be paid by the Owner.

3.3 JOINT REINFORCEMENT

.1 Locations of Joint Reinforcement:

.1 Concrete masonry unit wythe in cavity walls.

.2 Single wythe masonry walls and partitions.

.2 Install joint reinforcement horizontally at 400mm on centre vertical spacing, unless indicated otherwise.

.3 Place additional reinforcement extending 600mm beyond jambs in courses 200mm, 400mm and 800mm above and below wall openings.

.4 Lap joint reinforcement 300mm at splices.

.5 Reinforce and grout loadbearing masonry walls as shown on the Structural Drawings.

3.4 BONDING AND TYING

.1 Bond walls of tow or more wytes using wire joint reinforcement and metal connectors in accordance with the OBC, CSA-S304.1, CAN/CSA-A371 and as indicated.

.2 Tie masonry veneer to backing in accordance with OBC, SCA-S304.1, CAN/SCA-A371 and as indicated.

.3 Install continuous single wire brick joint reinforcement connected to brick ties.

3.5 REINFORCED LINTELS AND BOND BEAMS

.1 Reinforce masonry lintels and bond beams as indicated on Structural Drawings. Make joints in lintels and bond beams to match adjacent walls.

.2 Place and grout reinforcement in accordance with CAN/CSA-A371, and the Structural Drawings.

3.6 GROUTING

.1 Grout masonry in accordance with SCA-S304.1 and as indicated on Structural Drawings.

3.7 METAL ANCHORS

.1 Do metal anchor work as indicated.

3.8 LATERAL SUPPORT AND ANCHORAGE

.1 Do lateral support and anchorage in accordance with SCA-S304.1 and as indicated.

.2 Lateral Support Anchors (for attachment to structural steel): Blok-Lok, Flex-o-Lok.

3.9 CONTROL JOINTS

.1 Terminate reinforcement 25mm short of each side of control joints unless otherwise indicated.

3.10 FIELD BENDING

.1 Do not field bend reinforcement and connectors except where indicated or authorized by the Consultant.

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.

.3 Replace bars and connectors which develop cracks or splits.

3.11 FIELD TOUCH-UP

.1 Touch-up damaged and cut ends of epoxy coated or galvanized reinforcement steel and connectors with compatible finish to provide continuous coating.

END OF SECTION

CONCRETE UNIT MASONRY

PART 1 – GENERAL

1.1 RELATED WORK AND REFERENCE STANDARDS

.1 Masonry Mortar and Grout Section 04 05 13
.2 Masonry Anchorage and Reinforcement Section 04 05 19
.3 CAN/CSA-A165 Series: CSA Standards for Concrete Masonry Units.
.4 CAN/CSA-S304.1: Design of Masonry Structures.
.5 CAN/CSA-A371: Masonry Construction for Buildings.
.6 CAN/CSA-A370.
.7 National Concrete Masonry Association.

1.2 PROTECTION

.1 Protect adjacent surfaces from marking or damage due to masonry work.

PART 2 – MATERIAL

2.1 MATERIALS

.1 Concrete blocks:

.1 to CAN/CSA-A165 Series, metric modular, Type H/15/A/M in concealed spaces, and H/15/D/M lightweight for exposed walls.
.2 Provide block of higher compressive strength where indicated on structural drawings.
.3 Blocks for fire rated partitions to have required percentage of solid material necessary to provide rating.
.4 Sizes as indicated on drawings.

.2 Curing of lightweight block:

.1 Autoclave or low-pressure steam curing is acceptable, provided that masonry units comply with linear shrinkage and moisture content requirements of CSA A165.1 for type M units at time of delivery to site.
.2 Age all units, prior to delivery to site, as follows:

.1 Autoclaved units: minimum 7 days.
.2 Low pressure steam cured units: minimum 28 days

.3 Special Shapes:

.1 Bond beam, lintel beam, corner and other shapes as required or indicated on drawings.
.2 Provide external corner units as a single unit, with required architectural face appearance on one side and one end.

.4 Metal Anchors: Conforming to Ontario Building Code and Section 04 05 19.

.5 Control Joint Filler: Blok-Lok “Exp-Joint”, closed cell neoprene expansion joint material.

2.2 EXPOSED MASONRY FACES

.1 Notwithstanding visual inspection requirements of CSA standards, masonry units shall be free of surface indentations, surface cracks due to manufacture, or chipping. Units so delivered shall be culled from use for exposed purposes but may be used where concealed.

.2 Concrete masonry units exposed both sides, such as at interior partitions walls, must be visibly uniform in width, so that both faces of the wall are smooth, with all block faces in plane. Total variation in width must not exceed 2mm. Mason shall reject blocks which do not conform to this size requirement.

PART 3 – EXECUTION

3.1 WORKMANSHIP

.1 Build masonry work true-to-line, plumb, square and level, with vertical joints in proper alignment.

.2 Assume complete responsibility for dimensions, plumbs and levels of this work and constantly check same with graduated rod.

.3 Masonry courses to be of uniform height, and both vertical and horizontal joints to be of equal and uniform thickness.

.4 Extend non-loadbearing partitions to underside of floor structure above, providing 25mm deflection clearance. Install lateral support angles, as specified on the structural drawings, and acoustic insulation filler at top of wall.

.5 Carry wall up in uniform manner, no one portion being raised more than 1200mm above another at any time. Build no more than 1500mm of wall measured vertically in any one day.

.6 Buttering corners of units, throwing mortar into joints, deep or excessive furrowing of bed joints not permitted. Do not shift or tap units after mortar has taken initial set. Where adjustments must be made after mortar has started to set, remove mortar and replace with fresh supply.

.7 Where new masonry abuts old or fully set masonry, clean existing surfaces and dampen if necessary to obtain bond.

.8 Evidence of noncompliance with Contract Documents including the following will require replacement and/or repair:

.1 Shrinking
.2 Curling
.3 Spalling
.4 Poor colour blend
.5 Poor texture blend
.6 Discolouration of mortar
.7 Chipping

3.2 BLOCKWORK

.1 Lay concrete block in running bond, except as noted on Drawings, with thicker end of face shell upward. Standard coursing to be modular 200mm for one block and one joint.

.2 Use lightweight concrete blocks for exposed interior surfaces of walls and partitions. Regular concrete blocks may be used for concealed surfaces.

.3 Use special shaped, and finished units where indicated, specified or required. Use bull-nosed units for exposed external corners, window jambs, etc. Exposed open cells not permitted.

.4 Concrete masonry units shall have face shells and their end joints fully filled with mortar, and joints squeezed tight. Also fill webs at cores, to be reinforced and grouted, and strike flush at core taking care to prevent mortar from falling into core.

.5 Tie intersecting non-bearing walls together with masonry reinforcing every second course.

.6 Do not tie intersecting bearing walls together in masonry bond, except at corners.

.7 Exercise special care laying up concrete block in locations where plastic wall coating finish is indicated. Block walls in these locations shall be plumb with joints tooled, concave.

.8 Where resilient base is indicated, tool the joints to within 100mm of the floor. Cut joints flush behind the base.

3.3 MORTAR AND POINTING

.1 Mortar is specified in Section 04 05 13.

.2 Make all joints uniform in thickness, straight, in line, with mortar compressed to form concave joints.

.3 Strike joints flush where walls are to receive insulation, ceramic tile, or similar finishes.

.4 Point faced blockwork by filling holes and cracks in exposed mortar joints. Cut out defective joints, refill solidly with mortar and tool to form neat concave joint.

3.4 BUILDING IN COMPONENTS

.1 Build in door, screen, and window frames, steel lintels, sleeves, anchor bolts, anchors, nailing strips and other items to be built into masonry.

.2 Do not distort metal frames. Bed anchors of frames in mortar and fill frame voids with mortar or grout as wall is erected.

3.5 BEARING POINTS

.1 Fill concrete block solid with 20 MPa concrete grout at the following locations:

.1 for two courses below bearing points of structural members;
.2 behind wall-hung mechanical fixtures;
.3 and elsewhere as indicated on drawings.

.2 Install building paper over wire mesh reinforcing in the beds below solid block section.

.3 Use 100% solid concrete blocks where indicated.

3.6 CONTROL JOINTS

.1 Provide continuous vertical control joints in concrete block and brick partitions and walls at locations indicated, and at maximum 4.0m O.C. Control joints may be at 6.0m O.C. for autoclaved block only.

.2 Control joints are required at changes in wall height, at pilasters and changes in wall thickness, at movement joints in foundations and floors and roofs, at one side of door or window openings under 1.8m wide, on both sides of openings over 1.8m wide, and adjacent to corners.

.3 Confirm all control joint locations with the Consultant prior to wall construction. Provide drawings marked up to show locations of all control joints.

.4 Form control joints as detailed. Stop masonry reinforcing each side of joints; except where structural reinforcing is required, such as at bond beams.

.5 Provide bond breaker at each control joint, of building paper or black polyethylene. Continue bond breaker over lintels at openings.

3.7 HORIZONTAL REINFORCING

.1 Cavity wall and concrete block walls shall be continuously reinforced and tied together with horizontal masonry reinforcing in every second block bed joint.

.2 Additionally, place masonry reinforcing in first and second bed joints above and below openings. Reinforcing in first bed joint shall be continuous. Second bed joint reinforcing shall extend 600 mm beyond each side of opening.

.3 Place continuous reinforcing in second bed joint below top of wall.

.4 Lap reinforcement minimum of 150mm at splices. Supply & install prefabricated sections at corners and intersection of walls to insure continuity of reinforcing.

3.8 FIRE-RATED PARTITIONS

.1 Block shall be of density required to achieve fire rating, in accordance with the Ontario Building Code.

.2 At door and window openings in fire rated masonry partitions, fill concrete block solid with 20 MPa concrete for a distance of 400mm at each side and 400mm above openings.

3.9 REINFORCED MASONRY WALLS

.1 Construct reinforced masonry walls to conform to the requirements of the Ontario Building Code and CSA-A371, and as indicated on Structural drawings.

.2 Lay units to maintain an unobstructed vertical continuity in the cells. All walls and cross webs shall be fully bedded. No over-hanging mortar or debris shall be allowed inside the reinforced cells unless otherwise on the drawings.

.3 Vertical reinforcing shall be provided full length without splicing. It may be installed after the first 1200mm of masonry is erected. Locate rods accurately in the cells as shown on the Drawings. Hold in position top and bottom. Fill cells containing reinforcement solidly with 20 MPa concrete grout, unless noted otherwise on Structural drawings. Consolidate by puddling when placing and again reconsolidate before plasticity is lost. Place concrete grout in lifts not exceeding 1200mm. Stop each lift 38mm below the top of a masonry unit.

.4 Refer to Structural and Architectural drawings for locations and grout strength.

3.10 CUTTING MASONRY

.1 Cutting of masonry units exposed in finished work shall be done with approved type power saw. Where electrical conduit outlet or switch boxes occur, grind and cut units before services installed. Quick saw not permitted for cutting block above grade.

.2 Obtain Consultants approval before cutting any part or area which may impair appearance or strength of work.

.3 Patching of masonry not permitted without Consultants approval.

3.11 BOND BEAMS

.1 Install concrete block bond beams where indicated and where required for bearing of structural members.

.2 Unless more stringent requirements are noted on Structural drawings, make bond beams of special channel blocks with two 15M reinforcing bars placed in bottom, and filled with 20 MPa concrete grout. Extend a minimum length of 200mm, each side of structural member.

3.12 REINFORCED LINTELS

.1 Install reinforced concrete block lintels at openings where steel lintels are not indicated.

.2 Cast and cure lintels on a plank. Set special channel lintel blocks using specified mortar. Place wood stops at each end of lintel to prevent movement.

.3 Refer to Structural drawings for lintel sizes and dimensions. As a minimum, place 25mm of 20 MPa concrete grout in voids, lay in two 15M reinforcing bars and place concrete to level of block sides. Rod and tamp concrete well without disturbing reinforcing. Allow lintels to cure 7 days before loading.

3.13 COORDINATION

.1 Provide openings in masonry walls where required or indicated. Provide reinforced lintels over all openings in both loadbearing and non-loadbearing walls.

.2 Accurately locate chases and openings, and neatly finish to required sizes. Refer to Mechanical and Electrical drawings and co-operate with all trades.

.3 Where masonry encloses conduit or piping, bring to proper level indicated and as directed. Do not cover any pipe or conduit chases or enclosures until advised that work has been inspected and tested.

.4 Build in frames and anchor bolts, and metal brackets for vanities, benches, counters, etc.

3.14 CLEANING

.1 On completion, remove excess mortar and smears using wood paddles or scrapers.

.2 Point or replace defective mortar to match existing, as required or directed.

.3 Clean concrete masonry walls exposed in the finished work in accordance with manufacture's recommendations and NCMA TEK Bulletin #8-4A.

.4 Remove dirt and stains from masonry walls exposed in the finished work in accordance with manufacturer's recommendations and NCMA TEK Bulletin #8-2A.

.5 Remove efflorescence from masonry walls exposed in the finished work in accordance with manufacturer's recommendations and NCMA TEK Bulletin #8-3A.

.6 Repeat cleaning operations until work is satisfactory.

END OF SECTION

MASONRY ACCESSORIES

PART 1 – GENERAL

1.1 SECTION INCLUDES

.1 Masonry accessories.
.2 Masonry flashing.

1.2 RELATED SECTIONS

.1	General Requirements	Division 01
.2	Masonry Procedures	Section 04 05 00
.3	Masonry Mortar and Grout	Section 04 05 13
.4	Masonry Anchorage and Reinforcement	Section 04 05 19
.5	Concrete Unit Masonry	Section 04 05 22
.6	Clay Unit Masonry	Section 04 21 00
.7	Air Barriers	Section 07 27 00
.8	Firestopping and Smoke Seals	Section 07 84 00

1.3 REFERENCES

.1 CAN/CSA-A371-04 (R2009), Masonry Construction for Buildings.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Horizontal Control Joint Filler: purpose-made elastomer for minimum compression of 25% of uncompressed size. Emseal Corporation: Greyflex.

.2 Vertical Control Joint Filler: preformed expanding elastomer for minimum compression of 25% of uncompressed size. Emseal Corporation: Greyflex.

.3 Lap Adhesive: recommended by masonry flashing manufacturer.

.4 Compressible Joint Filler at Penetrations and Top of Masonry Partitions:

.1 AD Fire Protection System Inc.: A/D Firebarrier Mineral Wool Firestopping Insulation.
.1 Fibrex Insulations Inc.: Fibrex Safing Insulation.
.2 Roxul Inc.: RXL Safe Fire Stop Batt.

.5 Mechanical Fasteners: stainless steel, self-tapping.

.6 Metal Drip Flashing: Cold drawn and annealed stainless steel, Type 304, 50mm wide by 2400mm long, with 10mm hemmed edge.

.7 Flexible Through-Wall Flashing:

.1 Lexsuco Canada Limited.: F-20 membrane with CA-105 adhesive.
.2 W.R. Meadows of Canada Ltd.: Sealtight Flex-Guard PVC Masonry Flashing with Vinyl Flash Adhesive Compound.

.8 Cavity Wall Air Space Filler: compressible, closed cell neoprene.

.9 Mortar Dropping Control Device: Trapezoidal-shaped polyester mesh with integral insect barrier. Mortar Net USA Ltd.: Mortar Net with Insect Barrier.

PART 3 – EXECUTION

3.1 INSTALLATION

.1 Install continuous control joint fillers in control joints at locations indicated and under shelf angles.

.2 Install compressible joint filler at the top of masonry partitions that are not fire separations. Refer to Section 07 84 00 – Firestopping and Smoke Seals for joint treatment and fire separations.

.3 Install compressible joint filler and acoustical sealant at penetrations through walls and partitions between classrooms, both above and below ceilings.

.4 Install one row of mortar dropping control devices above all flashings at base of wall and above wall openings. Install in accordance with the manufacturer’s printed instructions.

.5 Install metal drip flashing at front edge of steel angles or masonry units. Coat surface of steel angles with bituminous paint prior to setting metal drip flashing. At splices, overlap metal drip sections by 100mm, apply butyl water resistant sealant between spliced pieces, and crimp hemmed edges.

3.2 CONSTRUCTION

.1 Build in flashings in masonry in accordance with CAN/CSA-A371 and as follows:

.1 Install flashings under exterior masonry bearing on foundation walls, slabs, shelf angles, and steel angles over openings. Install flashings under weep hole courses and as indicated.

.2 In cavity walls and veneered walls, carry flashings, starting 15mm back from front edge of masonry, under outer wythe, then up backing not less than 200mm, and as follows:

.1 For masonry backing, bond to wall, using manufacturer's recommended adhesive where required. Overlap flashing with air barrier membrane.

.2 For concrete backing, bond to wall, using manufacturer's recommended adhesive where required. Overlap flashing with air barrier membrane.

.3 For wood frame backing, staple flashing to walls behind sheathing paper.

.4 For gypsum board backing, bond to wall using manufacturer's recommended adhesive where required and overlap with air barrier membrane.

.2 Lap joints 150mm and seal with adhesive.

END OF SECTION

CLAY UNIT MASONRY

PART 1 – GENERAL

1.1 SECTION INCLUDES

.1 Procedures specific to installing brick.

1.2 RELATED SECTIONS

.1	General Requirements.	Division 01
.2	Masonry Procedures	Section 04 05 00
.3	Masonry Mortar and Grout	Section 04 05 13
.2	Masonry Anchorage and Reinforcement	Section 04 05 19
.3	Concrete Unit Masonry	Section 04 05 22
.4	Masonry Accessories.	Section 04 05 23

1.3 REFERENCES

.1 BIA, Technical Notes on Brick Construction No. 20, Cleaning Brick Masonry, November 1990.
.2 CAN/CSA-A82-06, Fired Masonry Brick Made From Clay or Shale.

PART 2 – PRODUCTS

2.1 MANUFACTURED UNITS

.1 Face Brick: Burned clay brick, to CAN/CSA-A82.

.1 Grade: EG (Exterior Grade)
.2 Type: X.
.3 Size: Refer to item 2.2 Masonry Unit Schedule.
.4 Colour and texture: Refer to item 2.2 Masonry Unit Schedule.

2.2 MASONRY UNIT SCHEDULE

.1 Masonry Unit Brick:

.1 Exterior Brick at wall infill at Gear Room:

.1 Manufacturer: Brampton Brick.
.2 Size: Modular 90mm H by 92mm D by 194mm L.
.3 Colour: Coppertone.
.4 Finish: Velour.
.5 Note: Brick to be stained to match adjacent existing brick.

PART 3 – EXECUTION

3.1 INSTALLATION

.1 Bond: running bond unless indicated otherwise. Provide stack bond at BR2 type masonry brick units noted between windows on the east building elevation.

.2 Coursing Height: as indicated.

.3 Jointing: concave where exposed or where paint or similar thin finish coating is specified unless indicated otherwise.

.4 Mixing and Blending: mix units within each pallet and with other pallets to ensure uniform blend of colour and texture.

.5 Clean unglazed clay unit masonry as work progresses.

3.2 CLEANING

.1 Clean brick masonry as follows:

.1 Remove large particles with wood paddles without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.
.2 Scrub with solution of 25 ML trisodium phosphate and 25 ML household detergent dissolved in 1 L of clean water using stiff fibre brushes, then clean off immediately with clean water using hose. Alternatively, use proprietary compound recommended by brick masonry manufacturer in accordance with manufacturer's directions.
.2 Repeat cleaning process as often as necessary to remove mortar and other stains.
.3 Use acid solution treatment for difficult to clean masonry as described in BIA Technical Note No.20.

END OF SECTION

STRUCTURAL STEEL

PART 1 – GENERAL

1.1 DESCRIPTION

.1 Coordinate this work with the work of the steel joist supplier. Provide all necessary dimension and structural steel shop drawings to the steel joist supplier for the completion of their work.

1.2 WORK FURNISHED AND INSTALLED

.1 Separate column base plates

.2 Columns, beams, purlins, and girts

.3 Bracing

.4 Steel framing around roof and floor openings

.5 Diagonal supports at columns for deck or slabs

.6 Stair landing beams and hangers for steel stairs

.7 Structural steel door frames and sill angles

.8 Hoist beams

.9 Weldable reinforcing steel bars attached to structural steel

.10 Field connections to concrete and masonry

1.3 WORK FURNISHED AND NOT INSTALLED

.1 Anchor bolts

.2 Connection assemblies set in concrete

.3 Loose angle lintels that bear on concrete or masonry

.4 Shelf angles/plates and wall plates that bear on or are attached to concrete or masonry

1.4 WORK INSTALLED ONLY

.1 Installation of steel joists and steel bridging

1.5 RELATED WORK SPECIFIED SHEWHERE

.1	Grouting under base plates	Section 03 30 00.
.2	Supply of steel joists	Section 05 21 00.
.3	Steel deck	Section 05 31 00.
.4	Metal fabrications,	Section 05 50 00.
.5	Cementitious Fireproofing	Section 07 81 16.

1.6 REFERENCES

.1 CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Quality Steel / Structural Quality Steels.

.2 CAN/CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CAN/CSA S16.1, Limit States Design of Steel Structures.

.4 CSA S136, North American Specifications for the Design of Cold Formed Steel Structural Members.

.5 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.6 CSA W48.1, Filler Metals and Allied Materials for Metal Arc Welding.

.7 CSA W59, Welded Steel Construction (Metal Arc Welding).

.8 CAN/CGSB 1.171, Inorganic Zinc Coating.

.9 CAN/CGSB 1.181, Ready Mixed Organic Zinc Coating.

.10 CISC/CPMA 1.73a, A Quick-Drying One-Coat Paint for Use on Structural Steel.

.11 CISC/CPMA 2.75, A Quick-Drying Primer for Use on Structural Steel.

.12 ASTM A53/A53M, Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

.13 ASTM A108, Standard Specification for Steel Bars, Carbon and Alloy, Cold Finished.

.14 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength.

.15 ASTM A325, Standard Specification for Bolts for Steel, Heat Treated 120/105 ksi Minimum Tensile Strength.

.16 ASTM A570/A570, Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.

.17 SSPC, Steel Structures Painting Council.

1.7 QUALITY ASSURANCE

.1 Structural steel fabrication shall be carried out by a firm that has been in structural steel business (for buildings) for at least five years and that is certified by the Canadian Welding Bureau under the requirements of CSA W47.1, Division 1 or 2.

.2 Erection of the structural steel and steel joists shall be carried out by the steel fabricator's own forces, unless written permission to sublet the Work is obtained from the Consultant. Welding shall be carried out by CWB approved welders under the supervision of a CWB approved firm.

.3 Engage a Professional Engineer to be responsible for the design, detailing and installation of all connections related to structural steelwork. Before submitting shop drawings, submit a letter signed and sealed by that Engineer stating that he has been engaged to undertake the responsibility for the above. Also submit a copy of that Engineer’s Certificate of Authorization, and proof of his liability insurance When requested, submit calculations signed and sealed by that Engineer. On completion of erection, submit a letter signed and sealed by that Engineer to certify that Work has been completed in accordance with all shop drawings reviewed by the Consultant and the Structural Engineer.

.4 Before the start of fabrication, supply the independent inspection and testing agency with mill test certificates or producer’s certificates satisfactorily correlated to the materials or products to which they pertain. The onus for ensuring that the materials and products can be properly identified according to grade or specification rests with the Contractor.

.5 Do not splice sections without the prior acceptance of the Consultant and the submission of pertinent shop drawings. Accepted splices will be required to develop the section. Each splice shall be given a non-destructive test by an independent inspection company acceptable to the Consultant. Testing shall be at the Contractor's expense. Evaluate results in accordance with CSA W59 and report to the Consultant.

1.8 TOLERANCES

.1 Conform to the fabrication and erection tolerances of CAN/CSA S16.

.2 In addition if more stringent tolerances are specified elsewhere to suit interfacing materials, the latter shall govern in such cases.

1.9 SHOP DRAWINGS

.1 Refer to Section 01 33 00 - Submittals. "Shop drawings" means erection diagrams and shop details. Shop drawings received after noon will be date-stamped as received the following working day.

.2 Submit to the Consultant for review before fabrication, 4 white prints of erection diagrams. Leave room on drawings for the stamps of the Consultant and the Structural Engineer. Check and sign before submission. Only 2 copies will be returned to General Contractor. The first submission of the erection diagrams to include a complete materials list indicating steel grades, paints, etc.

.3 Show orientation of bearing plates on erection drawings.

.4 In addition to beam designation marks, show beam sizes on erection drawings.

.5 Submit to the Consultant for review before the start of Work, 4 white prints of shop drawings. Leave room on drawings for the stamps of the Consultant and the Structural Engineer. Check and sign before submission. Only 2 copies will be returned to General Contractor.

.6 All shop drawings shall bear the seal and signature of the Professional Engineer responsible for designing the connections.

.7 The Professional Engineer designing the connections shall hold a Certificate of Authorization, and shall carry min. $1,000,000.00 in liability insurance.

.8 It is advisable to submit erection diagrams for review before preparing shop details. Include details of special conditions. Make erection diagrams. Copies of section details developed by VX Engineering Inc. will not be accepted as erection diagrams. If required, structural plans will be available “as-is” for use in the preparation of shop drawings provided that the title blocks are removed and provided that the Owner and the Owner’s Consultants are not held responsible for any errors or omissions on the

drawings. CAD files of the structural sections, elevations and schedules will not be made available for the preparation of shop drawings.

.9 Show the sizes, spacing and the locations of structural steel, connections, attachments, reinforcing and anchorage. Include all necessary plans, elevation and details. Indicate size and type of fasteners. For welded connections use welding symbols in compliance with CISC and indicate clearly the length of weld. Prepare shop drawings using metric sizes and units. All documents shall carry the seal of a Registered Professional Engineer licensed to practice in the Province of Ontario, who shall be responsible for the design of connections and details, and the fabrication, temporary shoring and erection of all structural steel. Show also vent holes required for galvanizing process.

.10 Review of shop drawings by the Consultant and Structural Engineer is a precaution against oversight or error and solely to review conformance with general design intent. It is not a detailed check and must not be construed as relieving the Contractor of responsibility for making the Work accurate and in conformity with the Contract Documents. Design for which the Contractor is responsible under the Contract will not be reviewed. Work done prior to the receipt of the reviewed drawings will be at the risk of the Contractor. Review comments are not authorization for changes to the Contract price.

.11 Provide the office preparing shop drawings with a complete set of Contract Drawings and Specifications plus all Addenda and Change Orders.

.12 Do not release column shop details for fabrication before establishing on site the final elevations of the tops of supporting piers.

.13 Make corrections required by previous review before resubmitting drawings. Clearly indicate all changes and additions to previous submission. Do not add new details to drawings which have been stamped as reviewed or noted.

.14 After review, erection diagrams will be returned to the Contractor stamped to show one of the following:

.1 Reviewe - Reviewed with no comments.
.2 Note - Reviewed with comments noted on drawing. Submit two final record prints as soon as corrections are made.
.3 Resubmit - Reviewed with comments noted on drawing. Correct and resubmit for review.

Conform to the requirements of each authority that has reviewed the drawings.

.15 Allow a minimum of 15 working days for review of each submission of shop drawings in the Structural Engineer's office. Allow more time when large quantities of shop drawings are submitted. Submit in general conformity with the sequence of construction intended. Co- ordinate with the Consultant. Shop drawings received after noon will be date-stamped as received the following working day.

.16 Keep on site at all times a set of shop drawings bearing the review stamps of the Consultant and the Structural Engineer and use only these drawings and the Structural Drawings to erect structural steel. Neatly mark on the Structural Drawings changes issued during the course of construction.

.17 Show details by which steel assemblies, which are set in concrete, are to be connected to the formwork.

.18 If additional instructions are required from the Consultant, allow a minimum of five working days for the Structural Engineer to review and respond to the request for instruction.

1.10 SUBSITUTIONS

.1 Submit all proposals for substitutions to the Consultant in writing in advance of shop drawings. Identify each item clearly. Do not proceed with a proposed change unless it is accepted in writing

.2 Substitution of alternative sections will be allowed provided the new members have equal or greater capacity and stiffness and are of dimensions acceptable at proposed locations.

1.11 SITE CONDITIONS

.1 Determine any potential interference with existing services and protect from disruption and damage.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Rolled shapes and plates.

.1 Wide flange sections: CAN/CSA G40.21, Grade 350W.
.2 Hollow structural sections: CAN/CSA G40.21, Grade 350W, Class C.
.3 Channels, angles and plates: CAN/CSA G40.21, Grade 300W
.4 Cold formed shapes: ASTM A570/A570M Grade 50, Fy=345MPa
.5 Standard S beams: ASTM A992, A572, Grade 50, Fy=345 MPa
.6 Structural pipe: ASTM A53, Grade B, Fy=241 MPa

.2 Welded wide flange shapes: CAN/CSA G40.21, Grade 350W.

.3 Weldable reinforcing steel: weldable steel, grade 400W, deformed bars to CSA G30.18.

.4 Arc welding electrodes and equipment: CSA W48.1. Electrode Classification Number: E480XX.

.5 High-strength bolts: ASTM A325M and CAN/CSA S16. Bolts shall be identifiable by their head markings and galvanized whenever used to connect members which are galvanized or painted with zinc-rich paint.

.6 Machine bolts: ASTM A307.

.7 Anchor bolts: CAN/CSA G40.21, Grade 300W

.8 Stud anchors, headed: ASTM A108, Grades 1010 through 1020, Fy=345 MPa (50 ksi). Lengths of studs given on drawings are the lengths after welding.

.9 Load indicating washers: Coronet - Cooper + Turner

.10 Cast-in-place concrete anchor with threaded bolt: Structural Connection Insert Type EC-2FW - Acrow - Richmond.

.11 Drilled concrete anchor:

.1 Kwik-Bolt 3 – Hilti Carbon steel anchors to be used unless otherwise noted.

.12 Drilled masonry anchor:

.1 Hilti HIT HY20 with threaded HIT-A Rods and screen tube (for hollow masonry).

.2 Hilti HIT HY150 with HAS –E Standard rods (for solid of grouted masonry).

.13 Joint filler for exposed steelwork: Epoxy resin.

.14 Shop primer paint for steel receiving finish coat of paint on site: CISC/CPMA 2-75 except no lead- based paints allowed.

.15 Shop primer paint for steel receiving intumescent paint on site: Primer compatible with intumescent paint to be used. See Section 07800 (Fireproofing).

.16 Shop paint for steel without finish coat: CISC/CPMA 1-73a except no lead-based paints allowed.

.17 Zinc-rich primer and touch-up paint:

.1 inorganic: CGSB 1-GP-171M, or
.2 organic, ready mixed: CAN/CGSB 1.181-92.

.18 Ensure compatibility with specified topcoat.

.19 Galvanizing: CAN/CSA G164

.20 Grating: Galvanized safety grating. Minimum thickness of material 2mm. Banded ends. Bolted connections. Capacity 4.8 kPa unless noted otherwise on drawings. Maximum deflection 1/180th of span. Provide:

.1 Type W/F by Borden Products (Canada) Ltd.
.2 Type 19-2 by Fisher and Ludlow

.21 Checker plate: CAN/CSA G40.21, Grade 300W. Plate with rolled-in embossments to provide non- slip surface.

.22 Sliding bearing assembly: Galvanized top steel plate with a type 304 stainless steel highly polished lower surface and bottom elastomeric pad with a polytetrafluoroethylene (Teflon) upper surface. Static and kinetic coefficients of friction not to exceed 5% under 7MPa to 14MPa working stress. Assembly to have a working stress capacity of 7 MPa) on lower pad. Elastomeric bottom pad to allow a 2% rotation of upper plate and still maintain a substantially uniform bearing pressure between plate and pad. . Manufactured by:

.1 Fabreeka Canada Ltd.
.2 Goodco Ltd.
.3 Structural Tech Corp. Ltd.

.23 Elastomeric bearing pad: Structural grade 50 durometer neoprene.

.24 Zinc-Rich Shop Primer Paint: CAN/CGSB-1.132.

2.2 CONNECTIONS

.1 Design connections to conform to CAN/CSA S16. Conform also to the CISC Handbook of Steel Construction, except as otherwise required by the specifications.

.2 Retain a Professional Engineer to be responsible for the design of all connections.

.3 In general, make shop and field connections with high-strength bolts or by welding. Use machine bolts only for secondary connections and at slotted holes with finger-tight bolts that are intended to accommodate movement.

.4 Pretension all high-strength bolts used in:

.1 wind bracing connections;
.2 connections where bolts are subject to tensile loadings;
.3 connections using oversized or slotted holes unless finger-tight bolts are required to accommodate movement; and
.4 connections required by CAN/CSA S16 to be pretensioned.

.5 Design non-composite beam connections for an end reaction due to the uniformly distributed load capacity of the member unless a greater reaction is noted on the Drawings.

.6 Use double angle headers or end connection plates whenever possible. Do not use single angle headers for beams greater than 530mm deep. Make minimum depth of headers and end plates one-half the beam depth. Provide seated beam connections with top clip angles. Cantilevered plate connections will only be accepted for secondary members carrying minor loads. Provide all eccentrically loaded spandrel beams with top and bottom flange connections for torsional restraint.

.7 Provide connections designed for a pass-through force equal to the smaller axial force where axial forces occur in beams framing in on opposite sides of a supporting member. Axial force is centred in smaller beam if beam sizes differ.

.8 Install web and flange stiffener plates at moment connections as required by connection design and detail but in every case when indicated on the drawings. If the shear generated in column web exceeds its shear capacity, reinforce the web.

.9 Provide at least one stiffener plate each side of web of beams continuous over columns unless another type of stiffener is shown on the Drawings.

.10 Design gusset plates at compression members for the force equivalent to twice the specified compression member force, or provide stiffeners to prevent gusset plate buckling.

.11 Provide moment connections at splices to maintain continuity of cranked beams. Provide stiffener plates to resist unbalanced flange forces at splices.

.12 Provide all wall supporting members (shelf angles, hangers, stubs, back braces, etc) which are attached to floor beams with adjustable connections capable to compensate for the deflection of the floor beams due to self-weight of concrete slabs. Anticipate beam deflection to be 20 mm. Alternatively, fabricate based on actual deflected shape of the beams as measured after concrete slabs are installed.

.13 Complete welded shop connections prior to galvanizing.

.14 Where slotted holes are required to accommodate deflection, provide slotted holes long enough to allow for deflection indicated plus construction tolerance assuming bolts are in centre of slots. Use A307 bolts. Bolts are to be finger-tight with burred threads to allow for movement during life of structure without bolts loosening.

.15 Where indicated on the drawings, connect to concrete using cast-in weld plates with headed stud anchors. Design and supply assemblies. Determine capacity of each anchor group considering edge distance, spacing and embedment.

.16 Connect new steel members to masonry or concrete using drilled anchors. Design, supply and install anchors. Determine the capacity of each anchor group considering edge distances, spacing, and a factor of safety of 4

minimum against failure. Activate wedge type anchors by applying pre-determined torque recommended by the manufacturer. Do not use epoxy anchors unless approved by Consultant. Do not field weld at connections with epoxy anchors.

.17 Where drilled anchors are shown on the drawings, but the embedment length is not shown, provide manufacturer's standard embedment length.

2.3 FABRICATION

.1 Conform to CAN/CSA S16 and CSA W59.

.2 Orientate straight beams, which have cambers within allowable mill tolerances so that the resulting beam camber is up.

.3 Install stud anchors in the shop with end welds in accordance with the recommendations of the stud manufacturer. Lengths of studs given on drawings are the lengths after welding. Replace studs that crack in the weld or shank.

.4 Increase thickness of curved sections at no extra cost where necessary to fabricate and galvanize the required curvature or fabricate curved sections from plates at no extra cost where necessary to accommodate the required curvature.

.5 Reinforce holes through webs of beams as indicated on drawings or in accordance with design procedure set forth in the CISC Handbook of Steel Construction provided calculations are submitted as part of the shop drawings.

.6 Provide 16 mm diameter weep holes in base plates at all HSS columns, which are not made watertight or that are to be exposed to temperature changes.

.7 Provide vent holes in HSS sections where required for galvanizing process. Holes are not to exceed 16 mm diameter and are to be located so that any water inside HSS will drain away when HSS is in its final position. After galvanizing, fill vent holes with weld material, grind smooth and touch-up with two coats of zinc-rich paint.

.8 Where shop inspection is required, do not ship material to the site before it has been inspected.

2.4 LINTLS

.1 Structural Drawings do not show all lintels required. Refer to lintel notes and Typical Details on the Drawings.

.2 Provide lintels with a minimum of 150 mm bearing at each end but not less than the length of any specified bearing plate.

.3 .Weld or bolt together multiple member lintels. Provide spacers if separated. If angle seats are at different elevations provide steel packing.

.4 .Connect ends of suspended lintels to the structure and/or build into masonry to provide adequate restraint.

.5 .Connect ends of steel lintels to columns where openings are adjacent to columns.

2.5 PLATES AND ANCHORS

.1 Provide beams bearing on walls with bearing plates and wall anchors as specified.

.2 Weld steel members to bearing plates as required.

.3 Where bearing plate sizes are not noted on the Drawings, design bearing plates for a maximum factored bearing pressure of 1.65 MPa (240 psi) on masonry and 7.5 MPa (1100 psi) on concrete.

.4 Set beam bearing plates 12 mm back from edge of support.

.5 Extend beams for full length of bearing plates.

2.6 SUPPORTS AT COLUMNS

.1 Provide cap plates at tops of columns where required for support of deck, slab, joists or beams.

.2 Provide diagonal or cantilevered angles at sides of columns where required for support of deck or slab.

.3 Provide seat angles for support of masonry lintels above openings adjacent to columns. Unless otherwise noted on the Drawings, provide 76 x 76 x 9.5 steel angles attached to sides of columns. Length of seat to equal width of lintel minus 25 mm.

.4 Provide additional angle welded to column for support of precast or deck interrupted by column.

2.7 PAINTING AND GALVANIZING

.1 Clean steelwork prior to application of paint. Refer to CAN/CSA S16.

.2 Surface preparation in shop for paints shall be as follows:

.1 Shop paint CISC/CPMA 1-73a: Clean off all grease and oil to SSPC SP1 and remove all loose rust, loose scale, dirt, weld flux, etc. by any suitable method.
.2 Shop primer paint CISC/CPMA 2-75: Clean off all grease and oil to SSPC SP1. Clean steel to SSPC SP7 Brush-Off Blast Cleaning.
.3 Zinc-rich primer paint and intumescent paint: Clean off all grease and oil to SSPC SP1. Clean steel to SSPC-SP6 Commercial Blast Cleaning, to an average surface profile of 0.04 mm (1.5 mils) or more.

.3 Apply paint under cover. Steel shall be dry when painted and paint shall be dry before loading for shipment.
.4 Apply zinc-rich primer paint not more than 24 hours after blast cleaning, but prior to any visible rust occurring on the surfaces. Do not apply when relative humidity exceeds 80%. Apply to achieve a dry film thickness of 0.08 mm (3 mils).
.5 Apply one coat of shop paint CISC/CPMA 1-73a to steelwork in the shop with the exception of:

.1 Members to receive a finish coat of paint on site for which a CISC/CPMA 2-75 shop primer is required
.2 Members to receive intumescent paint on site for which a compatible shop primer is required
.3 Members for which zinc-rich paint is specified
.4 Galvanized members
.5 Surfaces encased in or in contact with cast-in-place concrete including top flanges of beams supporting slabs
.6 Surfaces and edges to be field welded for a distance of 50 mm from the joint.

.7 Contact surfaces of slip-resistant type joints assembled with high-strength bolts.
.8 Surfaces to receive spray fireproofing

.6 Unless otherwise noted, apply one coat of primer paint (CISC/CPMA 2-75) in the shop for steel to receive a finish coat of paint on site.
.7 Unless otherwise noted, apply one coat of compatible primer paint in the shop for steel to receive intumescent paint on site.
.8 Only paints tested to ASTM E736 and approved by the spray fireproofing supplier may be used for steel which will receive spray fireproofing.
.9 Apply galvanizing to:

.1 Shelf angles and hangers in exterior walls
.2 Lintels in exterior walls
.3 Exposed exterior steel members
.4 Other steel noted on the Drawings

.10 When welding after galvanizing is in place, grind away galvanizing at areas to be welded. Touch up with two coats of zinc-rich paint.
.11 Apply primer paint to architecturally exposed surfaces without runs or sags. Sand down and repaint areas not acceptable to the Consultant.
.12 Apply touch-up paint after erection to all areas which have been missed, field welded, scraped or chipped using the same paint as the shop coat or primer.
.13 Clean surfaces down to bare metal and apply two coats of zinc-rich touch-up paint to any galvanized surface, which has been damaged or field welded, and which is accepted by the Consultant as being capable of repair without galvanizing.
.14 Clean and prepare surfaces of bolts, which will receive a finished coat of paint in the same manner as the connected steelwork.
.15 At exposed exterior structural steel framing members which are to receive a fire-resistant coating, as specified in Section 09 96 43, apply one coat of zinc-rich primer paint, compatible with specified coating. Over zinc-rich primer, apply "Carboguard 888" primer supplied under Section 09 96 43. Comply with product manufacturer's printed instructions for preparation of steel, application of product (over zinc-rich primer), and handling after application.

2.8 EXPOSED STEEL

.1 Conform to the requirements of the A.I.S.C. Specification for Architecturally Exposed Structural Steel and to the additional requirements

given below when fabricating and erecting steel members which will remain permanently exposed to view.

.2 Remove all imperfections which are unsightly from members permanently exposed to view. Remove mill and shop marks.

.3 Provide continuous welding at exposed joints or fill between welds with an approved epoxy resin filler finished to the same profile as the adjacent weld. Joint shall be weathertight and suitable for painting.

.4 Exposed welds shall be smooth. Hide bolts in bolted connections. Where exposed bolted connections are permitted, adjacent bolt heads shall be on same side and extensions of shank beyond nuts shall be uniform and not exceed 20 mm.

.5 Do not mark surface with marks that are visible after painting.

PART 3 – EXEXUTION

3.1 CONSTRUCTION REVIEW

.1 General Review during Construction by the Consultant and Structural Engineer and the services of the independent inspection and testing agencies appointed by the Owner are undertaken so that the Owner may be informed as to the quality of the Contractor's performance and for the protection of the Owner. They will be carried out by examination of representative samples of the Work.

.2 The Contractor will receive copies of the construction review reports and the results of material tests. He will thereby be informed of any defects or deficiencies found. The provision of this information does not relieve the Contractor of his responsibility for the performance of the Contract and he shall implement his own supervisory and quality control procedures.

.3 Bring to the attention of the Consultant and Structural Engineer any defects or deficiencies in the Work, which may occur during construction together with a proposal for remedy. The Structural Engineer will decide what corrective action may be taken. The Consultant will issue the necessary instructions.

3.2 COOPERATION

.1 Cooperate with all engaged on the Project. Exchange with related trades shop drawings and other data required to coordinate and schedule Work. Deliver material for installation by other trades when required.

.2 Provide where shown or required, holes and copings for connection and clearance of the Work of other trades. Show on shop drawings before submitting for review. Holes in members shall not cause any appreciable reduction in strength.

.3 Do not cut holes in the field unless sizes and locations are accepted by the Consultant in each case. Accepted field cutting and welding shall be undertaken by this Trade.

.4 Supply and install framing around openings in steel roof and steel floor decks in accordance with Typical Details and Drawing Notes.

.5 Maintain horizontal bracing and its connections below the underside of the deck so as not to interfere with the seating of the latter.

3.3 EXAMINATION OF WORK

.1 Do not begin operations before making a thorough examination of existing conditions and the Work of related trades. Report inconsistencies before proceeding.

3.4 INSPECTION AND TESTING

.1 The Consultant will appoint an independent inspection and testing agency. Notify the Consultant two weeks in advance of the date when the first Work will be ready for inspection.

.2 Pay for the cost of inspection from the Cash Allowance.

.3 Assist the agency in its work. Do not commence fabrication until details of inspection have been worked out with the inspection agency.

.4 Work will be inspected when erected. Items to be cast into concrete will be inspected on site before being installed.

.5 The inspection agency will submit reports to the Consultant, Structural Engineer, Contractor and Municipal Authorities covering the Work inspected and provide details of errors or deficiencies observed.

.6 Inspection will include:

.1 Checking that the mill test certificates or producer’s certificates are satisfactorily correlated to materials and products supplied for the

project or that legible markings were made on the material and products by the producers in accordance with the applicable material or product standards. Where this is not possible, notify the Structural Engineer and carry out sample tests as described below when required by the Structural Engineer.

.2 Confirming that all materials meet specifications.

.3 Sampling fabrication and erection procedures for general conformity with the requirements of the Contract.

.4 Checking welders' CWB Certification.

.5 Checking fabricated members against specified member shapes.

.6 Checking fabricated members against allowable sweep and camber.

.7 Checking fabricated members against specified camber.

.8 Visual inspection of all welded connections including spot checking of joint preparation and fit up.

.9 Sample checking bolted joints.

.10 Sample checking stud anchors.

.11 Sample checking of drilled concrete and masonry anchors.

.12 Sample checking that tolerances are not exceeded during erection including fit-up of field welded joints.

.13 Inspection of field cutting.

.14 Shop paint, including surface preparation, and field touch-up.

.15 Galvanizing and field touch-up.

.16 Grouting under base plates and bearing plates.

.7 Arrange for the inspector to be present during the welding of 25% of moment connections and 25% of butt welds in direct tension.

.8 Sample testing: When required, test coupons will be taken and tested in accordance with CSA G40.20 to establish identification. Cut samples from member locations selected by Structural Engineer and provide to inspection and testing agency. Make good the locations if requested, at no extra cost, by adding new plates and welds acceptable to the Structural Engineer. The agency will have the samples tested for mechanical properties and for chemical composition and will classify the steel as to specification.

.9 Arrange for the inspector to start field inspection as soon as each section of the Work is completed, plumbed, bolts tightened and field welding finished.

.10 The inspector will check high-strength bolts in a representative 10% of bolted connections by torque testing each bolt. He will torque test 10% of

the remaining bolts at random, but not less than 2 bolts in each connection. He will remove nuts from 1% of all bearing bolts and check that thread is excluded from the shear planes.

.11 The inspector will randomly select and pull test 5% of all types and sizes of drilled in anchors installed on a weekly basis, but not less than one anchor of each type and size. Pull test to twice the design tension capacity of the anchor given by the manufacturer. Submit reports to Consultant within one week of testing. Reports to indicate each anchor location, test load and mode of failure, if applicable. Notify Consultant immediately if any anchor fails the pull test.

.12 The inspector will visually check all the adjustable connections at wall supporting members to ensure the connections have been finalized after the concrete is poured.

3.5 FILED MEASUREMENTS

.1 Make field measurements necessary to ensure the proper fit of members.

.2 Identify on shop drawings dimensions, which have been obtained by field measurement.

3.6 ERECTION

.1 Comply with the requirements of CAN/CSA S16.

.2 Submit a description of proposed erection methods and sequence to the Consultant for his records if requested.

.3 Make adequate provision for all loads acting on the structure during erection. Provide erection bracing to keep the structure stable, plumb and in true alignment until the completion of masonry Work and the completion of floor and roof decks which together provide the permanent bracing. Prepare erection bracing drawings signed and sealed by a professional engineer and keep these drawings on site until erection bracing is no longer required.

.4 Set column base plates with levelling screws to the proper elevation ready for grouting. Lift base plates for inspection when so directed.

.5 Column base plates and beam bearing plates shall be grouted as soon as steelwork is completed. Do not add load on steelwork until grouting is completed and grout strength has reached at least 20 MPa.

.6 Do not make permanent connections until as much of the structure as will be stiffened thereby has been properly aligned.

.7 Adjust and finalize connections at wall supporting elements affected by floor beam deflections after concrete is poured.

.8 Report ill-fitting connections to the Consultant before taking corrective measures.

.9 Do not weld in an ambient temperature below -17°C. Preheat material adjacent to welding areas when ambient temperature is between -17°C and +4oc.

.10 Remove slag from all completed welds so that they may be visually inspected.

3.7 DRILLED ANCHORS

.1 Conform to requirements of manufacturer. Use hammer drill to make holes. Turn off hammer when drilling masonry with voids. Hole diameters must never exceed those required by manufacturer. Tighten all expansion anchors using a torque wrench unless finger-tight is required by the Drawings to allow for movement. Unless otherwise noted on drawings, provide manufacturer's standard embedment length into solid concrete.

.2 Do not cut reinforcement to accommodate anchors. Relocate anchors, at no extra cost to the Contract, when obstructions prevent drilling holes to required depth in locations specified. Obtain Consultant's approval of new location before drilling hole. Fill all abandoned holes with grout.

.3 Arrange for manufacturer's technical representative to be present during installation of first few anchors of each size and type. Submit site reports by manufacturer to Consultant within one week of each visit. Reports to indicate anchor sizes and types installed, locations, and names of those present during installation.

3.8 SUSPENDED LOADS

.1 Do not overstress members supporting suspended loads. Hanger loads shall not exceed one kN (220 pounds). Loads from mechanical and heavy electrical services suspended from the steelwork shall not exceed the load allowance provided for such services and shall be distributed uniformly. Prevent torsion from hangers connected to beams by alternating their positions on either side of members. Do not apply twisting loads to joists and make attachment using U-bolts with double hangers or other devices that will centre the hanger load on the joist. Loads shall only be suspended directly at the panel points of joists, unless the chords of the joists have been specifically designed to support the concentrated loads.

.2 Steel Beams: Vertical loads must be applied so that they do not cause twisting of the beams or excessive bending of the flanges. Lateral loads are not to be applied to beams unless approved in writing by the Consultant's structural engineer.

3.9 REJECTED WORK

.1 Do not deliver to the site materials, which are known not to meet the requirements of the Specifications. If rejected after delivery, remove immediately from site.

.2 Where review reveals materials or workmanship which appear to have failed to meet the specified quality or tolerances, the Consultant shall have the authority to order tests made of materials; to order detailed field surveys and measurements; to order a structural analysis of the existing elements and to load test the structure. All such Work will be carried out in order to assist in determining whether the structure may, in the opinion of the Consultant, be accepted, with or without strengthening or modification. Testing shall meet the requirements of the Ontario Building Code. All expense incurred shall be chargeable to the Contractor regardless of the results.

END OF SECTION

METAL FABRICATION

PART 1 - GENERAL

1.1 RELATED WORK

.1	Rough Carpentry	Section 06 10 00
.2	Painting	Section 09 91 00

1.2 REFERENCES

.1	CAN/CSA G40.20/G40.21	General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
.2	CAN/CSA G164	Hot Dip Galvanizing of Irregularly Shaped Articles
.3	CSA W47.1	Certification of Companies for Fusion Welding of Steel
.4	CSA W48	Filler Metals and Allied Materials for Metal Arc Welding
.5	CSA W59	Welded Steel Construction (Metal Arc Welding)
.6	CSA W178.1	Certification of Welding Inspection Organizations
.7	CSA W178.2	Certification of Welding Inspectors
.8	ASTM A653 / A653M	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
.9	ASTM A53	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
.10	ASTM A325	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
.11	ASTM A307	Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

1.3 SHOP DRAWINGS

.1 Submit Shop Drawings in accordance with Section 01 33 23. Show and describe detail work of this Section including large scale details of members and materials, of connections, joining details, anchorage devices, dimensions, gauges, thicknesses, description of materials, metal finishing specifications, as well as all other pertinent data and information.

.2 Indicate field dimensions on shop drawings.

1.4 FABRICATION

.1 Design, fabricate and erect structural steel members in accordance with CAN/CSA-Sl6.1.

PART 2 – PRODUCTS

2.1 REFERENCES

.1	Structural Steel:	to CAN/CSA - S161.1; CAN/CSA-G40.20/G40.21.
.2	Welding Materials:	to CSA W59, CSA W55.3 for stainless steel, ASTM A371; for aluminum, ASTM B 285 and CSA-S244.
.3	Sheet Steel:	wiped coated, ASTM A 653; structural quality
.4	Prime Paint:	CGSB 1-GP-40 M.
.5	Bituminous Paint:	CGSB-1-GP-108 M.
.6	Zinc-Rich Coating:	organic zinc rich coating, “ZRC 221 Cold Galvanizing Compound” by ZRC Worldwide.
.7	Steel pipes:	to CAN/CSA-G40.20 type 300W.
.8	Galvanizing:	to CAN/CSA G164, G90.
.9	Sheet Aluminum:	2mm thick, clear anodized, satin finish.
.10	Stainless Steel:	Type 304 for interior work, Type 317 for exterior applications, No. 4 brushed finish
.11	Bolts and anchors bolts:	to ASTM A307.

2.2 SECTION INCLUDES

.1 Steel supports at benches in the washroom.

.2 Cavity wall steel anchors at new exterior door and frame.

2.3 MATERIALS

.1 Supply angles, bolts, anchors, sleeves and any other attachments to structure necessary for the installation of work under this Section.

.2 Steel sections and plates Steel Sections and Plates: to CAN/CSA-G40.21, Grade 300W.

.3 Steel Pipe: to ASTM-A53 standard weight galvanized finish.

.4 Welding Materials: to CSA-W59.

.5 Steel Sheet: Cold rolled to ASTM-A366/A366M

.6 Bolts and Anchor Bolts: to ASTM-A307.

.7 Galvanized Sheet Metal: To ASTM-A924/A924M.

.9 Grout: non-shrink, non-metallic, flowable, 24 hours, MPa 15, pull-out strength 7.9 Mpa.

2.4 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.

.3 Where possible, fit and shop assemble work, ready for erection.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush. Fill as required.

.5 Cap open ends of sections exposed to view.

.6 Provide all miscellaneous steel components required to complete the work of this section.

2.5 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m5 to CAN/CSA-G164.

.2 Shop Coat Primer: to CAN/CGSB-1.40, lead and chromate free.

.3 Zinc Primer: zinc rich, ready mix to CAN/CGSB-1.181-92.

.4 Bituminous Paint: to CAN/CGSB-1.108-M89.

2.6 ISOLATION COATING

.1 Isolate aluminum from the following components, by means of bituminous paint:

.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.

.2 Concrete, mortar and masonry.

.3 Wood.

2.7 SHOP PAINTING

.1 Apply one shop coat of primer to metal items, with the exception of galvanized or concrete encased items.

.2 Use primer unadulterated, as prepared by the manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7^0C.

.3 Clean surfaces to be field welded; do not paint.

2.8 FABRICATED ITEMS

.1 Galvanized cavity wall steel anchorage angles at jambs at exterior hollow metal doors; 10mm thick, 300mm x 150mm for full height of the door frame. Provide engineered shop drawings signed and sealed by a Professional Engineer, licensed in Ontario, to comply with O.B.C. standards.

.2 Galvanized Steel Support at Washroom Benches; Provide supports at maximum spacing of 800mm O.C. Provide mounting brackets with size and shape as indicated on the drawings.

PART 3 - EXECUTION

3.1 WORKMANSHIP

.1 Use only workmen skilled in the Work of this Section. Do work to best standard practice and in accordance with applicable laws, by- laws and regulations. Conform to the requirements of Authorities Having Jurisdiction.

.2 Fit and assemble work in shop where possible. Execute work according to details and reviewed shop drawings. Where shop fabrication is not possible, make trial assembly in shop.

.3 Welding: to CSA W59. File or grind exposed welds smooth and flush, so as to be invisible after painting.

.4 Make workmanship of best grade of modern shop and field practice known to recognized manufacturers specializing in this work. Fit joints and intersecting members accurately. Make work in true plumb, true, square, straight, level and accurate to sizes and shapes detailed, free from distortion or defects detrimental to appearance or performance.

.5 Insulate metals where necessary to prevent corrosion due to contact between dissimilar metals and between metals and masonry, concrete or plaster. Use bituminous paint, butyl tape, building paper or other approved means.

.6 Supply all fastenings, anchors and accessories required for fabrication and erection of the work. Make exposed metal fastenings and accessories of same material, texture, colour and finish as base metal on which they occur unless otherwise shown or specified. Keep exposed fastenings to

an absolute minimum and inconspicuous, spacing them evenly and setting them out neatly. Make fastenings of permanent type.

.7 Draw mechanical joints to hairline tightness and seal countersunk screws and access holes for locking screws with metal filler where these occur on exposed surface.

.8 Thoroughly clean all ferrous metals, by methods suitable to remove burrs, weld spatter, rust, loose mill scale, oil, grease, dirt and other foreign matter. Apply one coat of prime paint to all surfaces except those requiring field welding. Brush on thoroughly and work well into all crevices.

.9 After erection and installation, thoroughly clean the work and apply field touch up of same formula as shop coat to all damaged or unpainted surfaces. Work all paint well into all joints, crevices and open spaces.

.10 Galvanize all exterior work. Do all galvanizing after welding.

.11 After installation, remove any rust and touch up all galvanized work with two coats zinc rich coating.

3.2 MISCELLANEOUS ITEMS

.1 Examine the drawings and provide all metal brackets and supports detailed or indicated, with the exception of items included in custom cabinetry.

.2 Anchor Bolts, Lag Screws, etc.: Supply anchor bolts, washers and nuts, lag screws, expansion shields, toggles, straps, sleeves, brackets, etc. where required or called for on Drawings for work of this Section. Such items occurring on or in exterior wall or slab shall be hot dipped galvanized. Thread dimensions shall be such that nuts and bolts fit without re-threading or chasing threads.

.3 Miscellaneous Sections: Provide all miscellaneous steel angles, channels, tubes, plates, etc. of shapes and sized noted or required which are not included on Structural Drawings or called for in other Sections of the Specifications.

END OF SECTION

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED WORK

1.	Plastic Laminate Work	Section 06 41 16
2.	Hollow Metal Doors and Frames	Section 08 11 13
3.	Door Hardware	Section 08 71 00
4.	Painting and Coating	Section 09 90 00
5.	Electrical	Division 26, 27, 28

1.2 REFERENCES

.1	CAN/CSA O80-Series	Standards for Wood Preservation
.2	CSA O121	Douglas Fir Plywood
.3	CSA O141	Softwood Lumber
.4	CSA O151	Canadian Softwood Plywood
.5	CSA B111	Wire Nails, Spikes and Staples.

.6 National Lumber Grading Authority (NGLA), Standard Grading Rules for Canadian Lumber

1.3 DELIVERY AND STORAGE

.1 Do not deliver materials until they are required for incorporation into the work.

.2 Protect materials, under weatherproof cover, both in transit and on site.

.3 All exterior and interior finish materials shall, upon delivery, be neatly stored in a dry place and shall be protected from damage due to weather, water, or any other cause.

1.4 PROTECTION

.1 Protect fire-retardant materials against high humidity and moisture.

.2 Protect countertops and cabinets with 6 mm plywood or other suitable sheet material.

.3 Protect installed hardware from damage and blemishes.

PART 2 – MATERIALS

2.1 MATERIALS

.1 Wood materials: straight, sawn square, true, dressed four sides, properly sized and shaped to correct dimensions from nominal sizes indicated or specified.

.2 Lumber grade and moisture content:

.1 Comply with the official grading rules of NLGA for the particular lumber and grade, and structurally complying with the latest requirements of the Ontario Building Code.
.2 Comply with CSA Standard O141 Softwood Lumber. Use only grade marked lumber.

.3 All wood materials:

.1 Well-seasoned NLGA, free from defects which impair strength and durability.
.2 Moisture content limit:

.1 S-GRN: Unseasoned
.2 S-DRY: Maximum 19% moisture content
.3 KD: Maximum 15% moisture content

.4 Pressure Treated Lumber to CSA O80.

.5 Lumber for Exterior Fences and Enclosures: Select Grade Eastern White Cedar.

.6 Blocking, cant strips, grounds, nailing strips:

.1 NLGA No. 2 Ontario White Pine, No. 2 Red Pine, all complying with the grading rules of the NLGA for Construction,
.2 Douglas Fir dense complying with COFI standard grading and dressing rules.

.7 Douglas Fir plywood:

.1 comply with CSA Standard O121, COFI Exterior.
.2 Western softwood plywood - comply with CSA Standard O151, COFI Waterproof glue WSP. Exposed two sides shall be grade G2S, and exposed one side shall be grade G1S.

.8 Wood preservative:

.1 Pentox Green preservative and Osmose Cut End preservative, as manufactured by Osmose Pentox Inc.; Pentox Conservator Clear for painted wood.
.2 For painted surfaces use clear type and for concealed surfaces use green tinted type.

.9 Fire Retardant Treatment: To ULC S102; flame spread rating 25 or less.

.10 Rough hardware:

.1 nails, screws, bolts, lag screws anchors, special fastening devices and supports as required for the erection of all carpentry items.
.2 For preservative treated wood, use only stainless steel hardware, with the following exception:

.1 Where galvanized steel items, such as gates, flashings, etc., are being attached to wood, galvanized steel fasteners shall be used.

.3 Do not mix stainless steel with galvanized steel; contact of these dissimilar metals can cause galvanic corrosion.
.4 Stainless steel hardware to be type 317.
.5 Galvanized hardware must be hot-dipped galvanized as follows:

.1 Fasteners meeting CAN/CSA-G164 minimum zinc coating of 600 g/m2 (ASTMA153 Class A or B1 G 185).
.2 Connectors meeting CAN/CSA-G164 minimum zinc coating of 600 g/m2 (ASTM A653 Class G-185 sheet) or better.
.3 Electroplated galvanized hardware is not permitted.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Examine surfaces to receive the work of this Section and proceed only when conditions are satisfactory for a proper installation.

.2 Lay out work carefully and to accommodate work of other trades. Accurately cut and fit; erect in proper position true to dimensions; align, level, square, plumb, adequately brace, and secure permanently in place. Join work only over solid backing.

3.2 INSTALLATION – GENERAL

.1 Provide running members of the longest lengths obtainable.

.2 Slowly feed machine-dressed members using sharp cutters. Provide finished members free from drag, feathers, slivers or roughness of any kind. Remove machine marks by sanding.

.3 Machine sand surfaces exposed in the finished work and hand sand to an even smooth surface free of scratches.

.4 Properly frame material with tight joints and rigidly secure in place. Use glue-blocks were necessary.

.5 Design construction methods for expansion and contraction of the materials.

.6 Conceal joints and connections wherever possible. Locate prominent joints only where directed.

.7 Match joints made on the site with joints made in the shop.

.8 Unless otherwise specified glue and blind screw or nail all work. Set and fill and plug surface screws using matching wood plugs.

.9 Accurately scribe, cope and mitre members where required to produce hairline joints.

.10 Erect work plumb, level, square and to the required lines.

.11 Do not regard blocking, strapping and other rough carpentry indicated as complete or exact. Provide rough carpentry items required for the installation of the Work of other Sections.

.12 The use of pressure treated wood is required for the following:

.1 Wood in direct contact with the ground or framed into concrete below ground level.
.2 Structural wood elements within 150mm of ground.
.3 In termite areas, for all structural wood elements within 450mm of ground.
.4 Wood framing members without a dampproof membrane separating the wood framing member from concrete in contact with the ground.
.5 Building components where moisture may accumulate.

.13 Aluminum must not be in direct contact with pressure treated wood. Provide minimum 6mm spacing between aluminum products and treated wood, with10mil polyethylene barrier and polyethylene or nylon spacers.

3.3 INSTALLATION - ROUGH CARPENTRY

.1 Blocking and Grounds: Fasten wood nailers, blocking, bucks, grounds curbs, copings and strapping solidly to supporting materials in true planes so that they will remain straight and not be loosened by work of other Trades.

.2 Framing: Do all wood framing in accordance with the Ontario Building Code latest version and to CAN 3 086 as applicable.

.3 Wood Cants, Copings: Fasten wood cant blocking to structure with 19 mm. dia. bolts 760mm o.c. Fasten curbs as indicated. Wood cants, curbs and copings to be preservative treated. Plywood to be exterior grade.

.4 Preservative:

.1 Apply preservative to concealed wood members in contact with exterior walls and roof before fixing in place.
.2 Apply preservative to all cut ends of pressure treated wood.
.3 Preserve all other wood indicated to be preserved. Use clear preservative for items to be painted.
.4 Preserve wood by immersing in preservative for at least one hour.

3.4 INSTALLATION - ELECTRIC AND TELEPHONE BACKBOARDS

.1 Supply and install 19mm thick backboards of fir plywood, fire retardant, pressure treated, solid, good 2 sides, sanded both sides, in electrical and telephone rooms to sizes required by equipment.

.2 Before installation, all backboards are to be prime painted, both sides. Painting to be in conformance to Specification Section 09 91 00 - Painting

.3 Fasten to wall using fasteners and spacing suitable to wall type to provide secure, sturdy installation which will carry equipment load without damaging wall. Confirm heights and locations required with electrical Subcontractor.

.4 Painting shall be done in accordance with Section 09 90 00 – Painting.

END OF SECTION

FINISH CARPENTRY

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 All finished wood items and trim, other than custom cabinetry, shown on drawings.

.2 Benches in Washrooms.

.3 Installation of shop fabricated casework, including wood trim pieces and corridor cubby millwork.

.4 Site fabricated fitments.

.5 Installation of door hardware and miscellaneous hardware.

1.2 REFERENCES AND RELATED WORK

.1 ANSI-A208.1-1993, Particleboard, Mat-Formed Wood.

.2 AWI/AWMAC - 2005, Architectural Woodwork Quality Standards.

.3 CSA-B35.4, Wood Screws.

.4 CSA-B111-1974, Wire Nails, Spikes and Staples.

.5 CAN/CSA-G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.

.6 CSA-O115-M1982, Hardwood and Decorative Plywood.

.7 CSA-O121-M1978, Douglas Fir Plywood.

.8 CAN/CSA-O132.2 Series-90 (R1996), Wood Flush Doors.

.9 CAN/CSA-O141-91, Softwood Lumber.

.10 CSA-O151-M1978, Canadian Softwood Plywood.

.11 CSA-O153-M1980, Poplar Plywood.

.12 CAN3-O188.1-M78, Interior Mat-Formed Wood Particleboard.

.13 NHLA, Rules for the Measurement and Inspection of Hardwood and Cypress, January 1986.

.14 NLGA, Standard Grading Rules for Canadian Lumber, 1994.

.15 Rough Carpentry: Section 06 10 00.

.16 Architectural Woodwork: Section 06 41 13.

1.3 SUBMITTALS

.1 Submit samples in accordance with Section 01 33 00 - Submittals.

.2 Samples: sample size shall be 300mm by 300mm or 300mm long unless specified otherwise of each wood species which is to receive finishing at the job site; finished samples of each panel material which has a factory applied finish; PVC edge strip.

.3 Submit Shop Drawings in accordance with Section 01 33 42 - Submittals.

.4 Indicate details of construction, profiles, jointing, fastening and other related details.

.5 Indicate all materials, thicknesses, finishes and hardware.

1.4 DELIVERY AND STORAGE

.1 Protect materials against high humidity and moisture at all times.

.2 Store materials in ventilated areas, protected from extreme changes of temperature or humidity.

.3 Wood door delivery, storage and handling shall be in accordance with AWI/AWMAC Quality Standards.

.4 Delivered materials, which are damaged in any way will be rejected by the Consultant and shall be removed from the site and replaced with acceptable materials.

PART 2 – MATERIALS

2.1 MATERIALS AND ACCESSORIES

.1 Wood materials - straight, sawn square, true, dressed four sides, properly sized and shaped to correct dimensions from nominal sizes indicated or specified.

.2 Lumber grade and moisture content - comply with the official grading rules of NLGA for the particular lumber and grade, and structurally complying with the latest requirements of the Ontario Building Code. Comply with CSA Standard 0141 Softwood Lumber. Use only grade marked lumber.

.3 All wood materials unless noted otherwise - well seasoned NLGA, free from defects which impair strength and durability. Moisture content limit: S-GRN: Unseasoned; S-DRY: Maximum 19% moisture content: KD: Maximum 15% moisture content.

.4 Hardwood Lumber: Select white birch moisture content of 7% or in accordance with:

.1 National Hardwood Lumber Association NHLA
.2 AWI / AWMAC custom grade moisture content as specified.

.5 Douglas Fir plywood - comply with CSA Standard O121, COFI Exterior. Exposed two sides shall be grade G2S, and exposed one side shall be grade G1S.

.6 Canadian Softwood Plywood - comply with CSA Standard O151, COFI Waterproof glue WSP. Exposed two sides shall be grade S2S and exposed one side shall be grade S1S.

.7 Hardwood plywood - conforming to CSA O115 and AWMAC. Face veneer: plain sliced, bookmatched, Select White Maple, veneer facing with solid core of interior mat-formed wood particleboard to CAN3-O188.1.

.8 Solid Wood Gables at Cubbies and Solid Core Wood Doors: to CSA-O132.2, Plain Sliced, bookmatched, Select White Maple, veneer facing with solid core of interior mat-formed wood particleboard to CAN3-O188.1.

.9 Particleboard: medium density, M-3 grade to ANSI-A208.1.

.10 Poplar Plywood (PP): to CSA-O153, standard construction.

.11 Fasteners:

.1 Wood screws: electroplated, to CSA-B35.4.
.2 Nails and Staples: to CSA-B111.
.3 Splines: metal.
.4 Adhesives: as recommended by manufacturer.

.12 Melamine Panels:

.1 Melamine overlay, thermofused under heat and pressure to particleboard core. Colour will be selected by the Consultant.

.2 Overlay shall be bonded to both faces where exposed on two sides, and when the panel material requires a finished surface on one side only, the reverse side shall be overlaid with a plain buff balancing sheet.

.3 Edge finishing: matching 3.2mm PVC edge strip, colour and pattern through full thickness of material.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Examine surfaces to receive the work of this Section and proceed only when conditions are satisfactory for a proper installation.

3.2 INSTALLATION – GENERAL

.1 Provide running members of the longest lengths obtainable.

.2 Slowly feed machine-dressed members using sharp cutters. Provide finished members free from drag, feathers, slivers or roughness of any kind. Remove machine marks by sanding.

.3 Machine sand surfaces exposed in the finished work and hand sand to an even smooth surface free of scratches.

.4 Properly frame material with tight joints and rigidly secure in place. Use glue-blocks where necessary. Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.

.5 Design construction methods for expansion and contraction of the materials. Form joints to conceal shrinkage.

.6 Conceal joints and connections wherever possible. Locate prominent joints only where directed.

.7 Match joints made on the site with joints made in the shop.

.8 Unless otherwise specified glue and blind screw or nail all work. Set and fill and plug surface screws using matching wood plugs.

.9 Accurately scribe, cope and mitre members where required to produce hairline joints.

.10 Erect work plumb, level, square and to the required lines.

.11 Install shop fabricated casework and millwork. Refer to Section 06 41 13 - Architectural Casework.

.12 Install site fabricated fitments as shown on Drawings.

.13 Install hollow metal doors. Refer to Section 08 11 13 – Hollow Metal Doors and Frames.

.15 Install door hardware. Refer to Section 08 71 00 - Door Hardware.

.16 Install miscellaneous cabinetry hardware. Refer to Section 06 41 13 – Architectural Casework and Hardware.

3.3 CONSTRUCTION

.1 Provide Fastening:

.1 Position items of finished carpentry work accurately, level, plumb, true and fasten anchor securely.

.2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturers.

.3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round cleanly cut hole and plug with

wood plug to match material being secured.

.4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

.2 Shelving: Install shelving on ledgers or shelf brackets, as indicated.

END OF SECTION

ARCHITECTURAL CASEWORK

PART 1 – GENERAL

1.1 SCOPE OF WORK AND RELATED WORK

.1 Provide all casework indicated on drawings including the following.

.2 Rough Carpentry Section 06 10 00.

.3 Plastic Laminate Work Section 06 41 16.

.4 Resilient Base Section 09 65 00.

.5 Painting and Coatings Section 09 91 00.

.6 Plumbing Work Division 22.

.7 Electrical Work Division 26.

1.2 REFERENCES

.1 ANSI-A208.1-1993, Particleboard, Mat Formed Wood.

.2 ASTM-A167-96, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.3 AWI/AWMAC-2005, Architectural Woodwork Quality Standards.

.4 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.

.5 CAN3-A172-M79 (R1996), High Pressure Paper Base, Decorative Laminates.

.6 CSA-B111-1974, Wire Nails, Spikes and Staples.

.7 CAN/CSA-O141-91, Softwood Lumber.

.8 CAN3-O188.1-M78, Interior Mat-Formed Wood Particleboard.

.9 NHLA, Rules for the Measurement and Inspection of Hardwood and Cypress January 1986.

.10 NLGA, Standard Grading Rules for Canadian Lumber 1994.

1.3 QUALIFICATIONS

.1 All Work to conform to minimum standard for premium Grade Work as specified in Quality Standards for Architectural Woodwork prepared by Architectural Woodwork Manufacturers Association of Canada (AWMAC).

.2 All Work to be subject to inspections at the plant and site by an appointed inspector, approved by the Architectural Millworkers of Ontario. The cost of inspections shall be paid from the cash allowance.

.3 Work which does not meet AWI/AWMAC Quality Standards shall be replaced by the Subcontractor at no additional cost to the Owner and to the satisfaction of the Consultant and the inspector.

.4 The architectural woodwork Subcontractor shall be a member in good standing of the Architectural Woodwork Manufacturers Association of Canada (AWMAC).

.5 The millwork manufacturer shall have not less than five (5) years proven experience in institutional millwork and shall be able to provide any sureties as required by the Owner.

1.4 INTENT

.1 The intent of this Section is that the casework shall be manufactured and finished at the plant, delivered to the site and immediately installed by this Section including provision of necessary strapping, backings, bearers, rough hardware and finish hardware. Touch up finish immediately prior to completion of the Work and leave in perfect condition.

.2 It is also the intent of this Section that all casework be manufactured with low or no VOC products, to minimize VOC emissions in the finished products.

1.5 SUBMITTALS

.1 Submit Shop Drawings of all finish carpentry and in accordance with

Section 01 33 23 –Shop Drawings.

.2 Draw Shop Drawings in related and/or dimensional positions with sections. Scaleminimum 1:10.

.3 Shop Drawings shall show fabrication details, materials, jointing, description of anchorageand hardware. Dimensions shall be based on actual measurements taken at the Site.

Provide details and dimensions for all fittings and the like for mechanical and electricalconnections to this work.

.4 Submit product data for all finishes.

.5 Submit samples of materials, construction method and finishes for Consultant's approval.

The colour of stain shall be selected by the Consultant; submit prepared 300mm by300mm finished samples for approval.

.6 Submit samples of all hardware.

.7 Submit duplicate samples at 300mm by 300mm of the following:

.1 Typical finished door panel.

.2 Colour samples of each type of laminated plastic linoleum selected.

.3 Each type of melamine panel.

.4 Each type of solid wood and plywood used in exposed work with examples of finish.

1.6 CO-OPERATION

.1 Co-operate with other Sections and do all cutting, fitting and making good of own work for all Sections as may be necessary to carry out the true intent of the Drawings and Specifications. Examine the work and materials installed by others insofar as it affects thisWork, and report to Consultant any such work not done properly.

1.7 OWNER'S EQUIPMENT

.1 Confirm all standard appliance and equipment dimensions with the OWNER prior tofabrication.

1.8 MEASUREMENTS

.1 Take necessary measurements at the Building of spaces and conditions to which workmust conform or through which access is required. Take such measurements prior tofabrication of the Work of this Section and in ample time to avoid delays in the Work.

1.9 DELIVERY AND STORAGE

.1 Do not deliver finished material during rain or damp weather or until "Wet Trades" have completed their work and windows are glazed or covered. Carefully protect from damageof any kind.

1.10 WARRANTY

.1 Provide an extended Warranty to the General Conditions of the Contract to two (2) yearsfrom date of Substantial Performance of the Contract.

.2 The warranty shall cover replacing, reworking and/or refinishing to make good defects inarchitectural woodwork due to faulty workmanship or defective materials, which appear during this two (2) year period. Work showing defects during this period shall be replaced or made good without delay and at no cost to Owner.

PART 2 – MATERIALS

2.1 MATERIALS

.1 Softwood Lumber: unless specified otherwise, S4S, moisture content 7% or less inaccordance with following standards:

.1 CAN/CSA-O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.3 AWI/AWMAC custom grade, moisture content as specified.

.2 Machine stress-rated lumber is acceptable for all purposes.

.3 Hardwood Lumber: Select White Maple moisture content 7% or less in accordance with following standards:

.1 National Hardwood Lumber Association (NHLA).

.2 AWI/AWMAC custom [premium] grade, moisture content as specified.

.4 Particleboard: medium density M-3 grade to ANSI-208.1.

.5 Maple Plywood: to AWI/AWMAC Quality Standards. G2S where both sides are exposed, G1S where only one side is exposed, Select White Maple, plain sliced and bookmatched face veneer, Grade A, core as specified.

.6 Maple Plywood: to AWI/AWMAC Quality Standards. G2S where both sides are exposed, G1S where only one side is exposed, Select White Maple, plain sliced and bookmatched face veneer, Grade A, core as specified.

.7 Laminated Plastic: to CAN3-A172. Refer to Section 06 41 16 - Plastic Laminates for type and finish.

.8 Melamine Panels:

.1 Melamine TFL overlay, thermofused under heat and pressure to medium density M-3 grade particleboard core.

.2 Overlay shall be bonded to both faces.

.3 Melamine panels are to be provided at all concealed panels within cabinetry and closets.

.4 Acceptable Products:

.1 Panolam: Winter White, Satin Finish, supplied by Wanderosa Wood Products Inc.

.2 Panval: 113 Super White, Suede Finish supplied by Uniboard.

.9 Provide plastic laminate finish. Refer to Section 06 41 16 - Plastic Laminates for type and finish.

.10 Hardwood Edging:

.1 All exposed edges on maple plywood shall be banded with 3mm hardwood maple edging.

.2 Edging shall be multi-layered natural wood made from 0.6mm veneers laminated together with PVA glue containing no hazardous ingredients and having no harmfuleffects on health or the environment.

.3 Final assembly of the edging shall be surface sanded to 180 grit and roughlysanded on the reverse side for good adhesion.

.4 The top layer of the edging shall have a continuous high quality veneer to match theplywood with minimal colour variation.

.5 All layers of the edging shall have asymmetrical finger joints.

.6 All edging shall be stored in a controlled humidified environment prior to applicationin order to provide proper adhesion.

.11 PVC Edging: 3.2mm thick, colour and pattern through full thickness of material to matchpanel finish, with rounded edges.

.12 Nails and Staples: to CSA-B111.

.13 Wood Screws: steel type and size to suit application.

.14 Splines: metal.

.15 Sealant: Refer to Section 07 92 00 - Sealants. Use aluminum coloured sealant atstainless steel locations.

2.2 MANUFACTURED UNITS

.1 Casework: General.

.1 This article covers all casework unless detailed or specified otherwise.

.2 Fabricate casework to AWI/AWMAC custom quality grade and to details and sizes as indicated.

.3 Furring, blocking, nailing strips, grounds and rough bucks and sleepers.

.1 S2S is acceptable.

.2 Board sizes: "Standard" or better grade.

.3 Dimension sizes: "Standard" light framing or better.

.2 Case Bodies:

.1 Panels, 19mm thick, particleboard core.

.2 Provide melamine finish at concealed panels.

.3 Provide plastic laminate finish at exposed panels.

.4 Refer to Section 06 41 16 – Plastic Laminates for type and finish.

.5 PVC edging, colour to match melamine and plastic laminate panel finish.

.6 Cabinet base: water resistant plywood, with veneer core, attached to melamine cabinet separately. Ensure that melamine gables do not come into contact with the floor.

.7 Toe Kick Rail: 19mm thick by 100mm high, water resistant plywood with veneer core, machined to receive four screws for attachment to bottom front edge of gables.

.3 Backs:

.1 Base cabinets: 6mm thick melamine panels.

.2 Wall cupboards: 13mm thick melamine panels.

.4 Shelving:

.1 White melamine finish.

.2 For spans up to 900mm: 19mm plywood.

.3 For spans greater than 900mm and up to 1200mm: 25mm plywood.

.4 For spans greater than 1200mm: support with intermediate gable.

.5 Edging: hardwood edging, 3mm thick.

.5 Drawers:

.1 Face: melamine finish at concealed faces and plastic laminate finish at exposed/finish faces, 19mm thick, particleboard core.

PVC edging colour to match face finish. Refer to Section 06 41 16 - Plastic Laminates for type and finish.

.2 Drawer Box: Front, back and sides - melamine panels 13mm thick, particleboard core, white colour. Melamine edging to match drawer box finish.

.3 Drawer Bottom: melamine panels, 6mm thick, particleboard core.

.6 Casework Doors:

.1 Plastic laminate finish at all faces, 19mm thick, particleboard core.

. 2 Refer to Section 06 41 16 - Plastic Laminates for type and finish.

. 3 PVC edging, colour to match door finish.

.7 Counter Tops:

.1 Postformed: Laminated plastic on 19mm particleboard. Apply coating of water-resistant sealer to all exposed surfaces of core material at sink cutouts.

.2 Self-edge Flatwork: Laminated plastic on 19mm particleboard.

.3 Refer to Section 06 41 16 for Plastic Laminates.

.8 Set finish nails and countersink screws below finished surfaces, apply plain wood filler to indentations, sand, smooth and leave ready to receive finish.

.9 Shelving to cabinetwork shall be adjustable unless otherwise noted.

.10 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.

.11 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.

2.3 KITCHEN COUNTERS

.1 General: material thicknesses shall be as indicated on details.

.2 Counters to continuous stainless steel finish, 16ga type 304 #4 stainless steel, rounded edges.

.3 Acceptable Manufacturers:

.1 Design Stainless Steel Ltd., Tel: 647.499.8244

.2 Tru Stainless, Tel: 416.754.8743.

.3 Equivalent Manufacturers are acceptable.

2.4 WASHROOM BENCHES

.1 Fabricate to AWMAC quality standards. Solid birch hardwood slats. Refer to drawings for thickness and sizes.

.2 Provide all required blocking and nailers.

.3 Provide steel wall hung support brackets. Refer to drawings and specification Section 05 52 00 – Metal Fabrications.

.4 Birch veneer fitments and solid Maple fitments and trim shall be finished in accordance with Section 1500 – Factory Finishing of AWI/AWMAC Quality Standards.

.5 Transparent clear finish: Post-Catalyzed Lacquer Finish System, Stain gloss finish.

.6 Melamine surfaced panels shall be finished on both sides in the same colours, patterns and grain.

2.5 CABINET AND MISCELLANEOUS HARDWARE

.1 The hardware specified herein is to be provided as listed. Any proposed substitutions must be submitted to the Consultant for approval prior to shop drawing submission.

.2 Proposed substitutions must be equal or better quality than the specified items and will be considered at the Consultant's discretion.

.3 Furnish and install all hardware to custom millwork as per below.

.4 Hardware for 19mm thick cupboard doors:

.1 Hinges: Hettich, Selekta Pro 2000, Finish 619.

.2 Hinge Plates: One piece plate within minimum 3mm height adjustment. Install using pre-mounted system screws. Wood

screw fastening system is not acceptable.

.3 Roller Catches: Richelieu, Selekta Pro 2000, Finish 603.

.4 Pulls: Recessed, Richelieu, 3100-310075160174, Finish 630.

.5 Cupboard Deadbolt Lock: Hafele, 235.08.358 Finish Polished Nickel. Provide complete with lock cores, 210.04.606 and cylinder rosettes 210.04.062.

.6 Strike Plates: Hafele, Gable Catch 239.61.319, Colour black. Provide bottom slot 239.08.705.

.7 Elbow Latch and Strike: Richelieu, 5540180, Finish 619.

.5 Hardware for Drawers:

.1 Slides: Knape & Vogt, GS4270 Full Extension, Finish in Zinc. Provide drawer slide type soft close for 100 pds, length to suit.

.2 Pulls: Recessed, Richelieu, 3100-310075160174, Finish 630.

.3 Drawer Locks: Hafele, 235.08.303, Finish Nickel. Provide complete with lock cores, 210.04.606 and cylinder rosettes 210.04.062.

.6 Bumpers: Polyurethane, 3mm high by 10mm diameter. Minimum 2 per door and drawer front.

.7 Hardware for Adjustable Shelves:

.1 Pilaster Strips: Knape & Vogt, 255 ZC Steel, Finish in Zinc.

.2 Pilaster Strips: Knape & Vogt, 255 ZC Steel, Finish in Zinc.

.8 Hardware for 38mm thick cupboard doors:

.1 Hinges: Stanley, F179 102x102, Finish 619.

.2 Roller Catches: Richelieu, 504XV, Finish 625.

.3 Surface Bolts: Richelieu, 392, Finish 646.

.9 Cabinet Keying: All cabinet and drawer locks in a room to be keyed alike. Provide 6 extractor keys.

2.6 FABRICATION – GENERAL

.1 Check job dimensions and conditions and notify the Consultant in writing of unacceptable conditions. Do not proceed until remedial instructions are received.

.2 As far as practical, assemble work at the shop and deliver to the job ready for installation.

Leave ample allowance for fitting and scribing on the job.

.3 Fabricate work square and to the required lines. Recess and conceal fasteners and anchor heads. Fill with matching wood plugs. All fixed elements must be glued and screwed or dowelled to ensure rigid construction.

4. Comply with glue manufacturer's recommendations for lumber moisture content, glue life, pot life, working life, mixing spreading, assembly time, time under pressure and ambient temperature.

.5 Provide exposed end grain of solid members and edges of exposed plywood and particleboard with matching solid hardwood edging at least 6.4mm thick.

.6 Make all necessary cut-outs in architectural casework for sinks and electrical switch and outlet boxes and pre-drill all mounting holes for faucets, fittings and outlet boxes. Refer to electrical and mechanical Drawings and specifications.

.7 Provide and install pipe covers, scribing pieces, top, bottom and/or and closures and filler panels where necessary, including wherever units require furring out or blocking to existing conduits, pipes, etc.

.8 Provide trim around dishwashers, ranges, microwaves and other under-counter appliances after installation of appliances.

.9 Provide continuous trim in matching plastic laminate finish at a 50mm height above all upper cabinets in continuous rows of millwork.

.10 Service cover panels to be provided at all kneehole drawer units, kneehole front rails and knee drawer table assemblies. End closing panels to be provided at all exposed ends of service strips and island/peninsula assemblies. Front filler panels to be provided where

called for on Drawings and as required by field conditions.

.11 Resilient base around all toe spaces.

2.7 BASE CABINET CONSTRUCTION

.1 All cabinet work shall be factory assembled in modular, unitized construction. Carefully machine with dovetailed mortised and tenoned or blind dado joints. Each unit shall be self-supporting and designed to be bolted together with fasteners inside units with plastic plugs over fasteners. All joints to be securely glued. Fabricate units as per drawings and as specified.

.2 Gables to be 19mm particle board core with 8mm thick melamine finish at concealed panel faces, tongue and grooved to solid framing members. Provide PVC edging with colour to match melamine panel finish. Provide plastic laminate finish at exposed/finished panel faces. Refer to Section 06 41 16 – Plastic Laminate Work.

.3 Provide top front, top back rails and posts of solid hardwood 19mm x 50mm framing members, tongue and grooved together and dadoed to gables unless noted otherwise.

.4 Bottom to be 19mm particle board core with melamine finish.

.5 Provide all base cabinets with minimum 100mm high toe space of 19 mm material setback from front face of cabinets 100 mm minimum. Provide one coat of sealer to toespace. Ensure compatibility with resilient base adhesive.

.6 Doors generally to be flush overlay 19mm minimum particle board with melamine finish at concealed panel faces and PVC edges all four sides of colour to match door face. Interior face of door to be considered a finished face. Provide plastic laminate finish at exposed/finished panel faces. Refer to Section 06 41 16 – Plastic Laminate Work.

.7 Back panels minimum 6mm thick melamine panels removable within unit where access required behind.

.8 Refer to details on architectural drawings.

.9 Provide all drawers with spring hinged stops to prevent accidental removal of drawer. Provide guides and slides for all drawers as

specified above, sized for depth of drawer. Top hung drawer slides or grooved drawer sides for runners are not acceptable.

.10 Shelves - 19mm. minimum hardwood plywood with solid wood edging, front and back.

Melamine finish acceptable.

.11 Sit all adjustable shelves on pilaster clips. Pilasters to be recessed into gables.

2.8 UPPER CABINET CONSTRUCTION

.1 Construct upper cabinets generally similar to base cabinets.

.2 Shelving to be open shelving generally 300mm deep unless specifically noted. Provide centre pilaster to all shelves 1200mm long or over. Back to be 6mm melamine finished to match exterior.

.3 Sit all adjustable shelves on pilaster clips. Pilasters to be recessed into gables, and fastened with screws. Staples are NOT acceptable.

.4 Provide centre gable to units 1200mm long where glass doors installed and also provide stiffener under bottom at front 25mm x 57mm on all cabinets to prevent deflection.

.5 Provide extended top, bottom and exposed gables where furring out of upper cupboards is required due to pipes, conduits, exhaust ducts, and the like behind to provide a flush face at walls. Extend enclosure to ceiling where necessary to conceal ducts and the like.

.6 Provide continuous 19mm thick trim panel in matching plastic laminate finish at a 50mm height above all upper cabinets in continuous rows of millwork.

2.9 FINISHING - WOOD CASEWORK

.1 Carefully prepare all woodwork to receive finish. Thoroughly sand all wood surfaces to remove machine marks and make dust-free before finishing.

.2 Finish all exterior surfaces and interior of exposed cases with one coat

of selected stain, one coat of sealer, sanded smooth, and three coats of finish as specified. Apply finish in accordance with best practice; the resultant finish must be of highest quality for furniture use.

.3 Finish unexposed surfaces with two coats of tinted sealer.

PART 3 - EXECUTION

3.1 INSTALLATION

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

.2 Provide heavy duty fixture attachments for wall mounted cabinets.

.3 Install all shelving, counter tops and sliding doors.

.4 Use draw bolts in countertop joints.

.5 At junction of plastic laminate counter, back splash and adjacent wall finish, apply small bead of sealant.

.6 Apply water resistant building paper over wood framing members in contact with masonry or cementitious construction.

.7 After installation, fit and adjust operating hardware for wood cabinet doors, drawers and shelves.

3.2 CLEANING

.1 Clean millwork and cabinet work, inside cupboards and drawers and all outside surfaces.

3.3 PROTECTION

.1 Protect millwork and cabinet work from damage until final inspection.

END OF SECTION

PLASTIC LAMINATE WORK

PART 1 - GENERAL

1.1 SCOPE OF WORK AND RELATED WORK

.1 Provide all plastic laminate work indicated on the drawings.

.2 Coordinate with millwork subtrade.

.3 Countertops, cabinetry finished/exposed faces, and modular control panel face panels are to be plastic laminate finish.

.4 Countertops in the kitchen are to be stainless steel finish. Refer to Section 06 41 13.

.5 Finish Carpentry Section 06 10 00.

.6 Architectural Woodwork Section 06 41 13.

.7 Electrical Work Division 26, 27, 28.

1.2 SUBMITTALS

.1 Refer to Section 01 33 23.

.2 Submit two 300 x 300mm samples of all materials to the Consultant for approval. The samples shall be identified by the project number, date and the name of the contractor the samples shall show colours and details of edging, forming and construction. The materials used in the building shall correspond to the approved samples.

.3 Shop Drawings:

.1 Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
.2 Show full-size details, edge details, attachments, etc.
.3 Show locations and sizes of furring, blocking, including concealed blocking and reinforcement required.
.4 Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers and other items installed in countertops.

.4 Submit data sheets for particle board, plywood, adhesives, joint sealants, and sealers.

.5 Maintenance Data and Materials:

.1 Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in project closeout documents.
.2 Provide maintenance kit for finishes.

1.3 PROTECTION

.1 Refer to General Instructions Section 01 10 00.

.2 Handle and store panels in accordance with manufacturers recommendations. Plastic laminate surfaces and cabinets shall be covered with heavy kraft paper, or tops shall be put in cartons for protection during shipment.

.3 If protective film is provided, do not remove until counters have been installed.

.4 Remove any stickers immediately after installation

.5 Protect installed laminate surfaces with heavy kraft paper secured in position with masking tape. Do not remove until final inspection.

.6 Comply with the printed directions, issued by the material manufacturers.

1.4 WARRANTY

.1 Plastic laminate work shall be warranted against warping or delamination for a period of two (2) years from the date of Substantial Performance of the Contract.

.2 Work showing defects during the warranty periods shall be replaced or made good without delay and at no expense to the Owner.

PART 2 – MATERIALS

2.1 MATERIALS - PLASTIC LAMINATE COUNTERTOPS

.1 Plastic laminate:

.1 Conforming to CAN3-A172; as indicated below.
.2 1.6mm (.062") thick, general purpose grade for flatwork, type 1.
.3 1.25mm (.050") thick standard postforming grade for shaped profiles and bends, type 2;
.4 Finishes to be matte, as selected by the Consultant from the manufacturers standard range of colours from the product line of one of the following manufacturers: Formica, Nevamar or Wilsonart.
.5 Laminated Plastic Backing Sheet: general purpose grade S not less than 0.5mm thick or same thickness and colour as face laminate.
.6 Laminated Plastic Liner Sheet: general purpose grade type 1, thickness 0.75mm white colour.

.2 Cores:

.1 Wood products shall be FSC certified, manufactured with no added urea formaldehyde.
.2 Particle board shall be NuGreen 2 NAUF particle board, as manufactured by Uniboard, meeting the requirements of ANSI A208.1 Grade M-2. Surface shall be smooth, dense, and free from loose particles, or defects which will telegraph through the laminate.
.3 Plywood core - fir core, poplar faced, 3, 5, or 7 ply, exterior grade veneer plywood, urea-formaldehyde free. Faces and second ply shall be without voids, or fir plywood conforming to CSA 0121, graded solid faces, 3, 5, or 7 ply.
.4 Provide waterproof cores in countertops with sinks and in all other areas where moisture is possible.

.3 Adhesives:

.1 Formulated for use in decorative laminate fabrication and to suit the conditions of application without failure.

.2 Adhesive conforming to CSA 0112 Series, no added urea formaldehyde; Greenguard certified low emitting products, type Laminated Plastic Adhesive: contact adhesive to CAN/CGSB-71.20.

.3 Adhesive for countertops where sinks will be installed is to be water resistant.
.4 Adhesive shall be acceptable to the laminate manufacturer.
.5 Plastic Laminate adhesives applied onsite and used within the weatherproofing system must have a VOC content equal to or less than 20 g/L as per section 01 67 00.

.4 Sealant - approved water-resistant sealer or glue, low VOC.

.5 Draw bolts - mechanical devices of approved manufacture which can be recessed into the core of decorative laminated panels and used to draw two parts together for permanently tight joints. Fixing clips - 1.6mm. (16 ga.) steel, galvanized (or prime painted), as detailed.

2.2 FINISH SCHEDULES

.1 Refer to room finish schedule and drawings for details of countertop work and cabinetry work.

2.3 PLASTIC LAMINATE WORK

.1 All units shall be shop fabricated. Plastic laminate shall be applied to an approved underlayment with a thermosetting adhesive.

.2 Build work plumb, true and square. Arrange adjacent parts of continuous laminate work to match in colour and pattern.

.3 Obtain the governing dimensions before fabricating items which are to accommodate or abut appliances or equipment.

.4 Veneering of plastic laminate to core material shall be done according to the laminate manufacturer's directions. All veneered work shall be backed with a balancing sheet except where exposed in the finished work, then face veneer to be applied to all exposed surfaces.

.5 Where fabrication is done at the site, laminate and core materials shall be stored in the work area for not less than 48 hours for preconditioning before bonding together.

.6 Form shaped profiles and bends as detailed, using postforming or bending grade according to manufacturer's recommendations. Core and laminate profiles shall coincide to provide continuous support and bond over the entire surface.

.7 Self Edging.

.1 Straight self edging shall be decorative laminate 1.6mm thick.
.2 Curved self edging shall be postformed material or bending grade.
.3 Chamfer exposed edges of laminate uniformly, at approximately 15mm.
.4 Do not mitre the decorative laminate sheet at edges.

.8 Joints:

.1 Locate joints where indicated, where not indicated at approximately 2440mm or 3660mm centres also include joints at corners, and changes in superficial area.

.2 Accurately fit decorative laminate together to provide tight, flush, butt joints. Joints in cored. panels shall be made with 6mm blind splines and draw bolts, one draw bolt for widths up to 150mm, two or more draw bolts at maximum 450mm O.C. for widths exceeding 150mm.

.3 Seal the core at joints with sealer.

2.4 CUTOUTS

.1 Provide cutouts as required for inserts, grilles, appliances, outlet boxes, and other fixtures. Radius the internal corners, chamfer the edges, and seal the core.

.2 Provide face finish, to match plastic laminate material, at cutouts.

2.5 EXAMINATION OF SURFACES AND CONDITIONS

.1 Refer to General Instructions 01 10 00.

.2 Surface and ambient temperatures shall be minimum of 20 degrees C at a relative humidity between 20 to 80%.

PART 3 - EXECUTION

3.1 INSTALLATION – GENERAL

.1 Install all work plumb, true and square, neatly scribed to adjoining surfaces.

.2 Make allowances around periphery and where fixed objects pass through or project into countertops, to permit normal movement without restriction.

.3 Secure work by concealed means in an approved manner (or as detailed). Fasteners shall not be more than 600mm O.C. and 150mm from edges and ends. Where concealed fastening is not possible use stainless steel trim threaded screws with matching cup washers or other approved means.

.4 Sand or chamfer site cut edges of the laminate free from chips. Radius any internal angle cuts. Seal core edges.

.5 Isolate decorative laminate panels from direct contact with exterior metal frames.

.6 Upon completion of installation remove identification marks and clean surfaces. Protect as specified in 1.4 above.

3.2 TRIM

.1 Decorative laminate trim shall be as detailed. Joints shall be kept to the minimum, with none occurring in lengths under 3000mm. Slightly bevel the laminate edges of joints. Secure trim with adhesive.

.2 Provide laminate trim above all rows of upper cabinets.

3.3 PROTECTION

.1 Cover finished laminated surfaces with heavy Kraft paper or place in cartons during shipment.

.2 Protect installed laminated surfaces by approved means. Do not remove protective coverings until immediately before final inspection.

END OF SECTION

WATERPROOFING

PART 1 - GENERAL

1.1 SECTION INCLUSIONS AND RELATED SECTIONS

.1 Surface preparation.

.2 Underslab vapour retarder.

.3 General Requirements Division 01.

.4 Cast in Place Concrete Section 03 30 00.

.5 Concrete Floor Finishing Section 03 35 00.

1.2 SUBMITTALS

.1 Submit under provisions of Section 01 33 00 – Submittal Procedures.

.2 Submit Product data for the Products specified in this section. Include manufacturer's printed application recommendations and certificate stating that Products meet or exceed specified requirements.

1.3 ENVIRONMENTAL REQUIREMENTS

.1 Apply self-adhering sheet waterproofing at substrate temperatures of +4°C or above. Do not apply to frozen concrete.

1.4 QUALITY ASSURANCE

.1 Submit in writing, a certificate stating that the applicator of the waterproofing membranes specified in this section is recognized by the manufacturer as suitable for the execution of the work.

.2 Install the Products of this section in accordance with the printed instructions of the membrane manufacturer and these specifications.

.3 Maintain one copy of the manufacturer's instructions on site.

.4 The membrane manufacturer's representative shall visit the Place of the Work to provide instructions for and supervision of the work of this section prior to the commencement of the work and during its execution.

.5 Waterproofing components shall be produced by one manufacturer, including sheet membranes, liquid sealants, primers, mastics and adhesives.

1.5 STORAGE AND HANDLING

.1 Store self-adhering membrane on pallets and cover if left outside. Keep materials away from sparks and flames. Store where temperature will not exceed 32 °C for extended periods of time.

.2 Store adhesives and primers at temperatures of 5C and above.

.3 Protect materials from direct sunlight until ready for use.

1.6 WARRANTY

.1 Provide a warranty for waterproofing work in accordance with the Contract Requirements, but for the following time periods.

.2 The applicator shall warrant that the waterproofing system shall stay in place and remain
watertight for a period of two years.

.3 The manufacturer shall warrant that the waterproofing system shall remain watertight and shall not leak as a result of faulty materials for a period of five years.

.4 Warranties shall be issued to the Owner within two (2) Working Days following the date of Substantial Performance of the Work.

PART 2 – PRODUCTS

2.1 UNDERSLAB VAPOUR RETARDER AND ACCESSORIES

.1 Underslab Vapour Retarder:

.1 Stego Industries, LLC: Stego Wrap Class A Vapour Retarder.

.2 W.R. Meadows of Canada, Sealtight Perminator, 0.254mm thick (10mil).

.2 Joint Tape:

.1 Stego Industries, LLC: StegoTape
.2 W.R. Meadows of Canada, Sealtight Perminator Tape, 100mm wide.

PART 3 – EXECUTION

3.1 EXAMINATION

.1 Verify substrate surfaces are sound, durable, and free of matter detrimental to adhesion or application of waterproofing system, clean, dry, smooth and free of voids.

.2 Verify items which penetrate surfaces to receive waterproofing are securely installed.

.3 Verify that the floor slab base course is in place and compacted prior to commencing installation of underslab vapour retarder.

.4 Verify that concrete is cured at least 14 days.

.5 Commencement of the work shall mean acceptance of the prepared substrate.

3.2 SURFACE PREPARATION

.1 Protect adjacent surfaces not designated-to receive waterproofing.

.2 Clean and prepare surfaces to receive membranes in accordance with manufacturer's instructions.

.3 Do not apply waterproofing to surfaces unacceptable to manufacturer.

.4 Patch all holes and voids and smooth out any surface misalignments. Remove all sharp protrusions.

3.3 APPLICATION: UNDERSLAB VAPOUR RETARDER

.1 Lay vapour retarder over prepared underslab base course.

.2 Lap sides and ends of sheets 150mm and seal with joint tape.

.3 Seal junctures with walls by folding sheet up for full slab thickness and sealing to wall with joint tape.

.4 Seal around all protrusions.

.5 Where vapour retarder is damaged, patch with a piece of vapour retarder overlapping damaged area by 150mm in all directions. Seal all edges with joint tape.

.6 Install under Ground Floor slab-on-grade except for areas where rigid panel waterproofing is specified.

3.4 INSPECTION AND REPAIR

.1 Inspect and repair waterproofing and vapour retarder system immediately before covering.

.2 Cover tears and inadequate overlays with detail strip and seal the patch edges with pointing mastic.

3.5 BACKFILLING

.1 Backfill against vertical walls immediately after protection board installation.

.2 Use care and caution when backfilling to avoid damaging the applied waterproofing system.

END OF SECTION

BOARAD INSULATION

PART 1 – GENERAL

1.1 SECTIONS INCLUDES

.1 Exterior Wall Insulation

1.2 RELATED SECTIONS

.1	General Requirements	Division 01
.2	Masonry Procedures	Section 04 05 00
.3	Rough Carpentry	Section 06 10 00
.4	Sheet Vapour Retarders	Section 07 26 00
.5	Air Barriers	Section 07 27 00

1.3 REFERENCES

.1 ASTM-E96-95, Standard Test Methods for Water Vapour Transmission of Materials.

.2 CGSB 71-GP-24M-77, Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation.

.3 CAN/ULC-S701-1997, Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.4 CAN/ULC-S702-1997, Thermal Insulation, Mineral Fibre, for Buildings.

1.4 SUBMITTALS

.1 Submit 200mm by 300mm samples under provisions of Section 01 33 00 – Submittal Procedures.

.2 If requested by Consultant, submit under provisions of Section 01 78 00 - Closeout Submittals, manufacturer’s certificate stating that products meet or exceed specified requirements.

1.5 MOCKUP

.1 Coordinate with all trades involved in exterior wall work to incorporate specified insulation and insulation accessories in the mockup panel.

1.6 PRE-INSTALLATION MEETING

.1 Convene a pre-installation meeting one week prior to commencing work of this section.

.2 Request attendance of parties directly affecting work of this section.

.3 Review conditions of installation, installation procedures, procedure for inspection and coordination of work with related sections.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Store, handle and protect products under provisions of Section 01 60 00 - Product Requirements.

.2 Minimize the time polystyrene insulation products are stored or exposed to sunlight at project site.

.3 Store products away from construction activity and sources of ignition.

.4 Protect products from damage during handling, installation and at point of installation.

1.8 WARRANTY

.1 Submit a warranty for exterior wall insulation work in accordance with the Contract Requirements, but for a period of two (2) years.

.2 The warranty shall cover defects in materials, installation, and workmanship.

.3 Warranties shall be issued to the Owner within two (2) Working Days following the date of Substantial Performance of the Work.

PART 2 - PRODUCTS

2.1 INSULATION

.1 Exterior Wall Insulation: Extruded Polystyrene to CAN/ULC-S701, Type 3, or most current standard; thickness as indicated on the drawings. Thermal Resistance: RSI value of 0.87 / R5 per 25mm thickness.

.2 Acceptable Materials are as follows: Dupont / Dow Chemical Canada Inc.: Styrofoam Cavitymate, Owens Corning or Celfortec Inc.: Celfort 200 or Owens Corning: Thermafiber Rainbarrier 45 Mineral Board Insulation.

2.2 ADHESIVES

.1 Adhesive (for polystyrene): to CGSB 71-GP-24. Bakor Inc.: Air-Bloc 21.
.2 Adhesive (for insulation clips): Rubber resin, solvent type. Bakor Inc.: 230-35 Insulation Clip Adhesive.

2.3 ACCESSORIES

.1 Air Seal: As specified in Section 07 27 00 - Air Barriers.

.2 Insulation Clips: impale type, perforated 50mm by 50mm galvanized cold rolled carbon steel 0.8mm thick, spindle of 2.5mm diameter annealed steel, length to suit insulation, 25mm diameter washers of self-locking type.

.3 Cavity-Wall Insulation Fasteners: Refer to Section 04 05 19 - Masonry Anchorage and Reinforcement.

PART 3 – EXECUTION

3.1 EXAMINATION

.1 Verify that building substrate surfaces, adjacent materials and installation conditions are ready to accept the work of this section. Ensure insulation materials and surfaces are dry.

.2 Verify that substrate is flat, sound, clean and free of objectionable air surface voids, fins, irregularities, and materials or substances that may impede adhesive bond.

.3 Notify Consultant upon completion of installation of vapour retarder and air seal to allow inspection before insulating material is installed or work is obscured.

.4 Beginning of installation shall mean acceptance of substrate.

3.2 PREPARATION

.1 Clean substrates of substances harmful to insulation.

3.3 INSTALLATION – GENERAL

.1 Keep insulation a minimum of 75mm from light fixtures and heat emitting devices.

.2 Use boards of largest possible dimensions to reduce the number of joints. Boards with chipped and broken edges are unacceptable.

.3 Offset both vertical and horizontal joints in multiple layer applications

.4 Apply adhesives in accordance with manufacturer's instructions. Attach boards prior to skinning of adhesive.

3.4 PERIMETER FOUNDATIONS

.1 Ensure bituminous dampproofing and sheet waterproofing are installed in accordance with Section 07 11 00 and Section 07 13 00 and that all materials have cured prior to proceeding with insulation installation.

.2 Apply adhesive in three continuous beads for each board length. Apply adhesive fully around protrusions.

.3 Install boards on interior face of foundation wall around building perimeter. Extend boards a minimum of 900mm below finish grade.

.4 Place boards in a method to maximize contact with bedding. Stagger joints. Butt edges and ends tight to adjacent boards.

.5 Extend boards across control and expansion joints, unbonded to foundation for 75mm on one side of joint.

.6 Cut and fit insulation tight to protrusions or interruptions to insulation plane.

.7 Protect insulation with opaque polyethylene or tarpaulin if backfilling is not to be completed within 24 hours.

3.5 EXTERIOR WALLS AND PREFINISHED PANEL CLAD CANOPIES AND SOFFITS

.1 Ensure air seal is installed in accordance with Section 07 27 00 - Air Barriers.

.2 Extend boards across control and expansion joints, unbonded to substrate for 75mm on one side of joint.

.3 Cut and fit insulation tight to protrusions or interruptions to insulation plane.

.4 Exterior Walls with Masonry Backup:

.1 Install boards horizontally between anchors.

.2 Install cavity wall insulation fasteners at each tie location, wedge between reinforcing and insulation.

.3 Ensure fastener positively clips onto reinforcing and holds insulation in firm contact with the substrate.

.5 Where clip installation in confined areas may not be possible, install insulation with adhesive.

.1 Apply adhesive in three continuous beads on each board length. Apply adhesive fully around protrusions.

.2 Position and press boards into firm contact with substrate.

3.6 INTERIOR APPLICATIONS

.1 Apply adhesive in three continuous beads each board length. Apply adhesive fully around protrusions.

.2 Install boards on wall surface, vertically between steel “Z” - stud furring.

.3 Stagger end joints. Butt edges and ends tight to adjacent boards and to protrusions.

.4 Extend boards across control and expansion joints, unbonded to substrate for 75mm on one side of joint.

.5 Install vapour retarder in accordance with Section 07 26 00 - Sheet Vapour Retarders.

3.7 CONCRETE SLABS

.1 Place insulation under slabs on grade where indicated and after base for slab is complete.

.2 Lay boards on level compacted fill.

.3 Extend boards where indicated minimum 600mm in from perimeter foundation wall.

.4 Cut and fit insulation tight to protrusions or interruptions to insulation plane.

.5 Prevent insulation from being displaced or damaged while placing slab.

3.8 EXTERIOR FROST SLABS

.1 Place insulation under exterior frost slabs where indicated and after base for slab is complete

.2 Lay boards in two equal layers on level compacted fill. Offset joints between layers by 300mm.

.3 Prevent movement between insulation layers by pinning layers together with 6mm diameter wood pegs or with adhesive.

.4 Ensure that insulation is not displaced or damaged while placing concrete slab.

3.9 PROTECTION

.1 Protect insulation and vapour retarders under provisions of Section 01 56 00 - Temporary Barriers and Controls.

.2 Do not permit work to be damaged prior to covering insulation. Protect from harmful weather exposures and physical abuse.

.3 Provide temporary coverings or enclosures when insulation will be subject to damage and cannot be protected by permanent construction immediately after installation.

END OF SECTION

BATT AND BLANKET INSULATION

PART 1 – GENERAL

1.1 SECTION INCLUDED

.1 Batt Insulation.
.2 Acoustical Batt Insulation.

1.2 RELATED SECTIONS

.1	General Requirements	Division 01
.2	Rough Carpentry	Section 06 10 10
.3	Sheet Vapour Retarders	Section 07 26 00
.4	Built-Up Bituminous Roofing	Section 07 51 00
.5	Fire Stopping and Smoke Seals	Section 07 84 00
.6	Non – Structural Metal Framing	Section 09 22 00
.7	Mechanical	Division 23

1.3 REFERENCES

.1 CAN/ULC-S702-1997, Thermal Insulation, Mineral Fibre, for Buildings.

PART 2 – PRODUCTS

2.1 INSULATION

.1 Batt Insulation:

.1 Mineral fibre to CAN/ULC-S702, Type 1-unfaced, thickness as indicated.
.2 Thermal Resistance: RSI value of 2.1 per 89mm thickness.
.3 Acceptable Products:

.1 CertainTeed Insulation Canada Inc.: Sustainable Insulation Fibre Glass Building Insulation.

.2 Owens Corning Canada Inc.: EcoTouch Pink Fiberglas Insulation.

.2 Acoustical Batt Insulation:

.1 Mineral fibre to CAN/ULC-S702, thickness as indicated.
.2 Acceptable Products:

.1 CGC: Thermafiber Sound Attenuation Fire Blankets.
.2 CertainTeed Insulation Canada Inc.: Sustainable Insulation Noise Reducer Sound Attenuation Batts.

.3 Owens Corning Canada Inc.: EcoTouch Quiet Zone Pink Fibreglas Acoustic Insulation.
.4 Roxul Inc.: Acoustical Fire Batt (AFB).

.3 Interior Wall Insulation at exterior walls:
.1 Semi-rigid glass fibre to CAN/ULC-S702, thickness as indicated.
.2 Thermal Resistance: RSI value of 0.74 per 25mm thickness.
.3 Acceptable Product: Roxwool Group., Comfortbatt SS.

2.2 ACCESSORIES

.1 Insulation Clips: Impale type, perforated 50mm by 50mm cold rolled galvanized carbon steel 0.8mm thick, spindle of 2.5mm diameter annealed steel, length to suit insulation, 25mm diameter washers of self-locking type.

.2 Retaining Mesh: Galvanized steel, hexagonal wire mesh.

PART 3 – EXECUTION

3.1 EXAMINATION

.1 Verify that substrate surfaces, adjacent materials and installation conditions are rec1dy to accept the work of this section. Ensure insulation materials and surfaces are dry.

.2 Beginning of installation means acceptance of substrate and conditions.

3.2 INSULATION INSTALLATION

.1 Supply insulation to Section 06 10 10 - Rough Carpentry as required for building-in to work of that section.

.2 Install insulation to maintain continuity of thermal protection and acoustical separation of building elements and spaces.

.3 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation. Trim insulation neatly to fit spaces.

.4 Do not compress insulation to fit into spaces. Install in spaces without gaps or voids.

.5 Install friction fit insulation tight to framing members.

.6 On sloping surfaces or in ceiling applications retain insulation in place with impale type fastener spaced at 600mm on centre. Adhere fastener to substrate with adhesive compatible with fastener and substrate.

.7 In unfinished unexposed applications retain insulation in place with wire mesh secured to framing members with fasteners appropriate for framing material.

.8 Keep insulation minimum 75mm from heat emitting devices such as recessed light fixtures.

.9 Notify the Consultant upon completion of insulation installation to allow for inspection before work is enclosed and obscured.

3.3 PROTECTION

.1 Protect insulation under provisions of Section 01 56 00 -Temporary Controls.

.2 Protect insulation from harmful weather exposures and physical abuse.

.3 Provide temporary coverings or enclosures when insulation will be subject to damage and cannot be protected by permanent construction immediately after installation.

END OF SECTION

SHEET VAPOUR RETARDERS

PART 1 - GENERAL

1.1 SECTION INCLUDED

.1 Sheet vapour retarders.
.2 Vapour retarder accessories.

1.2 RELATED SECTIONS

.1	General Requirements	Division 01
.2	Board Insulation	Section 07 21 13

1.3 REFERENCES

.1 CAN/CGSB-19.21-M87, Sealing and Bedding Compound, Acoustical.
.2 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.

1.4 JOB MOCKUP

.1 Provide mockup in accordance with Section 01 45 00 -Quality Control.

.2 Construct mockup of sheet vapour retarder installation including one lap joint, one inside corner and at one electric box. Mock-up may be part of finished work.

.3 Allow 48 hours for inspection of mock-up by the consultant before proceeding with vapour retarder work.

PART 2 – PRODUCTS

2.1 SHEET VAPOUR RETARDER

.1 Polyethylene Film: to CAN/CGSB-51.34, 0.15mm thick.

2.2 ACCESSORIES

.1 Joint Sealing Tape: air resistant pressure sensitive adhesive tape, type recommended by vapour retarder manufacturer, 50mm wide for lap joints and perimeter seals, 25mm wide elsewhere.

.2 Sealants: Non-drying, non-hardening synthetic rubber to CAN/CGSB-19.21. Acceptable Product: Tremo Ltd., Tremco Acoustical Sealant.

.3 Staples: minimum 6mm leg.

.4 Moulded Box Vapour Barrier: factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.

PART 3 – EXECUTION

3.1 INSTALATION

.1 Ensure services are installed and inspected prior to installation of retarder.

.2 Install sheet vapour retarder where indicated on warm side of exterior wall, ceiling and floor assemblies prior to installation of wall finish to form a continuous vapour retarder.

.3 Use sheets of largest practical size to minimize joints.

.4 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

3.2 EXTERIOR SURFACE OPENINGS

.1 Cut sheet vapour retarder to form openings and ensure material is lapped and sealed to frame.

3.3 PERIMETER SEALS

.1 Seal perimeter of sheet vapour retarder as follows:

.1 Apply continuous bead of sealant to substrate at perimeter of sheets.

.2 At metal stud substrate apply bead of sealant at each stud. Lap sheet over sealant and press into sealant bead. Affix sheet temporarily with joint sealing tape.
.3 At wood substrate install staples through lapped sheets at sealant bead into substrate.
.4 Use only enough fasteners to ensure sheet remains in place until wall finish is installed.
.5 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.4 LAP JOINT SEALS

.1 Seal lap joints of sheet vapour barrier as follows:

.1 Attach first sheet to substrate.
.2 Apply continuous bead of sealant over solid backing at joint.
.3 Lap adjoining sheet minimum 150mm and press into sealant bead.
.4 At metal stud substrate install joint sealing tape to cover joint completely.
.5 At wood substrate install staples through lapped sheets at sealant bead into substrate.
.6 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.5 ELECTRICAL BOXES

.1 Seal electrical switch and outlet device boxes that penetrate vapour retarder.

.2 Install moulded box vapour retarder.

.3 Apply sealant to seal edges of flange to main vapour retarder and seal wiring penetrations through box cover.

END OF SECTION

AIR BARRIERS

PART 1 - GENERAL

1.1 SECTION INCLUDED

.1 Membrane air seal materials and installation methods.
.2 Air seal materials to bridge and seal openings and penetrations of window frames and door frames.

1.2 RELATED SECTIONS

.1	General Requirements	Division 01
.2	Masonry Procedures: Masonry wall construction	Section 04 05 00
.3	Masonry Accessories	Section 04 05 23

1.3 REFERENCES

.1 CAN/CGSB-19.13M-M87, Sealing Compound, One Component, Elastomeric Chemical Curing.
.2 CGSB-19-GP-14M-84, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.
.3 CAN/CGSB-19.18M-M87, Sealing Compound, One Component, Silicone Base, Solvent Curing.
.4 CAN/CGSB-19.24-M90, Multi-Component, Chemical Curing Sealing Compound.
.5 Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.

1.4 SUBMITTALS

.1 Submit samples of air barrier material in accordance with Section 01 33 00 – Submittal Procedures.

.2 Manufacturer's Installation Instructions: Submit indicating preparation, installation requirements and techniques, product storage and handling criteria.

.3 Inspection Company Reports: Submit reports on air barrier membrane installation as it progresses.

1.5 QUALITY ASSURANCE

.1 Perform Work in accordance with Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.

.2 Air barrier applicators shall be licensed or approved by the membrane material manufacturer.

.3 Air barrier materials and accessory materials shall be from the Product line of one manufacturer.

1.6 QUALIFICATIONS

.1 Applicator: Company specializing in performing work of this section approved and trained by materials' manufacturers.

.2 The applicator shall have proven experience in the work of this section for jobs of similar size.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Do not install solvent curing sealants or vapour release adhesive materials in enclosed spaces without ventilation.

.2 Maintain temperature and humidity recommended by materials manufacturers before, during and after installation. Ensure materials are stored at a minimum temperature of 5C.

1.8 SEQUENCING AND COORDINATION

.1 Sequence work to permit installation of materials in conjunction with related materials and seals.

.2 Coordinate work of this section with all sections referencing this section.

1.9 WARRANTY

.1 Provide a warranty in accordance with the Contract Requirements, but for a period of two (2) years.

.2 The warranty shall cover defects in material, installation, and workmanship.

.3 Warranties shall be issued to the Owner within two (2) Working Days following the date of Substantial Performance of the Work.

PART 2 – PRODUCTS

2.1 AIR BARRIER MATERIALS

.1 Membrane Air Barrier - Typical: Self-adhesive, rubberized asphalt bonded to sheet polyethylene, nominal total thickness of 1mm to 1.5mm.

.1 Henry Company Canada: Blueskin SA.
.2 Soprema Inc.: Sopraseal Stick 1100T.
.3 W.R. Grace & Co. of Canada Ltd.: Perm-A-Barrier.
.4 W.R. Meadows of Canada Ltd.: Sealtight Air-Shield.

.2 Vapour Permeable Air Barrier: Fluid-applied vapour permeable air barrier membrane.

.1 BASF Corporation: Enershield-1.
.2 Henry Company Canada: Air-Bloc 31.
.3 Tremco Incorporated: ExoAir 220.
.4 W.R. Grace & Co. of Canada Ltd.: Perm-A-Barrier VP.
.5 W.R. Meadows of Canada Ltd.: Air-Shield LMP.

.3 Sheet Steel Air Barrier: Galvanized steel, 2275 zinc coating, 1.5mm core steel thickness.

2.2 SEALANTS

.1 Sealants: Refer to Section 07 92 00 - Sealants.

.2 Sealant Primer: Recommended by sealant manufacturers.

.3 Substrate Cleaner: Non-corrosive, type recommended by sealant manufacturer, compatible with adjacent materials.

2.3 MASTIC AND PRIMER

.1 Mastic: Compatible with membrane air barrier and substrate, thick mastic of uniform consistency.

.1 Henry Company Canada: Blueskin Sealant.
.2 Soprema Inc.: Sopramastic 200.
.3 W.R. Grace & Co. of Canada Ltd.: Bituthene Mastic.
.4 W.R. Meadows of Canada Ltd.: Sealtight Pointing Mastic.

.2 Primer: Compatible with membrane air barrier and substrate.

.1 Henry Company Canada: Bakor Blueskin Primer.
.2 Soprema Inc.: Elastocol 700 Primer.
.3 W.R. Grace & Co. of Canada Ltd.: Perm-A-Barrier Primer.
.4 W.R. Meadows of Canada Ltd.: Sealtight Mel-Prime.

PART 3 – EXECUTION

3.1 EXAMINATION

.1 Verify that substrate surfaces are dry and clean and conditions are ready to accept the work of this section.

.2 Commencement of work implies the acceptance of substrate surfaces.

3.2 PREPARATION

.1 Remove loose or foreign matter which might impair adhesion of materials.

.2 Clean and prime substrate surfaces to receive air barrier membrane in accordance with manufacturer's instructions.

.3 Prime only substrate surface that can be covered with membrane the same day.

3.3 INSTALLATION OF MEMBRANE AIR BARRIER

.1 Install materials in accordance with manufacturer's instructions.

.2 Seal joints and perimeter edges of sheet steel air barrier.

.3 Co-operate with other trades to ensure continuity of air barrier membrane at junctions of different components and constructions.

.4 Stagger end laps to avoid four-way joints in air barrier membrane.

.5 Apply a bead of mastic to end laps, application terminations, and around all penetrations of the membrane.

.6 Ensure air barrier membrane js lapped and sealed onto window, curtain wall, and door frames.

.7 At the end of each day ensure that the work of this section is protected from adverse weather and other mechanical damage.

3.4 APPLICATION OF VAPOUR PERMEABLE AIR BARRIER

.1 Mix air barrier material until thoroughly blended in conformance with the manufacturer's printed instructions.

.2 Spot all fasteners and sheathing joints, terminations, inside and outside corners with mixed air barrier material.

.3 Place and centre the manufacturer's recommended sheathing fabric at all sheathing joints, terminations, inside and outside corners. Ensure sheathing fabric extends evenly on both sides of sheathing joint.

.4 Lap sheathing fabric 65mm minimum at intersections.

.5 Allow to dry to the touch before applying the air barrier membrane to the entire wall surface.

.6 Apply air barrier membrane to wall surface with. roller, brush, or spray gun to a consistent even coating that is free of voids and pin holes. Follow the manufacturer's printed application recommendations.

.7 Thickness of membrane shall be sufficient to achieve the required air barrier performance requirements.

3.5 PROTECTION OF FINISHED WORK

.1 Protect finished work under provisions of Section 01 60 00 - Product Requirements.

.2 Do not permit adjacent work to damage work of this section.

3.6 FIELD QUALITY CONTROL

.1 Inspection: An inspection and testing company selected by the Owner will inspect and report on the installation of the air barrier system.

.2 The cost of inspection services will be paid from the cash allowance specified in Section 01 10 00 – General Instructions.

3.7 SCHEDULE

.1 Wall Air Seal Over Outer Surface of Inner Wythe of Masonry or Concrete: Membrane air barrier over masonry unit or concrete surface, seal masonry anchor and other penetrations air tight.

.2 Curtain Wall Perimeter: Lap and seal air barrier membrane onto window, curtain wall, and door frames and fill space between frames and wall with air barrier foam sealant and elastomeric sealant as specified in Section 07 92 00 - Sealants.

.3 Wall and Roof Junction: Lap wall membrane air barrier onto roof deck with 150mm of contact over firm bearing. Lap roof air seal membrane over wall membrane air barrier with 100mm of full contact.

.4 Junctions between dissimilar materials: Where shown on Drawings install sheet steel air barriers to configuration shown. Lap and seal air barrier membranes over sheet steel air barrier providing a minimum of 100mm contact.

END OF SECTION

METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SECTION INCLUSIONS AND RELATED SECTIONS

.1 Metal flashings, reglets and flashing receivers.
.2 General Requirements Division 01.
.3 Masonry Procedures Section 04 05 00.
.4 Rough Carpentry Section 06 10 00.

1.2 REFERENCES

.1 ASTM-A653/a653M-11: Standard specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
.2 ASTM-A924/A924M-10a: Standard specification for General Requirement for Steel Sheet, Metallic-Coated by the Hot Dip Process.
.3 ASTM-B32-96: Standard Specification for Solder Metal.
.4 ASTM-D523-89 (1994)e1 : Standard Test Method for Specular Gloss.
.5 ASTM-D822-96: Standard Practice for Conducting Tests on Paint and Related Coatings and Materials Using Filtered Open Flame Carbon-arc Exposure Apparatus.
.6 CAN/CGSB-37.5-M89: Cutback Asphalt Plastic Cement.
.7 CAN/CGSB-51.32-M77: Sheathing Membrane, Breather Type.
.8 CSA-A123.3-M1979: Asphalt or Tar saturated Roofing Felt.
.9 CSA-Bill-1974: Wire Nails, Spikes and Staples.

1.3 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

.1 Metal flashing receivers and recessed reglets supplied to Section 04 05 00 – Masonry Procedures.

1.4 SUBMITTALS

.1 Submit Shop Drawings in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit 100mm by 100mm samples of each type of sheet metal material, colour and finish.

1.5 WARRANTY

.1 Provide a warranty for metal flashing work in accordance with the Contract Requirements, but for a period of five (5) years.

.2 The warranty shall cover materials, installation and workmanship.

.3 Warranties shall be issued to the Owner within two (2) Working Days following the date of Substantial Performance of the Work.

PART 2 – PRODUCTS

2.1 PREFINISHED SHEET METAL MATERIAL

.1 Prefinished steel sheet with factory applied 2-coat silicon modified polyester finish system, Perspectra Series on exposed surfaces.

.1 Zinc coated steel sheet: commercial quality to ASTM-A653/A653M, with 2275 designation zinc coating to ASTM-A924/A924M.
.2 Class: F2S.
.3 Specular gloss: 30 units+/- 5 degrees in accordance with ASTM-D523.
.4 Coating thickness: not less than 25 micrometers.
.5 Resistance to accelerated weathering for chalk rating of 8, colour fade 7 units or less and erosion rate less than 20% to ASTM-D822 as follows:

.1 Outdoor exposure period 1000 hours.
.2 Humidity resistance exposure period 1000 hours.

.6 Unexposed or reverse side shall have a clear wash coat finish.
.7 Manufacturers:

.1 Stelco Steel.
.2 Dofasco Inc.

2.2 PREFABRICATED FLASHING

.1 Stack Jack Flashing: pre-insulated aluminum flashing sleeve with integral flange coated with bituminous paint, aluminum hood and perforated collar, and EPDM base seal. Thaler Metal Industries: Model SJ-31 Vandal Proof Stack Jack Flashing.

.2 Flexible Conduit Flashing: liquid-tight, gooseneck shaped aluminum flashing pipe sleeve with integral flange coated with bituminous paint, and EPDM end cap and base seals. Thaler Metal Industries: Model MEF-2A liquid Tight Flexible Conduit Flashing.

.3 Rigid Conduit Flashing: aluminum flashing sleeve with integral flange coated with bituminous paint, EPDM base seal, removable cap, and EPDM grommet seal. Thaler Metal Industries: Model MEF-1 Rigid Conduit Flashing.

.4 Square Post Flashing: split stainless steel flashing sleeve with integral flange coated with bituminous paint, contoured vented cap filled with EPDM pressure grommet seal, and continuous EPDM seals at split junctures of sleeve and flange. Thaler Metal Industries: Model SP J-4 Square Split Flashing (Vented Cap).

2.3 ACCESSORIES

.1 Isolation Coating: alkali resistant bituminous paint.

.2 Plastic Cement: to CAN/CGSB-37.5.

.3 Underlay for Metal Flashing: dry sheathing to CAN/CGSB-51.32 or No. 15 perforated asphalt felt to CSA-A123.3.

.4 Sealants: Refer to Section 07 92 00 – Sealants.

.5 Cleats and Starter Strips: of same material, and temper as sheet metal, minimum 50mm wide. Thickness 1.0mm.

.6 Fasteners: of same material as sheet metal, to CSA-8111, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.

.7 Washers: of same material as sheet metal, 1mm thick with rubber packings.

.8 Touch-up Paint: as recommended by prefinished material manufacturer.

2.4 FABRICATION

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details and as indicated.

.2 Form pieces in 2400mm maximum lengths. Use lock type joints between sections. Make allowance for expansion at joints.

.3 Hem exposed edges on underside 12mm. Miter and seal corners with sealant.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.5 METAL FLASHINGS

.1 Form flashings, and flashing receivers to profiles indicated of 0.5mm thick prefinished galvanized steel sheet. Colour: Grey.

2.6 REGLETS AND CAP FLASHINGS

.1 Form recessed and surface mounted reglets and metal cap flashing of 0.5mm thick galvanized steel sheet metal to be built-into masonry work for base flashings as detailed.

.2 Provide slotted fixing holes and steel/plastic washer fasteners.

.3 Colour to be Grey.

PART 3 – EXECUTION

3.1 INSTALLATION

.1 Install sheet metal work in accordance with CRCA FL series details, SMACNA Architectural Sheet Metal Manual, and as detailed.

.2 Use concealed fastenings except where approved before installation.

.3 Provide underlay under sheet metal. Secure in place and lap joints 100mm.

.4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock seams forming tight fit over hook strips.

.5 Lock end joints and caulk with sealant.

.6 Install surface mounted reglets true and level, and caulk top of reglet with sealant.

.7 Insert metal flashing under cap flashing to form weathertight junction.

.8 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25mm. Lead wedge flashing securely into joint.

.9 Caulk flashing at reglet with sealant.

.10 Supply metal flashing receivers and recessed reglets to Section 04 05 00 – Masonry Procedures for building into masonry walls.

END OF SECTION

FIRESTOPPING AND SMOKE SEAL

PART 1 – GENERAL

1.1 SECTION INCLUDED

.1 Firestopping of Penetrations in Rated Assemblies.

.2 Fire Resistive Joint Systems.

.3 Perimeter Fire Containment Systems.

.4 Firestopping of Penetrations in Fire Blocking Compartments.

.5 Smoke Seals

.6 It is the intent of this section of the specifications to establish a single, competent source to be responsible for providing all labour, materials, products, equipment and services, to supply and install firestopping and smoke seals for the area of work, including at the following locations:

- .1 Openings in fire rated walls, floors and roofs both empty and those containing penetrations.
- .2 Gaps between fire rated floor slabs and exterior curtain walls.
- .3 Gaps between fire rated walls and exterior curtain walls.
- .4 Gaps located within expansion joints.
- .5 Openings at each floor level in fire rated shafts or stairwells.
- .6 Gaps between the tops of fire rated walls and underside of fire rated floor or roof assemblies.
- .7 Penetrations through construction enclosing compartmentalized concealed areas (fire blocks), involving both empty openings and openings containing penetrating items.
- .8 Penetrations through smoke barriers.

.7 Note: It is not the intention of this section to delete firestopping work fully specified in the mechanical and electrical specifications. Coordinate with all mechanical and electrical sections to ensure the complete firestopping of the area of work. All firestopping not specifically called for in the mechanical and electrical specifications is to be included under this section.

1.2 RELATED WORK

.1 Fire blocking of concealed spaces:

.1 Fire separation of concealed spaces shall be provided under applicable specification sections, and as indicated on drawings.

.2 Non-Rated Openings through Floors and Walls:

.1 Non-rated openings through floors and walls shall be sealed under applicable architectural, mechanical, and electrical specification sections.

.3 Metal sleeves for fire rated openings through floors and walls shall be

.1	ASTM E814	Test Method of Fire tests of Through Penetration Firestops
.2	ASTM E 2174	Standard Practice for On-Site Inspection of Installed Fire Stops
.3	ASTM E 2393	Standard Practice for On-Site Inspection of Installed Fire Stop Joint System.
.4	ASTM E 2307	Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using the Intermediate-Scale, Multi Story Test Apparatus (ISMA)
.5	ASTM C 920	Standard Specification for Elastomeric Joint Sealants systems

provided under applicable mechanical and electrical specification sections.

.4 Firestopping and smoke seals within mechanical (i.e. inside ducts, dampers) and electrical assemblies shall be sealed under applicable mechanical and electrical specifications sections and only in accordance with the equipment or device manufacturers' installation instructions.

1.3 RELATED SECTIONS

.1	Concrete Unit Masonry	Section 04 22 00
.2	Sealants	Section 07 92 00
.3	Gypsum Board	Section 09 29 00
.4	Mechanical work requiring firestopping	Division 20, 22
.5	Electrical work requiring firestopping	Division 26, 27, 28

1.4 REFERENCE STANDARDS/DOCUMENTS

.1 American Society for Testing and Materials (ASTM):

.2 Underwriters Laboratories, Inc. (UL):

.3 Underwriters Laboratories of Canada (ULC):

.4 Intertek: WH Mark Product Directory

.5 Factory Mutual Approval Guide

1.5 PERFORMANCE REQUIREMENTS

.1 Provide firestopping systems of sufficient thickness, width and density to provide and maintain a fire resistance rating, as indicated on drawings and in accordance with ULC, cUL or WH design numbers.

.2 Provide a seal completely filling all annular spaces to prevent the passage of flame, smoke and gases through the opening in the fire separation in which it is installed.

.3 Provide materials which are compatible with all materials used in the system including materials used in or on penetrating items as well as all construction materials used in conjunction or contiguous with the system.

.4 Accessories:

.1 Provide components for each firestopping system that are needed to install fill materials.
.2 Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire resistance rated systems.
.3 Accessories include but are not limited to the following items:

.1 Permanent forming/damming/backing materials temporary forming materials
.2 substrate primers
.3 collars
.4 steel sleeves

.5 Provide products that upon curing, do not re-emulsify, dissolve, leach, and breakdown or otherwise deteriorate over time from exposure to

atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction.

.6 Provide firestop sealants sufficiently flexible to accommodate motion such as pipe vibration, water hammer, thermal expansion and other normal building movement without damage to the seal.

.7 Pipe insulation shall not be removed, cut away or otherwise interrupted through wall or floor openings. Provide products appropriately tested for the thickness and type of insulation utilized.

.8 Openings within walls and floors designed to accommodate voice, data and video cabling shall be provided with re-enterable products specifically designed for retrofit.

.9 Penetrations through fire-resistance rated floor-ceiling assemblies contained within chase wall assemblies shall be protected with products tested by being fully exposed to the fire outside of the chase wall.

.10 Provide fire-resistive joint sealants sufficiently flexible to accommodate movement such as thermal expansion and other normal building movement without damage to the seal.

.11 Provide fire-resistive joint sealants designed to accommodate a specific range of movement and tested for this purpose in accordance with a cyclic movement test criteria as outlined in Standard ANSI/ UL 2079.

.12 Provide through penetration firestop systems and fire-resistive joint systems subjected to an air leakage test conducted in accordance with Standards, ANSI/UL1479 and ANSI/ UL2079, respectively, with published L-Ratings for ambient and elevated temperatures as evidence of the ability of the through penetration firestop system or fire-resistive joint system to restrict the movement of smoke. Provide fire-resistive joint systems subjected to an air leakage test conducted in accordance with Standard, ANSI/ UL2079 with published L-Ratings for ambient and elevated temperatures as evidence of the ability of the fire-resistive joint system to restrict the movement of smoke.

1.6 SUBMITTALS

.1 Manufacturer’s Data:

.1 Submit manufacturer's specifications, installation instructions and product data for each material required, in accordance with Section 01 33 23.
.2 Include ULC, cUL, or WH tested systems or designs, to show compliance with the Contract Documents.

.2 Shop Drawings: Submit shop drawings showing typical installation details, including reinforcement, anchorage, fastenings and method of installation for each type of firestopping condition.

.3 Samples: If requested, submit samples of each type of firestopping systems, smoke seals and accessories. Indicate location where material/system shall be utilized.

.4 Qualifications: Submit certificate indicating qualifications of installer.

1.7 QUALITY ASSURANCE

.1 Manufacturer: Manufacturer shall be one of the approved manufacturers listed below.

.2 Applicator: Company having a minimum of three (3) years' experience in the installation of materials specified herein, on projects comparable to this project, who is certified, licensed or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products in accordance with the specified requirements. Installer shall be certified by ULC, or other approved agency.

1.8 REGULATORY REQUIREMENTS

.1 Conform to the Ontario Building Code for fire resistance ratings.

.2 Provide materials, accessories and application procedures which have been listed by ULC, cUL, or tested by a nationally recognized independent testing agency in accordance with ASTM E814, ANSI/UL 1479, CAN4-S115 or ANSI/UL 2079 to achieve the required fire protection rating(s).

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Do not proceed with the installation of firestopping materials when temperatures or weather conditions exceed the manufacturer's recommended limitations for installation.

.2 Ventilate solvent based and moisture-cure firestopping per firestopping manufacturer's instructions by natural means or, where this is inadequate, by forced air circulation.

1.10 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to Site in manufacturer's sealed, undamaged containers, with labels intact. Labels shall identify product and manufacturer, date of manufacture; lot number; shelf life, qualified testing and inspection agency's classification marking, and mixing instructions for multi-component materials.

.2 Handle and store materials in accordance with manufacturer's instructions.

1.11 PROJECT/SITE CONDITIONS

.1 Comply with manufacturer's recommended requirements for temperature, relative humidity and substrate moisture content during application and curing of materials.
.2 Maintain minimum temperature before, during, and for minimum 3 days after installation of materials.
.3 Do not install firestopping products when substrates are wet due to rain, frost, condensation, or other causes.

1.12 SEQUENCING AND SCHEDULING

.1 Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

.2 Coordinate sizing of sleeves, openings, core-drilled holes or cut openings to accommodate through-penetration firestop systems.

.3 Do not install firestopping system until Work within opening has been completed. Coordinate with other applicable Sections.

.4 Schedule installation of safing materials in linear opening at curtain wall prior to construction that limits access to safing slot.

.5 Schedule work of other trades so that firestopping applications can be inspected prior to being covered by subsequent construction.

PART 2 – PRODUCTS

2.1 APPROVED MANUFACTURERS

.1 Provide firestopping silicone sealants, water-based sealants, intumescent sealant, mortars, or firestop devices from one of the following manufacturers:

.1 A/D Fire Protection Systems Inc.
.2 Tremco Fire Protection Systems Group
.3 Hilti (Canada) Corporation
.4 Nuco Inc., Self-Seal Firestops

2.2 MATERIALS

.1 Firestop systems:

.1 Provide a complete system of asbestos-free firestop systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of CAN4-S115, ASTM E814, ANSI/UL 1479, or ANSI/UL 2079, and listed by ULC, cUL, or Warnock Hersey, and approved by jurisdictional authorities and the Consultant.
.2 Comply with applicable Building Code requirements for locations and ratings.

.2 Materials specified below are as manufactured by A/D Fire Protection Systems Inc. Equivalent products manufactured by one of the approved manufacturers listed above are acceptable.

.3 Silicone Sealants:

.1 Primerless, single component silicone sealant, curing to durable, flexible, silicone rubber; to ASTM C 920, Type S, Grade NS, class 25; A/D Fire barrier Silicone Sealant or equivalent.
.2 For use in: openings with penetrating items subject to high movement; multiple penetration systems; for combustible pipes up to 2-in. diameter; in control joints; in curtain wall joints; expansion

joints; floor/wall joints; wall/wall joints; head of wall joints; and as a sealant for smoke barrier construction.

.4 Pourable Sealant:

.1 Single component, water based, elastomeric sealants, forming durable, flexible, watertight bonds; A/D Firebarrier Seal (pourable) and Seal NS (non-slumping) or equivalent.
.2 Use non-slumping type for vertical applications.
.3 Water based firestop sealants for use with: control joints; head of wall joints; floor/wall joints; wall/wall joints; multiple penetration systems; plumbing; mechanical; electrical; and where sprayed sealant application is required or desired.

.5 Intumescent Caulk:

.1 Single component, water based, elastomeric sealant for use in interior building locations; A/D Firebarrier Intumescent Caulk or equivalent.
.2 For general use as a firestop sealant with: insulated pipes; pipes; electrical cables and conduit; ducts.

.6 Mortar:

.1 Non-combustible, fibre reinforced, foamed cement mortar; A/D Fire barrier Mortar or equivalent.
.2 For use in: large openings; static non-moving penetrations such as cable trays; for multiple penetration systems; electrical and communication bundles; conduits; non-combustible sleeves; and insulated pipes.

.7 Collars:

.1 Steel collars with intumescent silicone strip, in diameters to suit pipe sizes; A/D Firebarrier Collar or equivalent.
.2 For use in openings with single combustible pipe penetrations greater than 50mm diameter; confirm maximum pipe diameter (for applicable tested assemblies) with manufacturer.

.8 Pillows:

.1 Self-supporting, sealed polyethylene bags containing intumescent materials and non-combustible insulation; A/D Firebarrier Pillows or equivalent.
.2 For use in openings with: cable tray; multiple cable penetrations; where retrofitting of penetrating items is anticipated; and as a temporary firestop system.

.9 Mineral Wool:

.1 Non-combustible, semi-rigid, preformed mineral wool strips and sheets; A/D Firebarrier Mineral Wool or equivalent.
.2 For use in tested firestop systems, as fire barrier and forming material.

.10 Additional Materials:All materials shall be by the manufacturer's listed above and shall be components of tested assemblies, acceptable to local authorities having jurisdiction, for the fire rating required.

.11 Fire Stopping: Asbestos-free materials and systems capable of maintaining an effective barrier against flame and heat in compliance with requirements of CAN4-S115 and not to exceed opening sizes for which they are intended. Acceptable Products:
.1 A/D Fire Protection Systems Inc.: A/D Firebarrier Mineral Wool Fire Stopping Insulation.
.2 Roxul Inc.: RXL Safe Fire Stop Batt.

.12 Smoke Seals: fire resistant material capable of maintaining an effective barrier against smoke and gases.

.1 Fire Rated Sealant - Type 1 (for joints in vertical surfaces): non-sagging, fire rated silicone listed for use in fire separations:
.1 Hilti (Canada) Corporation: CP 601S Elastomeric Firestop Sealant.
.2 3M Canada Inc.: Firebarrier 2000.
.3 Tremco Construction Products: TREMstop Fyre-Sil.

.2 Fire Rated Sealant - Type 2 (for head of wall applications): sprayable single component, water-based, acrylic fire stop sealant.
.1 Hilti (Canada) Corporation: CP672 Firestop Joint Spray.
.2 3M Canada Inc.: 3M FireDam Spray.
.3 Tremco Construction Products: TREMstop Acrylic SP.

.3 Fire Rated Sealant - Type 3 (for joints in horizontal surfaces): self-leveling, fire rated silicone, listed for use in fire separations.
.1 Hilti (Canada) Corporation: CP604 Self-leveling Firestop Sealant.
.2 3M Canada Inc.: Firebarrier 2003.
.3 Tremco Construction Products: TREMstop Fyre-Sil Self Leveling.

2.3 ACCESSORIES

.1 Damming and backup materials, supports and anchoring devices: Non-combustible, to manufacturer's recommendations and in accordance with the tested system being installed, and as acceptable to local authorities having jurisdiction.

.2 Primers: As required by firestopping manufacturer and compatible with selected system and contiguous materials.

.3 Water: Potable.

.4 Tape: Pressure sensitive masking tape as recommended by the firestopping manufacturer.

.5 Fasteners: Provide suitable fasteners, for applicable substrates, for all collars and other field fastened firestopping components.

PART 3 – EXECUTION

3.1 EXAMINATION

.1 Examine substrates, openings, voids, adjoining construction and conditions under which the Work is to be installed. Confirm compatibility of surfaces scheduled to receive firestopping.
.2 Verify that penetrating elements are securely fixed and properly located with the proper space allowance between penetrations and surfaces of openings.

.3 Do not proceed with Work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Surfaces to receive firestopping shall be free of dirt, dust, grease, oil, rust, loose materials, form release agents, frost, moisture or any other matter which would impair the bond of firestopping material to the substrate of penetrating item(s).

.2 Prime substrates in accordance with manufacturer's written instructions or recommendations. Confine primers to areas of bond; do not allow spillage or migration onto exposed surfaces.

.3 Do not apply firestopping and smoke seals to surfaces previously painted or treated with sealers, curing compounds, water repellent or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure that anchoring devices, back-up materials, clips, sleeves, supports and other related materials used in the actual fire tests are provided.

.5 Mask where necessary to prevent firestopping materials from contacting adjoining surfaces that will remain exposed upon completion of Work. Remove tape as soon as it is possible to do so without disturbing firestopping seal with substrates.

.6 Installation is not to proceed until submittals have been reviewed and returned by the Consultant.

3.3 INSTALLATION

.1 Manufacturer's Instruction:

.1 Comply with ULC, cUL, or Warnock Hersey listings and manufacturer's instructions for the type of material and condition of opening in each case.
.2 Consult with the manufacturer's technical representative to determine proper procedure for conditions not fully covered by printed instructions.
.3 Record in writing any oral instructions received, with copy to manufacturer.

.2 Firestopping for vertical applications: Non-sag caulk or spray grade sealants, Mortar, Collars or Pillows.

.3 Firestopping for horizontal applications: Non-sag caulk or self-levelling or spray grade sealants, Mortar, Collars or Pillows.

.4 Firestopping for overhead applications: Non-sag caulk or spray grade sealants or Mortar.

.5 Install firestopping with sufficient pressure to properly fill and seal openings to ensure an effective smoke seal. Tool or trowel exposed surfaces. Remove excess firestopping material promptly as the Work progresses and upon completion.

.6 Damming: Provide leak-proof dams as required to seal openings and contain liquid sealants, putty or mortar until cured. Install damming in accordance with manufacturer's instructions.

.7 Damming Boards: Install forming/damming materials and other accessories of type required to support fill materials during their application and in the position needed to produce the shapes and depths required to achieve fire ratings of through-penetration firestop systems.

.1 Combustible Type: For temporary dams only. Remove after firestopping material has cured.
.2 Non-Combustible Type: For temporary or permanent dams. Provide non-combustible type wherever damming material cannot be removed after applying firestopping materials.

.8 Void Filler: Use materials recommended by the firestopping manufacturer to seal gaps created by non-combustible type damming boards and to seal around cables, conduits, pipes and where void filler material becomes part of the fire rated assembly.

.9 Sealant:

.1 Install damming material or mineral wool as required.
.2 Apply sealant so air voids are not present and sealant is in full contact with penetrating items. Tool sealant to ensure substrate contact.
.3 Remove excess sealant in accordance with manufacturer's recommendations.

.10 Mortar:

.1 Install damming material as required.

.2 Mix mortar in strict accordance with manufacturer's instructions.
.3 Pump, trowel or hand pack mortar through openings to minimum thickness as recommended by manufacturer and as listed by ULC, or cUL, to achieve required fire rating.

.11 Firestopping Mineral Wool:

.1 Install firestopping by compressing material to the minimum required by ULC, cUL, or WH listing.
.2 Apply firestopping in sufficient thickness, depth and density so as to achieve the required fire resistance rating.
.3 Use impaling clips to support and secure firestopping where required by tested system.

.12 Where joint application is exposed to the elements, fire-resistive joint sealant must be approved by manufacturer for use in exterior applications.

3.4 FIELD QUALITY CONTROL

.1 Notify Consultant when completed installations are ready for inspection prior to concealing or enclosing an area containing firestopping materials.

.2 Arrange for inspections by the Owners independent inspection and testing company, appointed and paid for by Owner.

.3 Following field inspections, provide all repair as required to ensure compliance with the Contract Documents.

.4 Keep areas of work accessible until inspection by authorities having jurisdiction

3.5 SCHEDULE

.1 Fire stop for full depth or thickness of the assembly or component being fire stopped.

.2 Apply smoke seal material to both sides of vertical assemblies required to have smoke seals. This applies to all fire separations, whether rated or unrated.

.3 Fire Stop and Smoke Seal At:

.1 Penetrations through vertical fire separations of masonry, concrete, or gypsum board construction.

.2 Edge of floor slabs at curtain wall and precast concrete panels.

.3 Top of fire separations of masonry construction at underside of fluted steel deck assemblies:

.1 Option No. 1: cUL Design No. HW-D-0098.
.1 Fire stopping: all specified fire stopping Products.
.2 Smoke seal: Hilti Type 2 fire rated sealant.
.2 Option No. 2: ULC Design No. HW23.
.1 Fire stopping: all specified fire stopping Products.
.2 Smoke seal: 3M Type 2 fire rated sealant.
.3 Option No. 3: cUL Design No. HW-D-0092.
.1 Fire stopping: all specified fire stopping Products.
.2 Smoke seal: Tremco Type 2 fire rated sealant.

.4 Top of fire separations of gypsum board construction at underside of fluted steel deck assemblies:

.1 Option No. 1: cUL Design No. HW-D-0042.
.1 Fire stopping: all specified fire stopping Products.
.2 Smoke seal: Hilti Type 2 fire rated sealant.
.2 Option No. 2: ULC Design No. HW21.
.1 Fire stopping: all specified fire stopping Products.
.2 Smoke seal: 3M Type 2 fire rated sealant.
.3 Option No. 3: ULC Design No. HW71.
.1 Fire stopping: all specified fire stopping Products.
.2 Smoke seal: Tremco Type 2 fire rated sealant.

.5 Intersection of fire separations of masonry or gypsum board construction.

.6 Control joints in fire separations of masonry construction.

.1 Option No. 1: ULC Design No. JF83.
.1 Fire stopping: all specified fire stopping Products.
.2 Smoke seal: Hilti Type 1 fire rated sealant.
.2 Option No. 2: ULC Design No. JF 13
.1 Fire stopping: all specified fire stopping Products.
.2 Smoke seal: 3M Type 1 fire rated sealant.

.3 Option No. 3: ULC Design No. JF 18
.1 Fire stopping: all specified fire stopping Products.
.2 Smoke seal: Tremco Type 1 fire rated sealant.

.7 Control joints in fire separations of gypsum board construction: ULC Design No. JF 70.

.1 Fire stopping: all specified fire stopping Products.
.2 Smoke seal: 3M Type 1 fire rated sealant.

.8 Joints in horizontal fire separation assemblies - concrete floor slabs:

.1 Option No. 1: ULC Design No. JF82.
.1 Fire stopping: all specified fire stopping Products.
.2 Smoke seal: Hilti Type 3 fire rated sealant.
.2 Option No. 2: ULC Design No. JF13.
.1 Fire stopping: all specified fire stopping Products.
.2 Smoke seal: 3M Type 3 fire rated sealant.
.3 Option No. 3: ULC Design No. JF18.
.1 Fire stopping: all specified fire stopping Products.
.2 Smoke seal: Tremco Type 3 fire rated sealant.

.9 Penetrations through fire-resistance rated floor slabs, ceilings and roofs, and horizontal fire separations.

.10 Openings and sleeves installed for future use through fire separations.

.11 Mechanical assemblies penetrating fire separations: Refer to Division 23 - Heating, Ventilating, and Air Conditioning (HVAC).

.12 Electrical assemblies penetrating fire separations: Refer to Division 26 - Electrical.

3.6 CLEANING AND PROTECTION

.1 Clean all surfaces adjacent to sealed openings to be free of excess firestopping materials and soiling as work progresses.

.2 Upon completion of this work, remove all materials, equipment and debris from the site. Leave work area and adjacent surfaces in a condition acceptable to the Consultant.

.3 Leave installed work with sufficient protection to enable it to remain untouched until project turnover.

END OF SECTION

SEALANTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Sealants and caulking for exterior wall openings and joints.

.2 Sealants and caulking for interior wall openings and joints.

.3 Sealants and caulking for floor joints.

1.2 DELIVERY, STORAGE, AND HANDLING

.1 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels intact. Protect from freezing, moisture, water and contact with ground or floor.

1.3 SUBMITTALS

.1 Submit samples of each sealant, in conformance with Section 01 33 23 – Shop Drawings, Product Data and Samples.

.2 Provide colour cards for Consultants selection.

.3 Submit written adhesion and compatibility approval from the sealant manufacturer for all materials to be sealed.

1.4 RELATED WORK

.4	General Requirements	Division 01
.5	Cast-in-Place Concrete	Section 03 30 00
.6	Masonry Procedures	Section 04 05 00
.7	Solid Surface Fabrications	Section 06 61 16
.8	Air Barriers	Section 07 27 00
.9	Metal Flashing and Trim	Section 07 62 00
.10	Firestopping and Smoke Seal	Section 07 84 00
.11	Non-Structural Metal Framing	Section 09 22 00
.12	Ceramic Tiling	Section 09 30 13
.13	Plumbing Fixtures	Division 22

1.5 REFERENCES

.1 CGSB-19-GP-5M-84 Sealing Compound, One Component, Acrylic Base, Solvent Curing.

.2 CAN/CGSB-19.13-M87 Sealing Compound, One-Component, Elastomeric, Chemical Curing.

.3 CAN/CGSB-19.17-M90 One-Component Acrylic Emulsion Base Sealing Compound.

.4 CAN/CGSB-19.21-M87 Sealing and Bedding Compound, Acoustical.

.5 CAN/CGSB-19.22-M89 Mildew Resistant Sealing Compound for Tubs and Tiles.

.6 CAN/CGSB-19.24-M90 Multi-Component, Chemical Curing Sealing Compound.

.7 CAN/ULC-S711.1-05 Standard for Thermal Insulation – Bead-Applied One Component polyurethane Air Sealant Foam, Part 1.

.8 CAN/ULC-S711.1-05 Standard for Thermal Insulation – Bead-Applied Two Component Polyurethane Air Sealant Foam, Part 1 : M.

1.6 APPROVED MANUFACTURERS

.1 The products of the following manufacturers are approved for use subject to meeting the specifications for the particular type of sealants listed below. However, this is not an approval to substitute another type of sealant for those specified unless the material manufacturer requests change in his product in writing to the Consultant.

.1 Canadian General Electric Company Ltd.
.2 Dow Corning Canada Inc.
.3 Tremco

.2 Material manufacturers must be willing to review Shop Drawings and drawing details, visit the site to review sealant installation and provide written reports to the Consultant.

1.7 INSTALLER QUALIFICATIONS

.1 Sealants and caulking shall be installed by a specialized Subcontractor, having skilled mechanics thoroughly trained and competent in all aspects of caulking work, with minimum 5 years' experience.

.2 Sealants shall be appropriate for the application and materials to be caulked.

1.8 ENVIRONMENTAL AND SAFETY REQUIREMENTS

.1 Comply with requirements of Workplace Hazard Materials Information System (WHIMIS) regarding use, handling, storage, and disposal of hazardous materials, and regarding labelling and provision of material safety data sheets acceptable to the authority having jurisdiction.

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.3 Ventilate area of work as required and as may be directed by the Consultant by use of approved portable supply and exhaust fans.

1.9 WARRANTY

.1 Extend Contractor's warranty to five (5) years, in writing. Warranty shall commence on the date of Substantial Performance.

.2 Defective work shall include, but not be restricted to, joint leakage, cracking, crumbling, melting, running, loss of adhesion, loss of cohesion, or staining of adjacent surfaces.

.3 Provide manufacturer's project-specific 20 year non-staining warranty and 10 year weather seal warranty for "Type A" sealant listed below.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Sealant Type A: For exterior locations. Non-Staining, primer less, silicone weather-proofing sealant:

.1 SilPruf SCS9000 NB, manufactured by Canadian General Electric Company Limited, Dow Corning 756 SMS, manufactured by Dow Corning Canada Inc., or
.2 Spectrem 3, manufactured by Tremco Ltd., and
.3 conforming to the product properties published.

.2 Sealant Type B: For interior locations. Non-staining, primer less, silicone hybrid sealant:

.1 SCS7000, manufactured by Canadian General Electric Company Limited.
.2 Dow Corning 756 SMS, manufactured by Dow Corning Canada Inc., or
.3 Spectrem 3, manufactured by Tremco Ltd., and

.3 Sealant Type C: For interior locations where conditions of high humidity exist such as washrooms, showers, Mildew resistant, one component silicone conforming to CGSB 19-GP.22M and ASTM C920:

.1 CGE SCS1700 Sanitary Sealant,
.2 Dow Corning 786, or
.3 Tremco Tremsil 200 White

.4 Sealant Type D: For interior locations. Paintable, non-staining, primer less, silicone hybrid sealant:

.1 SCS7000, manufactured by Canadian General Electric Company Limited.

.5 Sealant Type E:

.1 Multi-component, epoxidized polyurethane sealant conforming to CAN/CGSB-19.24, Type 2, Class B, SWRI Certified.
.2 Dymeric 240, manufactured by Tremco Ltd.
.3 Contractors Weatherproofing Sealant (CWS) Contractors Concrete Sealant by Dow Corning.

.6 Colours of sealants and caulking when exposed in the finished work to later selection by the Consultant. Allow different colours for different situations and materials. Allow for custom colours for exterior sealants.

.7 Primers for sealing: As manufactured or recommended by the manufacturer of the sealing materials for the specific applications.

.8 Joint backing material:

.1 circular foam strips, of approved manufacture, compatible with sealant and 50% greater width than joint width;
.2 Vertical Surfaces: extruded polyolefin foam, Sof Rod by Tremco Ltd.
.3 Horizontal Surfaces: closed cell polyethylene foam, Standard Backer Rod by Tremco.

.9 Bond Breaker: pressure sensitive plastic tape backing material, which will not bond to sealant; 3M #226 or #481, or Valley Industries #40.

.10 Acoustical Sealant.

.1 To CAN/CGSB-19.21.

.2 Acceptable Product: Tremco Commercial Sealants & Waterproofing, Tremco Acoustical Sealant.

.11 Air Barrier Foam Sealant - One Part.

.1 One part polyurethane insulating foam sealant, to CAN/ULC-S710.1.

.2 Acceptable Products:

.1 Adfast Inc.: ADFOAM 1885-2
.2 Dow Chemical Canada ULC: GREAT STUFF PRO Gaps & Cracks Insulating Foam Sealant.
.3 Zerodraft Products Inc.: Zerodraft Foam Sealant.

.12 Air Barrier Foam Sealant - Two Part.

.1 Two part polyurethane insulating foam sealant, to CAN/ULC-S711.1.

.2 Acceptable Products:

.1 Dow Chemical Canada ULC: FROTH-PAK Foam Sealant.

.2 Zerodraft Products Inc.: Zerodraft Insulating Air Sealant.

.13 Preformed Compressible and Non-Compressible Back-up Materials.

.1 Polyethylene, Urethane, Neoprene or Vinyl Foam.

.1 Extruded closed cell foam backer rod.

.2 Size: oversize 30 to 50%.

.2 Neoprene or Butyl Rubber: Round solid rod, Shore A hardness 70.

.3 High Density Foam: Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200kPa, extruded polyolefin foam, 32kg/m; density, or neoprene foam backer, size as recommended by manufacturer.

.4 Bond Breaker Tape: Polyethylene bond breaker tape which will not bond to sealant.

.14 Cleaning material for surfaces to receive sealant to be as recommended by the manufacturer of the sealant.

PART 3 – EXECUTION

3.1 LOCATIONS

.1 Seal all exterior junctions and joints wherever required to close gap and wherever sealant is essential to maintain the continuity of air barrier, water barrier, or non-rated smoke separation of wall with Sealant Type A. Areas to be caulked include:

.1 Concrete to metal, masonry, concrete and precast concrete.
.2 Masonry to metal, concrete, precast concrete, and masonry.
.3 Metal to metal, masonry, concrete, and precast concrete.
.4 Around pipes and conduit through foundation walls.
.5 Between hollow metal frames and screens and adjacent materials.
.6 Between metal panels and adjacent materials.
.7 Between window and louvre frames and sills and adjacent materials.
.8 At all control and expansion joints.

.2 Seal all interior junctions and joints wherever required to close gap and wherever sealant is essential to maintain the continuity of air barrier, water barrier, or non-rated smoke separation of wall with Sealant Type B. Areas to be caulked include:

.1 Concrete to metal, masonry, concrete and precast concrete.
.2 Masonry to metal, concrete, precast concrete, and masonry.
.3 Metal to metal, masonry, concrete, and precast concrete.
.4 Around pipes and conduit through walls.
.5 Between hollow metal frames and screens and adjacent materials.
.6 Between window and louvre frames and sills and adjacent materials.
.7 At all joints between millwork and masonry, to provide neat junction.
.8 At junction between all counters and/or splashbacks and adjacent substrate with neat 3mm bead.
.9 At all control and expansion joints.

.3 Seal with Sealant Type C at the following locations:

.1 Around access panels in ceramic tile faced walls with a neat 3mm bead.
.2 Around perimeter of piping penetration at tile work.
.3 At junctions between all counter tops and/or splashbacks and adjacent substrate in washrooms, with neat 3mm bead.
.4 At junctions of lavatories, toilets, and other plumbing fixtures and adjacent substrate.

.4 Seal with Sealant Type D at all interior non-moving joints to be painted.

.5 Seal at all other vertical and horizontal joint locations with Sealant Type E.

.6 Refer to Section 07 84 00, Firestopping and Smoke Seal, for location of fire stopping and fire-resistant caulking.

.7 Refer to Section 09 29 00, Gypsum Board, for acoustic sealant work.

3.2 SUPERVISION

.1 Unless specified otherwise herein comply with the recommendations and directions of the manufacturer whose materials are being used on the work.

.2 Arrange for the sealant manufacturer's technical representatives to visit the site prior to the commencement of the sealing to meet with the Contractor and the Consultant.

.3 Sealant manufacturer to visit site periodically and to provide written reports to Consultant ensuring sealant is in accordance with good trade practice, the manufacturer's recommendations and the intent of this Specification.

3.3 PROTECTION

.1 Protect installed work of other trades from staining or contamination.

3.4 PREPARATION

.1 Install sealants only when surfaces and ambient temperatures are suitable for the material used, as per manufacturer’s recommendations.

.2 Clean all joints and spaces to be sealed.

.3 Ensure that surfaces are structurally sound, free from grease, chalk or other contaminants which may adversely affect the adhesion of the sealing materials. Use dry oil free clean compressed air stream if necessary to clean out the joint.

.4 Clean surfaces with a solvent or cleaner recommended by the manufacturer of the sealant materials.

.5 Remove chalk lines completely. Do not place clear sealant over coloured chalk lines.

.6 Test materials for indications of staining or poor adhesion before any sealing is commenced.

.7 Submit colour chart to Consultant and obtain his written instructions for colours and locations of colours.

3.5 PRIMING

.1 If recommended by the manufacturer of the sealing materials, prime joints to prevent staining, or to assist the bond, or to stabilize porous surfaces.

.2 Apply primer with a brush which will permit the priming of all joint surfaces.

3.6 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer’s instructions.

.2 Install joint back-up to achieve correct joint depth and shape, with approximately 30% compression.

3.7 MIXING

.1 Mix materials in strict accordance with sealant manufacturer’s instructions.

3.8 MASKING

.1 Where necessary to prevent contamination of adjacent surfaces, mask the areas adjacent to the joints with masking tape.

3.9 INSTALLATION

.1 Install joint backing materials at all locations as detailed or where required by sealant manufacturer's printed directions.

.2 Install a bond breaker tape or packing over asphalt impregnated fibre board as recommended by sealant manufacturer.

.3 Ensure that the correct sealant depth is maintained.

.4 Finished joints shall be free of wrinkles, sags, air pockets, ridges and embedded impurities.

.5 Tool all sealant surfaces to produce a smooth surface.

.6 Remove droppings and excess sealant as work progresses and before material sets.

.7 Sealing materials shall be gun grade or tool grade consistency to suit the joint conditions.

.8 Commence sealing only after all adjacent surfaces have been painted under Painting Section.

3.10 CLEANING

.1 Clean adjacent surfaces immediately and leave work neat and clean. Remove excess sealant and droppings using recommended cleaners as work progresses. Remove masking after joint tooling.

END OF SECTION

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

RELATED WORK

.1	Concrete Unit Masonry	Section 04 22 00
.2	Sealants	Section 07 92 00
.3	Door Hardware	Section 08 71 00
.4	Glazing	Section 08 80 00
.5	Gypsum Board	Section 09 29 00
.6	Painting and Coating	Section 09 91 00
.7	Electrical	Division 26, 27, 28

WORK INCLUDED

.1 Supply and install all hollow metal products including doors, frames, transom frames, screens, sidelight and window assemblies with provision for glazed, paneled or louvered openings, fire labelled and non-labelled, as scheduled or shown on the Drawings.

.2 Work shall include the following:

- .1 Door cutouts, complete with reinforcing, stops and closers required for glazing.
- .2 Reinforcing for Finishing Hardware.
- .3 Supply all necessary fastening and anchoring devices for above items.
- .4 Steel closure pieces at metal panels, steel columns, horizontal members, and hollow metal frames and screens. Refer to Drawings.
- .5 Metal panels in hollow metal frames.
- .6 Provision of zinc-rich coating on all exterior steel doors, frames and screens.
- .7 Fire rated and labelled doors, frames, & screens where noted on schedule.
- .8 Supply and install HSS and channel reinforcing members where shown at screens and door frames/sidelights.
- .9 Supply and installation of transfer grilles and door louvres, where indicated on Door and Frame Schedule; fire labelled where door rating is indicated.
- .10 Supply and install door silencers on metal frames.

REFERENCES

.1 CAN4-S104 Fire Tests of Door Assemblies

.2 CAN4-S105 Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104

.3 CAN4-S106 Standard Method for Fire Tests of Window and Glass Block Assemblies

.4 Canadian Steel Door Manufacturers Association (CSDMA)

- .1 Recommended Specifications for Commercial Steel Doors and Frames
- .2 Recommended Dimensional Standards for Commercial Steel Doors and Frames
- .3 Recommended Specifications for Sound Retardant Steel Doors and Frames
- .4 Canadian Fire Labelling Guide for Commercial Steel Door and Frame Products
- .5 Guide Specification for Installation and Storage of Hollow Metal Doors and Frames

.5 CGSB 82.5 Insulated Steel Doors

.6 CSA A101 Mineral Fiber Thermal Insulation for Buildings

.7 CSA W59 Welded Steel Construction (Metal Arc Welding)

.8 ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

.9 ANSI A250.4 Test Procedure and Acceptance Criteria for Physical Endurance For Steel Doors Frames and Frame Anchors

.10 ANSI A115.IG Installation Guide for Doors and Hardware

.11 ANSI A250.11 Recommended Erection Instructions for Steel Frames

PERFORMANCE

.1 Doors and frames covered by this specification shall be certified as meeting Level “A” acceptance criteria when tested in strict conformance with ANSI-A250.4-2011. Swing Test duration shall be 1,000,000 cycles. For door twist tests maximum deflection is not to exceed 32mm (1¼”) when loaded to 136kg (300 lbs), and permanent deflection is not to exceed 3.2mm (1/8"). Tests shall be conducted by an independent nationally recognized accredited laboratory.

.2 Fire labelled product shall be provided for those openings requiring fire protection and temperature rise ratings, as determined and scheduled by the Consultant. Doors, frames, transom frames and sidelight assemblies shall be tested in strict accordance with CAN4-S104. Product shall be listed by Underwriters Laboratories of Canada under an active Factory Inspection Program and shall be constructed as detailed in Follow-Up Service Procedures issued to the manufacturer.

.3 Should any door or frame specified by the Consultant to be fire rated, not qualify for labelling due to design, hardware, glazing or any other reason, advise the Consultant before manufacturing commences.

.4 Core materials for exterior doors shall attain a thermal resistance rating RSI 1.06 (R6.0) when tested in accordance with ASTM C518.

.5 Product quality shall meet standards set by the Canadian Steel Door Manufacturers Association.

QUALITY ASSURANCE

.1 Supply all steel door and frame product from one manufacturer Member Company of the CSDMA.

.2 Manufacturer must be capable of labelling the fire rated doors, frames, and screens, glazed with specified fire glass. Refer to Section 08 80 00 for fire glass specifications. No Georgian Wire Glass will be permitted on the job.

.3 CSDMA Specification 08 11 13 “Commercial Steel Doors and Frames” is the minimum fabrication standard for this section, as if printed in its entirety herein, except where specified otherwise.

.4 Handle and install product in strict compliance with CSDMA 08 11 13, DHI A115.IG and NFPA 60.

.5 A cash allowance is included in the tender price to cover cost of an independent inspection company, to be selected by Consultant. Allowance is the responsibility of the Contractor and any ensuing deficiency correction costs are the responsibility of the supplier and/or the installer(s), as determined by the inspection report. The Owner reserves the right to have inspection include manufacturing facilities, and work in progress for this project, prior to award of contract or Substantial Performance of the contract.

SUBMITTALS

.1 Submit confirmation that the manufacturer can label all fire rated doors, frames, and screens, glazed with the fire rated glass to be used on the project, for the fire separation required.

.2 Prepare and submit shop Drawings in accordance with Section 01 33 23, and show the following:

- .1 Door and frame schedules, identifying each unit, with door numbers referencing the numbering in the contract documents.
- .2 Provide columns for Stock Code Numbers for both doors and frames.
- .3 Typical and special details; including mortises, reinforcements, anchorages, locations of exposed fasteners, openings (glazed, panelled or louvered) and arrangement of hardware.
- .4 Materials and finishes; including steel, core, material thickness.
- .5 Hardware preparation.
- .6 Frame anchorage details.
- .7 Submit manufacturer's standard catalogue data for specified products demonstrating compliance with referenced standards.
- .8 Other pertinent information

.3 Submit information on standard shop drawing sheets as approved by the Canadian Steel Door and Frame Manufacturers Association.

.4 Shop drawings for hollow metal screens over 8m2 in size, and for all screens which are required by code to be designed as guards at variations

in floor level, must be sealed by a professional engineer, registered in the Province of Ontario.

.5 Submit manufacturer's printed installation instructions.

.6 Operation and Maintenance Data: Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

PRODUCT HANDLING

.1 Matchmark doors, panels, frames and windows with Stock Code Numbers as shown on the Door Schedule. If Stock Code Numbers are not shown on the Schedule, matchmark with Door Numbers.

.2 Deliver, store and handle components so as to prevent damage, distortion and corrosion.

.3 Store Steel Frames under cover, raised on wood skids at least 100mm above grade, and as required to prevent damage and rusting. Store assembled frames in an upright position. Stack frames to prevent twisting; maximum 5 units per stack. Provide minimum 6mm airspace between frames to permit air circulation. Covers must be vented so as to avoid a build-up of humidity within.

.4 Doors to be delivered to site immediately prior to installation. Store doors protected at corners to prevent damage or marring of finish. Store in upright position, in enclosed, dry space, in a manner to prevent rust and damage. Use vented covers.

TESTING

.1 Three doors will be selected at random by the Consultant and shall be subjected to destructive testing by an Inspection Company appointed by the Consultant, to verify conformance to the specifications. Replace the doors at no additional cost to the Contract.

WARRANTY

.1 Provide an extended warranty of three (3) years from date of Substantial Performance against defects of workmanship including failure of welded

seams or of reinforced hinge anchorage plates. Work showing defects during this period shall be repaired or replaced without cost to the owner.

PART 2 – MATERIALS

2.1 MATERIALS

.1 General: All materials shall be new and suitable for their various purposes and shall be free from flaws and imperfections.

.2 All doors, frames, and screens shall be from one manufacturer. Only the following manufacturers will be accepted:

.1 Manufacturers:

.1 Fleming Baron Door Products (Assa Abloy)
.2 Daybar Industries Ltd.
.3 All Steel Doors
.4 Gensteel Doors
.5 Trillium Steel Doors
.6 Vision Hollow Metal

.2 Manufacturers must be able to provide and label the fire rated doors, frames, and screens required for this project, using the fire glass specified. If the manufacturer carried in the tender is not capable of providing the fire labelled products, the Contractor will be required to use one of the other listed manufacturers for the work, at no additional cost to the Owner.

.3 Sheet Steel:

.1 General: cold rolled, carbon steel, stretcher levelled. Steel to have hardness of Rockwell 'B' maximum 65 (ASTM E103) suitable for forming and bending without metal or coating fracture.
.2 ASTM A65 3/A653M commercial grade tension levelled hot-dipped galvannealed steel sheet, coating designation Z275

.4 Steel Thicknesses:

.1 Doors:

.1 1.6mm (16 ga) for exterior, high use and oversize doors

.2 1.3mm (18 ga) for other interior doors

.2 Panels: 1.3mm (18 ga)
.3 Frames: 1.6mm (16 ga)
.4 Hinge Reinforcement: 3.5mm (10 ga)

.5 Door Materials:

.1 Exterior, High Use and Oversize Doors:

.1 Includes all exterior doors and vestibule doors, stairwell doors, Gymnasium doors, and all other high use doors, and

.2 all doors over 3m2 and over 1200mm wide or over 3000mm in length

.3 Semi-rigid glass fibre insulation fastened between continuous interlocking steel ribs to prevent sagging or movement.

.4 Doors to be Fleming H-Series, 16 gauge, with continuous welded edge seams.

.2 Other interior doors and panels up to 3m2 and maximum width of 1200mm or maximum length of 3000mm:

.1 Doors to be Fleming D-Series, 18 gauge.

.2 Interior Doors to be reinforced with continuous interlocking steel ribs.

.6 Fire rated doors: in accordance with fire test requirements.

.1 Locate U.L.C. label on inside of hinge jamb on frame.
.2 Locate U.L.C. label on the top hinged edge of door midway between top

.3 Hinge and top of door. Doors to be as noted above.

.7 Sound Insulated Doors:

.1 Where sound insulated doors are indicated in the door schedule, provide assemblies that have been tested in accordance with ASTM E90, certified to a minimum rating of STC 43.
.2 Assembly includes manufacturer's proprietary door and frame construction, and acoustical gasketing system. Doors to be Fleming SD Series, 16 gauge.

.8 Door Reinforcement: Reinforce all steel doors with 20 ga. vertical interlocking weld steel stiffeners at 150mm o.c., spot welded to face sheets.

.9 Frame reinforcement:

.1 Reinforce frames for high frequency hinge preparation.
.2 Stiffen all mullions and hinge jambs with continuous 3.5mm channel where continuous hinges are required.
.3 Reinforce and provide cut outs and boxes for security devices.
.4 Reinforce for overhead stops.

.10 Exterior Top Caps: galvanized steel caps, flush with top of door.
.11 Zinc Rich Coating: ZRC 221 Cold Galvanizing Compound by ZRC Worldwide, low VOC coating, or equivalent approved by the Consultant.
.12 Metal Filler: Two component epoxy type.
.13 Primer: Rust inhibitive primer
.14 Glass Stop Screws: Oval head, cadium plated, self-tapping steel screws. Other mechanical locking methods may be used but shall be detailed on Shop Drawings for review.
.15 Door Silencers: Rubber - Ives SR64 or approved equal.

2.2 FABRICATION

.1 General

.1 Dissimilar metals in contact, or metals which will be in contact with concrete or masonry when installed, shall be insulated one from

another by methods and materials required for such results, as approved by the Consultant.

.2 Components shall be the types and sizes shown on the Drawings.

.3 Reinforce components, where required, for the installation of Finishing Hardware. Drill and tap to suit templates.

.4 Prepare doors and frames for the installation of the security system. Confirm requirements with Consultant.

.5 Ensure adequacy of anchoring devices.

.6 No patching, plugging, skimming or other such means of overcoming defects, discrepancies or errors shall be resorted to without written permission of the Consultant.

.7 Fabricate components from clean steel, free of rust and scale, which has been thoroughly degreased.

.8 The dimensions shown on the Drawings are the full rebate size of the frame.

.9 In addition to specified requirements for hollow metal doors and frames, fire doors and frames shall comply with the Underwriters Laboratories requirements for the specified rating and be provided with the appropriate labels.

.10 All seams in exterior doors, stairwell doors, and all doors over 3m2 and over 1200mm wide or over 3000mm in length, and seams in all frames must be continuously welded. No spot welding will be permitted. All welds must be ground flush. No visible seams will be accepted.

.11 All exterior steel doors, frames and screens to be painted with 2 coats of zinc-rich coating after fabrication and before delivery to site.

.12 All areas where shop applied zinc-rich coating has been damaged on site shall immediately be cleaned and touched up with the same zinc-rich coating product.

.13 Steel framed doors, screens and windows are to be glazed as specified in Section 08 81 00. Exterior and acoustic doors and screens are to be prepared for double glazed units.

.2 Edge Clearances

.1 Unless otherwise specified, allow edge clearances in accordance with Canadian Manufacturing Specifications for Steel Door and Frame Manufacturers Association.

.2 Where hardware items are to be attached to, or mortised into, bottom edges of doors, provide proper clearance between door and floor or threshold to accommodate such hardware.

.3 Hardware Preparation

.1 Refer to Hardware Schedule, included in Section 08 71 00, and prepare doors for hardware listed.
.2 Templated hardware: prepare work in accordance with templates supplied in Section 08 71 00. Prepare doors for mortice locksets according to Hardware Schedule
.3 Reinforce doors and frames for concealed, mortised and surface mounted hardware in
accordance to "Thickness of Steel for Component Parts" in the "Canadian Manufacturing Standards for Steel Doors and Frames", published by the Canadian Steel Door and Frame Manufacturers' Association.
.4 Prepare doors and frames for security system where noted.
.5 At oversized door locations, provide minimum 4 butt hinge preparations.
.6 Prepare all exterior doors and vestibule doors and frames for four hinges.

.4 Hollow Metal Doors and Panels

.1 Doors and panels shall be of seamless, continuously welded construction with no visible seams or joints on faces. Doors to be 44.4mm minimum thickness.
.2 Secure edge seams with suitable continuously welded seams to the approval of the Consultant.
.3 Interlocking seams for doors shall be fully seam welded, for full length of door. All welding to be ground smooth.
.4 Core construction:

.1 Exterior doors to be filled with glass fibre insulation between steel reinforcing. All Type H doors to be steel stiffened as specified herein.
.2 All interior doors shall have steel reinforcing.
.3 Temperature Rise Rated (TRR): Solid slab core of non-combustible, inorganic composite to limit temperature rise on the “unexposed” side of door to 250(C at 30 or 60 minutes, as required by governing building code requirements and determined and scheduled by the Consultant

.5 Welds shall be ground, filled, and dressed smooth to provide an invisible joint and smooth flush surface.

.6 Fully reinforce doors as required for specified hardware. All exterior, stairwell, and washroom doors and all doors noted as "high frequency" shall be reinforced with S.W. Fleming high frequency angle top hinge reinforcement, welded to door skin.

.7 Close top and bottom edges of doors with a continuous, recessed, minimum 1.5mm thick steel channel, extending full width of door and welded to both faces. At exterior doors, provide an additional flush closing channel at top edge and, where required for attachment of weather stripping, a flush closure at bottom edge. Provide similar closure channel at all stair doors.

.8 Surround openings in doors with minimum 1.5mm thick steel edge channels, welded to both face sheets.

.9 Vertical edge profile for single acting swing doors: bevelled 3mm in 50mm.

.10 Glazing Stops:

.1 Equip glazed doors with minimum 0.9mm steel glazing stops, mitred and welded at corners. Where least dimension of stop is less than 12mm, make stop from solid square bar.

.2 Glazing stops at outside of exterior doors and at secure side of interior doors shall be rendered non-removable by welding to door. Secure removable stops with screws.

.3 Glazing stops may be mechanically locked in place, providing details have been reviewed on Shop Drawings.

.4 Glazing stops at fire rated doors and screens shall conform to the requirements of the tested assemblies.

.11 Fabricate exterior panels with a full width steel drip on the outer, lower edge.

.12 Doors for installation in channel frames shall be double-depth mortised to accommodate both butt flanges.

.13 Construct fire rated doors to meet fire test requirements and provide U.L.C. labels.

.5 Steel Frames

.1 Frames shall be of sheet steel, formed profiles shown on the Drawings. Fleming D Series for interior, Fleming H Series for exterior.

.2 Fabricate frames in sections as large as practicable to minimize field jointing. Internally reinforce all mullions and hinge jambs with 1.3mm channel.

.3 Steel thickness: 1.6mm (16 ga.) galvanized steel.

.4 Glazing stops shall be as specified for doors above.

.5 Sidelight framing shall be of same metal and thickness as adjacent door frame.

.6 Assemble components with accurately cut joints. Mitre outside corner joints of frames. Continuously weld joints on inside of profile; grind welds flush and sand to smooth uniform surface. Provide semi-rigid insulation to exterior frames.

.7 Tack weld two (2) removable 1.2mm steel spreader channels to inside faces of door frames at base, for protection during shipping.

.8 Provide adjustable base clips at bottom of each door jamb for anchorage to floor.

.9 Provide button type rubber silencers; three per strike jamb of single doors: two per head member of double door frames.

.10 Prepare door frames for ANSI strike, where doors to be fitted with latchsets or lockets.

.11 Provide removable mullions where noted. Reinforce removable mullions with 3.5mm channel to prevent forcing of latching hardware.

.12 Masonry Anchors:

.1 At interior frames, provide masonry anchors of 1.5mm galvanized corrugated tee anchors or 3mm diameter galvanized wire anchors - supplied loose, at rate of 3 per jamb up to 2.2m high; one additional per jamb for each 0.6m over 2.2m high. Frames for observation windows shall be provided with 2 anchors per jamb.

.2 At exterior frames, provide galvanized tee anchors fabricated from 3mm steel plates, installed at rate of 3 per jamb up to 2.2m high; one additional per jamb for each 0.6m over 2.2m high

.13 Anchors at steel stud framing:

.1 At interior frames, provide adjustable wall anchor clips (AWA), galvanized, supplied loose at 3 per jamb up to 2.2m high; one additional per jamb for each 0.6m over 2.2m high. Frames for observation windows shall be provided with 2 anchors per jamb.

.14 Provide two 38mm by 38mm by 4.8mm thick steel stiffening angles in the head member of frames for two or more doors totalling over 1980mm, wide. Provide necessary vertical stiffeners where required and carry to structure above. Provide stiffener angles in all exterior door jamb with sidelights and in all centre mullions between doors.

.15 Mounting bars for sidelights shall be as detailed on the Drawings and shall be completely filled with glass fibre insulation.

PART 3 - EXECUTION

3.1 GENERAL

.1 Store doors and frames as specified under item 1.7, Product Handling, above.

.2 When installing frames during cold weather, installer to coat inside of frames with a corrosion inhibiting bituminous product, prior to installation, to protect against cold weather additives in masonry grout.

.3 Silencers, gaskets, etc., are to be installed in holes in frames prior to installation of frames; so to avoid filling these holes with grout during installation.

.4 Keep steel surfaces free of grout, tar, other bonding materials, and sealers; clean surfaces immediately following installation.

3.2 INSTALLATION

.1 Frame and Screen Installation

.1 Remove all steel spreaders, which are provided to avoid damage during shipping. Provide wood spreaders at base and midpoint of frames. Wood spreaders to be min. 38 x 89mm lumber, notched to clear frame stops; width to be equal to opening between jambs at header level. Wood spreaders to remain in place until frames are set permanently in walls.

.2 Set frames and screens plumb, square, aligned, without twist and at correct elevation. Maximum allowable limits of distortion shall be as follows:

.1 Plumbness: Not more than 1.6 mm out of plumb, measured using a line from the intersection of vertical members and the head to the floor.

.2 Squareness: Not more than 1.6 mm difference between diagonal measurements between corners.

.3 Alignment: Not more than 1.6 mm, measured on jambs, through a horizontal line parallel to the plane of the wall.

.4 Twist: Not more than 1.6 mm, measured at face corners of jambs, on parallel lines perpendicular to the plane of the wall.

.3 At masonry walls, build in frames using the corrugated or wire masonry anchors. Brace frames solidly in position while being built in, with wood spreaders as noted above. Provide vertical support at centre of head for openings exceeding 1200 mm in width.

.4 After installation, fill countersunk screw heads flush with frame and sand smooth ready for painting. Fill exterior frames with glass fibre batt insulation. Cooperate with masonry trade to fill interior frames with mortar.

.5 Where large screens are assembled on site, they must be joined by continuously welded seams, ground smooth. Provide formed covers for structural columns built into screens.

.2 Door Installation

.1 Install hollow metal doors plumb and true.

.2 Co-ordinate installation of hardware.

.3 Adjust operable parts to ensure proper operation. Lubricate using a suitable lubricant compatible with door and frame coatings.

.4 Install hollow metal panels with concealed fastenings.

3.3 TOUCH UP

.1 Remove rust, clean and touch up any damaged galvanizing with "ZRC 221" coating.

.2 Remove rust, clean and touch up any damaged paint with approved rust inhibitive primer.

3.4 CLEANING AND PROTECTION

.1 Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged products. Clean installed products in accordance with manufacturer's instructions before Owner's acceptance.

.2 Remove construction debris associated with this work from project site, and dispose of in accordance with applicable laws.

.3 Protect installed products and finished surfaces from damage during construction.

END OF SECTION

GLAZING

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Glazing for hollow metal doors, screens and windows.

1.2 RELATED SECTIONS AND REFERENCES

.1 General Requirements: Division 01.
.2 Sealants: Section 07 92 00.
.3 Hollow Metal Doors and Frames: Section 08 11 13.
.4 ASTM-D2240-97: Standard Test Method for Rubber Property Durometer Hardness.
.5 ASTM-E84-98: Standard Test Method for Surface Burning Characteristics of Building Materials.
.6 ASTM-E330-97: Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
.7 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
.8 CAN/CGSB-12.3-M91, Flat, Clear Float Glass.
.9 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.
.10 CAN/CGSB-19.13-M87, Sealing Compound, One-Component, Elastomeric Chemical Curing.
.11 Insulating Glass Manufacturers Alliance (IGMA), Glazing Guidelines for Sealed Insulating Glass Units, 1997.
.12 Glass Association of North America (GANA), Glazing Manual, 2005.
.13 NFRC-100-2010, Procedure for Determining Fenestration Product U-Factors.

1.3 QUALITY ASSURANCE

.1 Glass and glazing work of this section shall conform to good glazing practice as described in the IGMA-North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use and the GANA Glazing Manual.

.2 Submit all documentation specified to show that all Products used meet or exceed the requirements of these Specifications.

.3 All glass shall bear manufacturer's labels identifying glass type and thickness. Labels shall remain on glass until final cleaning.

.4 Glazing Subcontractor shall be member in good standing of the Architectural Glass & Metal Contractors Association or the Ontario Glass & Metal Association, and have a minimum of five years uninterrupted experience in successfully carrying out projects of similar size.

1.4 PERFORMANCE REQUIREMENTS

.1 Structural Design of Glass:

.1 Glass thickness:

.1 Specified glass thicknesses are minimums.
.2 Confirm glass thicknesses by analyzing Project loads and in-service conditions.
.3 Provide glass lights in the thicknesses required to meet or exceed these requirements, but not less than the minimum thickness specified.

.2 Size glass units and glass thickness in accordance with CAN/CGSB-12.20.
.3 Size glass to withstand wind loads, dead loads and positive and negative live loads as measured in accordance with ASTM-E330.
.4 Limit glass deflection to 1/175 of span to a maximum of 15mm with full recovery of glazing materials.
.5 Probability of Breakage:

.1 Vertical glazing – typical: 8 lights per 1000 for lights set vertically or not more than 15 degrees off vertical.
.2 Sloped glazing: 1 light per 1000 for lights set greater than 15 degrees off vertical.
.3 Glazing acting as guard: 1 light per 1000.

.6 Design exterior and interior glass lights to withstand OBC design loads for guards for glazing that extends to less than 1070mm above the floor and where the floor level on one side is more than 600mm higher than the elevation of the floor or ground on the other side.

.2 Thermal and Optical Performance:

.1 Maximum centre-of-glass U-factor values for glazing Products shall be as specified in Part 2 of this section and shall be determined in conformance with CAN/CSA-A440.2 and NFRC-100.

.2 Maximum solar heat gain coefficient (SHGC) and minimum visible transmittance (VT) for glazing Products shall be as specified in Part 2 of this section and shall be determined in conformance with CAN/CSA-A440.2 and NFRC-200.

1.5 SUBMITTALS

.1 Submit in accordance with Section 01 33 23 – Shop Drawings, Product Data and Samples.

.2 Submit all documentation and samples for review by Consultants at one time, prior to ordering glass products.

.3 Shop Drawings:

.1 Submit Shop Drawings for the work of this section.

.2 Shop Drawings shall include glass type, thicknesses, sizes, shapes, accessories, locations, and glazing methods.

.3 Shop Drawings shall include a glazing schedule listing glass types and thicknesses for each size opening and location.

.4 Shop Drawings shall identify the insulating glass unit (IGU) supplier.

.5 Shop Drawings shall bear the seal and signature of the Professional Engineer providing glazing design for the Glazing Subcontractor.

.6 Submit a General Review Commitment Certificate for the work of this section as may be required by the municipality or any authority having jurisdiction.

.7 Letter of Compliance: Submit the necessary documentation indicating compliance with the requirements of the Building Code and the approved drawings which formed the basis of the General Review Commitment Certificate.

.5 Samples:

.1 Submit 300mm by 300mm size samples of each type of glass specified.

.6 Product Data:

.1 Submit Product data for the work of this section.
.2 Provide the manufacturer's transmittance, reflectance, and thermal performance data for insulating glass units.
.3 Submit letter from insulating glass fabricator stating current IGMA compliance number and identifying the types of edge construction covered by that number.
.4 Manufacturers' certification:

.1 The respective manufacturers of specified glass products shall submit with the window and curtain wall assembly Shop Drawings, written certification stating that all glass and glazing materials and requirements as detailed and specified on the Shop Drawings have been reviewed and approved for use relative to their specific application, dimensional design and profile parameters, and conformance to all requirements as detailed and as specified in the Drawings and Specifications.

.2 Certification shall indicate the Shop Drawings reviewed by enumerating sheet number, dates and revisions.

.3 Identify any specified requirements that are in error or cannot legitimately be met, and provide alternates that meet the intent of the Specifications for the Consultant's approval.

1.6 SITE CONDITIONS AND COORDINATION

.1 Do not install any glazing until all nearby welding, grinding, sandblasting, waterproofing, mortar work and acid etching are complete.

.2 Schedule activities such as welding, sandblasting and grinding of steel or concrete, mortar work, acid etching and any other work harmful to glass, to be completed before start of glass installation. When such activities must be carried out in the vicinity of stored or installed glass, provide hoarding or other suitable protection recommended by Glazing Subcontractor.

.3 Report to the Consultant in writing any defects in existing work, or unsatisfactory site conditions. Start no work until conditions are

satisfactory. Starting work shall imply acceptance of existing conditions and surfaces.

.4 Glaze with compounds, sealants, or tapes only when glazing surfaces are at temperatures recommended by the tape or sealant manufacturer, and when the substrates are free of moisture.

.5 When temperature of glazing surfaces is below that recommended by sealant manufacturer, obtain Consultant's approval for glazing methods and protective measures which are to be used under these conditions.

.6 Cooperate with other Subcontractors and with framing Supplier(s) to ensure the work of this section is completed as specified.

1.7 WARRANTY

.1 Warranty all glass to be free from defects in workmanship and materials of any kind for a period of ten (10) years.

.2 Replace (including removal and installation) all glass found to be defective.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Float Glass:

.1 Conform to CAN/CGSB-12.3, Annealed glazing quality.
.2 6mm thick unless specified or indicated otherwise and 9.5mm thick where glass units span more than 1220mm in width.

.2 Tempered Safety Glass (TGL):

.1 Type 2 – tempered.
.2 Class B – Float glass.
.3 Category 1.
.4 Minimum 6mm thick clear tempered glass conforming to CAN/CGSB 12.1. Provide minimum 9.5mm thick clear tempered class conforming to CAN/CGSB 12.1 where glass units span more than 1220mm in width.

.3 Setting Blocks: Neoprene, 80 - 90 Shore A durometer hardness to ASTM-D2240, to suit glazing method, glass light weight and area.

.4 Spacer Shims: Neoprene 50 - 60 Shore A durometer hardness to ASTM-D2240, 75mm long by one half height of glazing stop by thickness to suit application. Self-adhesive on one face.

.5 Glazing Tape: Preformed butyl compound with integral resilient tube spacing device, 10 - 15 Shore A durometer hardness to ASTM-D2240; coiled on release paper; size to suit glazing method, black colour.

.6 Sealant: One-part neutral cure silicone to CAN/CGSB-19.13, custom colour selected by the Consultant.

.1 Dow Corning Corporation: 795 Silicone Building Sealant.
.2 General Electric Canada Inc.: Silpruf Sealant.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Ensure fabricated glass will fit openings and that all required clearances to framing will be maintained.

.2 Clean contact surfaces with solvent and wipe dry.

.3 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.4 Prime surfaces scheduled to receive sealant. Ensure surfaces are free of moisture and frost.

.5 Contractor shall take all precautions necessary to protect materials, before and after installation, from lime, mortar, water run-off from concrete or copper, careless handling of tools, weld spatter, acids, roofing tar, solvents, abrasive cleaners, and other items that could damage the glass surfaces. Do not rely on use of protective plastic films to protect materials.

3.2 INSTALLATION – GENERAL

.1 Install all materials according to manufacturers' instructions and reviewed Shop Drawings and best practices as described in IGMA and GANA glazing manuals. Ensure each material used is compatible with the material which it contacts.

.2 Adjust operating sash before glazing. Glaze operating sash in the closed position. Sash to remain closed, and not be opened by any trade, until glazing materials have properly cured.

.3 Provide specified edge and face clearances and glass bite.

.4 Ensure all vent and weep holes and passages remain free of obstructions.

.5 Follow sealant manufacturer's recommendations for proper joint design, including use of joint fillers, primers, and bond breakers, as required to suit jobsite conditions.

.6 Remove excess glazing and sealant compounds, dirt, and other substances from glass and adjacent surfaces at completion of glazing work.

.7 Provide safety markings to installed glass by attaching streamers or tape to face of sash. Do not apply tape directly to the glass. Do not mark glass with paint or any other substance that is hard to remove or could leave permanent stains.

.8 Replace all defective glass products and glass damaged during installation at no cost to the Owner.

3.3 INSTALLATION: INTERIOR - DRY METHOD (TAPE AND TAPE)

.1 Cut glazing tape to length and set against permanent stops, projecting 1.5mm above sight line.

.2 Place setting blocks at 1/3 points, with edge block maximum 150mm from corners.

.3 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.

.4 Cut glazing tape to length and place glazing tape on free perimeter of glazing, projecting 1.5 mm above sight line.

.5 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

.6 Knife trim protruding tape.

3.4 INSTALLATION: MIRRORS

.1 Supply and installation of washroom mirror is specified in Section 10 28 13 – Washroom Accessories.

3.5 PROTECTION

.1 Contractor shall take all precautions necessary to protect stored glass and installed glass, from lime, mortar, water run-off from concrete or copper, weld spatter, acids, roofing tar, solvents, abrasive cleaners, careless handling of tools, and any other activities by building trades that could permanently damage the glass surfaces.

.2 Install protective cover to glazing where there is a high risk of damage. Use plywood, heavy Kraft paper or non-staining transparent plastic sheet. Do not let protective materials contact surface of glass. Consult with Glazing Subcontractor to determine appropriate protective measures.

.3 Do not rely on use of adhesive plastic films to protect installed glass. When plastic sheeting is used, it must be transparent, suspended away from the surface of the glass, and be provided with adequate ventilation holes to prevent heat build-up.

3.6 CLEANING

.1 As work progresses clean all glass, including fittings. Remove all setting and glazing compounds from adjacent surfaces. Remove all finger and hand prints and other soil.

.2 Protect glass from contact with contaminating substances during construction.

.3 Clean and wash glass by methods recommended by glass manufacturers.

.4 All glass shall be cleaned immediately prior to the Consultant’s review for Substantial Performance and again immediately prior to occupancy of the building by the Owner.

.5 Remove all protective materials, glazing materials, and other deposits from finished surfaces.

.6 Remove labels after work is complete.

.7 Do not use vigorous cleaning methods. Avoid scratching glass.

.8 Clean and restore stained or damaged surfaces in accordance with manufacturer's recommendations. Replace glass if cleaning is impossible.

END OF SECTION

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1 Rough Carpentry: Section 06 10 00.

.2 Gypsum Board: Section 09 29 00.

.3 Acoustic Ceilings: Section 09 51 00.

1.2 REFERENCES

.1 CSA S126: North American Specification for the Design of Cold-Formed Steel Structural Members.

.2 CAN/ULC-S101: Standard Methods of Fire Endurance Tests of Building Construction and Materials.

.3 AISI: North American Standard for Cold-Formed Steel Framing Product Data.

.4 ASTM International:
- .1 A653/A653M: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 A641/A641M: Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
- .3 A792/A792M: Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy- Coated by the Hot-Dip Process.
- .4 A1003: Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic coated for Cold-Formed Framing Members.
- .5 C645: Standard Specification for Nonstructural Steel Framing Members.
- .6 C754: Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- .7 C840: Standard Specification for Application and Finishing of Gypsum Board.
- .8 C841: Standard Specification for Installation of Interior Lathing and Furring.
- .9 C844: Standard Specification for Application of Gypsum Base to Receive Gypsum Veneer Plaster.
- .10 C1002: Standard Specification for Steel-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster bases to Wood Studs or Steel Studs.

.11 ASTM E90: Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
.12 ASTM E413: Classification for Rating Sound Insulation.
.13 E488: Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.
.14 E1190: Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members.

.5 Canadian Sheet Steel Building Institute (CSSBI):

.1 Lightweight Steel Framing Technical Bulletin Volume 7, Number 1, Maximum Height Tables for Interior Non-Loadbearing Partitions.

1.3 QUALITY ASSURANCE

.1 Fire-Test-Response Characteristics:

.1 For fire-resistance-rated assemblies that incorporate non-loadbearing interior steel framing, provide materials and construction identical to those tested in assembly indicated according to CAN/ULS-S101.

.2 STC-Rated Assemblies:

.1 For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413.

1.4 DELIVERY AND STORAGE

.1 Handle and store materials carefully to prevent damage.

.2 Obtain approval of proposed locations for stockpiling material. Provide any necessary temporary covers, skids and the like.

.3 Do not install damaged or deteriorated material but remove from Site.

1.5 RELATIONS WITH OTHER TRADES

.1 Coordinate with other trades for the locations of items to be framed in and framed around.

.2 Co-ordinate with mechanical and electrical Trades to ensure that all services are installed prior to application of wall board.

.3 Coordinate with mechanical and electrical trades for locations of access panels. Install access doors and panels supplied by those trades.

.4 Co-ordinate with forces installing insulation and vapour barrier in exterior soffits.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Metal framing shall be as manufactured by Bailey Metal Products or approved alternate; to ASTM C645.

.2 Metal Studs and Track: minimum 0.912mm (20 gauge) galvanized steel; depths as indicated on drawings, 41mm, 64mm, 92mm,152mm.

.3 Metal Furring Channels: minimum 0.455 (18 mils) sheet galvanized steel channel and accessories as manufactured by Bailey Metal Products, or approved alternate; to ASTM C645.

.4 Cold Rolled Furring Channel: 20mm, x 12.7mm zinc coated channel weighing minimum 0.446 kg per m.

.5 Cold Rolled Carrying Channel: 38mm x 15mm zinc coated channel weighing min 0.707 kg per m.

.6 Hanger wire: minimum 3.77mm (9ga) galvanized steel wire.

.7 Tie Wire: minimum 1.5mm (16 ga) galvanized soft annealed steel.

.8 CGC Brand Screws (or approved equal) of type recommended by the board manufacturer.

.9 Thermal Break: Permanent adhesive faced rubberized cork, 3 mm thick by width of stud on channel to be used between masonry in exterior wall and metal furring channels.

.10 Ceiling Anchors: Self drilling tie wire anchors, Phillips "Red Head" T-32 or approved equal.

PART 3 - EXECUTION

3.1 GENERALS

.1 Provide plumb, straight, level, rigid, and secure installation. Failing to achieve this result shall be cause for rejection and reinstallation of this work.

.2 Where walls run parallel and under steel joists, the joists shall be framed both sides and enclosed with gypsum board to provide sound barrier between rooms.

3.2 CEILING SUSPENSION

.1 Do not regard grillage system indicated on drawings as exact or complete. The Specification for metal framing contained in CGC Gypsum Construction Handbook and ASTM C840 shall govern installation conditions not covered by this Specification. The more stringent specifications shall apply.

.2 Hangers:

.1 Install hangers for suspended wallboard ceilings to support the grillage independent of walls, columns, pipes, ducts and the like. Erect plumb and securely anchor to the structure. Submit details of proposed method to the Consultant for approval. If so requested, test hangers to prove that anchorage is adequate to support the proposed loading. Erect hangers plumb and securely anchor to structural steel or support channels fastened to structural steel (DO NOT FASTEN TO STEEL DECK).

.2 Space hangers at 1200mm maximum o.c. along the carrying channels and not more than 150mm from ends (or as required to conform with fire tested assemblies where applicable).

.3 Carrying Channels:

.1 Space channels at 1200mm maximum o.c. (or as required to conform with fire tested assemblies where applicable).
.2 Run channels transversely to structural framing members.
.3 Where splices are necessary, lap members at least 200mm and wire each end with two laps; avoid clustering or lining up splices.
.4 Attach to hangers by bending hanger under runner and securely wire in place with a saddle tie.
.5 Provide 25mm clearance between channels and abutting walls and partitions.

.4 Cross Furring

.1 Install drywall screw channels transversely across runner channels, joists or other supports.
.2 Space drywall screw channels at 600mm o.c. and not more than 150mm from perimeter walls. Provide 25mm clearance between channels and abutting walls and partitions. Use closer spacing if so noted on drawings.
.3 Secure drywall screw channels to each support with approved clip or attachment; splice joints by messing minimum 200mm and tying channels together with double strand 16 gauge tie wire.
.4 Level drywall screw channels to a maximum tolerance of 4mm over 3600mm.
.5 Drywall shall not be fixed directly to open web steel joists and the like. Provide cross furring as specified.

.5 Openings

.1 Frame openings with suitable channels; check clearances with respective Trades. Provide support for edges of boards at all cut-outs and openings in ceilings.
.2 Provide all additional hangers and supports for fixtures as required.
.3 Provide additional hangers and framing for enclosure of radiant heating panels.

.6 Bulkheads

.1 Fur out bulkheads in areas indicated and as required to conceal mechanical, electrical or other services in rooms where drywall finishes are scheduled, and elsewhere if called for on drawings.
.2 Use methods and materials as previously specified in this section.

3.3 STEEL STUD SYSTEM (PARTITION) INSTALLATION

.1 Conform to the guidelines for metal framing contained in The Gypsum Construction Handbook, CSA A.82.31, and these specifications. The most stringent requirements shall apply.

.2 Attach metal runners at floor and ceiling to structural elements with suitable fasteners located 50mm from each end and spaced 600 mm. o.c. with toggle or molly bolts spaced 400mm o.c.

.3 Position studs vertically, engaging floor and ceiling runners, and spaced 400mm o.c., unless otherwise noted on drawings. When necessary, splice studs with 200mm nested lap and one positive attachment per stud flange. Place studs in direct contact with door frame jambs, abutting partitions, partition corners and existing construction elements.

.4 Where studs are installed directly against exterior walls install rubberized cork stip between studs and wall surfaces to provide thermal break.

.5 Anchor studs for shelf-walls and those adjacent to door and window frames, partition intersections and corners to ceiling and floor runner flanges with an approved crimping tool. Securely anchor studs to jamb and head anchor clips of door or borrowed-light frames by bolt or screw attachment. Over metal door and borrowed-light frames, place horizontally a cut-to-length section of runner, with a web-flange bent at each end, and secure with one positive attachment per flange. Position a cut-to-length stud (extending to ceiling runner) at vertical panel joints over door frame header.

.6 Stiffen partitions exceeding 3m long or 2.7m high with 19mm. cold rolled channels. Fix horizontally and provide the number of rows necessary to ensure a rigid installation. Provide other partition reinforcing necessary to support wall hung components, cupboards, closets and the like. Use 2 studs at jambs of openings and corners.
.7 Where horizontal runs of service lines are to be installed within the partition, erect studs with web openings aligned.

.8 Provide reinforcing and necessary stiffeners to support hollow metal frames and screens. Reinforcing to be capable of supporting screens rigidly and solid without deflection.

3.4 CHASE WALL INSTALLATION

.1 Align two parallel rows of floor and ceiling runners spaced apart as indicated. Attach to concrete slabs with concrete stub nails or power driven anchors 600 mm o.c. Attach to suspended ceilings with toggle or molly bolts 400mm o.c. Attach to wood framing with suitable fasteners 600mm o.c.

.2 Align metal studs vertically in runners, 200mm o.c. with flanges in the same direction and with studs on opposite sides of chase directly across from each other. Anchor studs to floor and ceiling runner flanges with an approved metal crimping tool.

.3 Cut cross bracing to be placed between rows of studs from gypsum panels, 400mm high by chase wall width. Space braces at quarter points not to exceed 600mm o.c. vertically and attach to stud webs with six 25mm screws 200mm o.c. maximum on each side.

.4 Bracing with 64mm metal studs may be used in place of gypsum panels. Anchor web at each end of metal brace to stud web with two 10mm pan head screws. When chase wall studs are not opposite, install metal stud cross braces 400mm o.c. horizontally and securely anchor each end to a continuous horizontal 64mm runner screw-attached to chase wall studs with the cavity.

.5 Adapt cross bracing as necessary to avoid interference with service.

3.5 WALL FURRING INSTALLATION

.1 Direct Furring Channel Attachment - Attach metal furring channels, vertically or horizontally spaced 400mm o.c. to masonry or concrete surfaces with hammer-set ro power-driven fasteners or concrete stub nails staggered 600mm o.c. on opposite flanges. Nest channels 200mm at splices and anchor with two fasteners in each wing. Where furring channel is installed directly to exterior wall, install thermal break strip between furring channel and wall. For horizontally placed channels attach maximum 100mm from floor and ceiling.

.2 Bracketed Furring Channel Attachment:

.1 Attach adjustable wall furring brackets with serrated edges up, 900mm o.c. horizontally, 1200mm o.c. vertically, within 100mm of columns or other abutting construction, within 150mm of floor and ceiling, and as required above and below openings. Use 50mm cut nails in mortar joints of brick or clay tile or concrete block, or in field of lightweight aggregate blocks; use 16mm concrete stub nails or power driven nails or other suitable fasteners in monolithic concrete. Place fastener in top hole of bracket.

.2 Lay cold-rolled channels horizontally with flanges down, on furring brackets, plumb with other channels, and tie with double strand 16 ga. or triple strand 18 ga. wire at each junction with cold rolled channel.

.3 Free Standing Furring - In locations where wall furring is indicated as self-supporting, use steel studs and furring channels installed to provide a rigid frame to receive wall board.

3.6 CONSTRUCTION OF SUSPENDED AND FURRED CEILINGS

.1 Apply gypsum panels of maximum practical length with long dimension at right angles to drywall furring channels. Position end joints over furring channel web and staggered in adjacent rows.

.2 Fasten panels to drywall furring channels with screws spaced a maximum of 300mm o.c. in field of panels and along abutting ends and edges.

.3 Provide framing and drywall finish in stairwells, where required to enclose underside of stairs and landings.

.4 Where noted on plans, provide bulkheads with steel framing and drywall finish.

END OF SECTION

GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Rough Carpentry	Section 06 10 00.
.2	Non-loadbearing Steel Framing	Section 09 22 00.
.3	Acoustic Ceilings	Section 09 51 00.
.4	Painting and Coating	Section 09 91 00.

1.2 REFERENCES

.1 ASTM International:
- .1 ASTM C1396: Standard Specification for Gypsum Board.
- .2 ASTM C840: Standard Specification for Application and Finishing of Gypsum board.
- .3 ASTM C1629: Standard Classification for Abuse-Resistant Nondecorated Interior.

.2 CAN/ULC-S101 Gypsum Panel Products and Fibre-Reinforced Cement Panels

.3 Gypsum Association:

GA-214: Recommended Levels of Gypsum Board Finish.
GA-216: Application and Finishing of Gypsum Panel Products.

.4 The Gypsum Construction Handbook - CGC Inc.

1.3 DELIVERY AND STORAGE

.1 Handle and store materials carefully to prevent damage. Materials must be delivered to site in their original, unopened packages.

.2 Obtain approval of proposed locations for stockpiling material. Materials must be stored in an enclosed shelter providing protection from exposure to the elements. Provide any necessary temporary covers, skids and the like.

.3 Store all panels flat.

.4 Do not install damaged or deteriorated material but remove from Site.

.5 Materials as delivered shall bear manufacturer's name, brand name of material and where applicable, ULC designation.

1.4 ENVIRONMENTAL CONDITIONS

.1 Do not apply gypsum board or joint filler to surfaces that are damp or contain frost.

.2 During gypsum panel application and joint finishing, temperatures within work areas shall be within the range 12oC. to 25oC.

.3 Provide adequate ventilation to carry off excess moisture.

1.5 RELATIONS WITH OTHER TRADES

.1 Co-ordinate with mechanical and electrical Trades to ensure that all services are installed prior to application of wall board.

.2 Coordinate with mechanical and electrical trades for locations of access panels. Install access doors and panels supplied by those trades.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 All materials to conform to ASTM C1396 unless specified otherwise. Except where noted otherwise, products listed herein are produced by Canadian Gypsum Company (CGC). Equivalent products from Georgia Pacific (GP) and Certainteed will be accepted, subject to acceptance of equivalency by the Consultant.

.2 Gypsum panels: Typical panels to be 16mm thick abuse resistant, water resistant and mould resistant, to ASTM C1629.

.1 Acceptable 16mm thick gypsum panels:

.1 Sheetrock Mold Tough Abuse Resistant Firecode Core gypsum panels or

.2 GP ToughRock Fireguard X Mold-Guard Abuse Resistant gypsum board.

.2 Panels in gypsum board ceilings at high ceilings may be 13mm thick mould resistant panels.
.1 Acceptable 13mm thick gypsum panels:
.1 CGC Sheetrock Mold Tough or
.2 GP ToughRock Mold-Guard.

.3 Fire-rated Gypsum panels:
.1 To ASTM C1629.
.2 Minimum thickness for fire-rated panels is 16mm.
.3 Abuse resistant, water resistant, mould resistant, Type X-Fire-rated.
.4 Acceptable 16mm fire-rated panels:
.1 CGC Sheetrock Mold Tough Abuse Resistant Firecode Core gypsum panels.
.2 GP ToughRock Fireguard X Mold-Guard Abuse-Resistant gypsum board.

.4 Cement board: 16mm thick; "Durock" Next Generation cement board, by CGC.

.5 Exterior Sheathing: 16 mm thick, Type X, CGC “Securock” glass-mat exterior sheathing, DensGlass by Georgia Pacific, or GlasRoc Sheathing by CertainTeed Gypsum Canada Inc.

.6 Metal Studs and Channels: minimum 0.455mm (26 ga) galvanized steel as manufactured by Bailey Metal Products or approved alternate; to ASTM C645.

.7 Metal Furring Channels: minimum 0.455 (26ga) sheet galvanized steel channel and accessories as manufactured by Bailey Metal Products, or approved alternate; to ASTM C645.

.8 Cold Rolled Furring Channel: 20mm, x 12.7mm zinc coated channel weighing minimum 0.446 kg per m.

.9 Cold Rolled Carrying Channel: 38mm x 15mm zinc coated channel weighing min 0.707 kg per m.

.10 Cold Rolled Carrying Channel: 28 ga. galvanized steel with perforated flanges; one piece per location.

.11 Control Joint: CGC No. 093.

.12 Hanger wire: minimum 3.77mm (9ga) galvanized steel wire.

.13 Tie Wire: minimum 1.5mm (16 ga) galvanized soft annealed steel.

.14 Screws: CGC Brand Screws (or approved equal) of type recommended by the board manufacturer.

.15 Thermal Break: Permanent adhesive faced rubberized cork, 3 mm thick by width of stud on channel to be used between masonry in exterior wall and metal furring channels.

.16 Joint Treatment Material:
- .1 Joint compound, topping compound, laminating compound; to ASTM C474 and C475.
- .2 Use material recommended by board and tape manufacturer for the proposed use.
- .3 CGC Sheetrock or Durabond Setting-Type, for use with CGC fibreglass drywall tape.

.17 Reinforcing Tape: Paper or fibreglass mesh tape, as recommended by the panel manufacturer for the panel type.

.18 Finish materials: Over surface of glass mat faced boards, use level 5 finisher such as CGC Tuff Hide.

.19 Acoustic sealant: Quietseal Pro as manufactured by Quietrock, or equivaltent as manufactured by CGC, Tremco or Presstite Division of Interchemical Corporation for acoustic partitions.

.20 Ceiling Anchors: Self drilling tie wire anchors, Phillips "Red Head" T-32 or approved equal.

.21 Access Panels: Refer to mechanical and electrical drawings and specifications for type and quantity of access panels required in partitions and ceilings.

.22 Drywall Reveals: Fry Reglet, reveal mouldings and “F” reveal mouldings, 13mm wide, with baked on finish, as follows:

- .1 DRM-625-50 and DRM-50-50.

.2 DRMF-625-50 and DRMF-50-50.
.3 Aluminum alloy 6063 T5 with chemical conversion coating.
.4 Colour to be selected by the Consultant.

.23 Stainless Steel Corner Guards (CG):
.1 Gauge: Minimum16 gauge stainless steel wall guards in satin finish.
.2 Size: Flange width of 50mm.
.3 Height: 1220mm in height.
.4 Type and Finish: Type 304 alloy with #4 satin finish.
.5 Mounting: Adhered to wall with no exposed fasteners.
.6 Acceptable product: Construction Specialties or equivalent product.
.7 Quantity and Location: As noted on the architectural drawings.

PART 3 - EXECUTION

3.1 GENERAL

.1 Provide plumb, straight, level, rigid, and secure installation. Failing to achieve this result shall be cause for rejection and reinstallation of this work.

.2 Conform to The Gypsum Construction Handbook, ASTM C840, and these specifications. The most stringent requirements shall apply.

.3 Where walls run parallel and under steel joists, the joists shall be enclosed both sides with gypsum board to provide sound barrier between rooms. Fill with minimum 100 mm acoustic batt insulation.

.4 Install access panels supplied by mechanical and electrical contractors. Rigidly secure panel frames to furring or framing systems.

3.2 CEILING SUSPENSION

.1 Do not regard grillage system indicated on drawings as exact or complete. The Specification for metal framing contained in CGC Gypsum Construction Handbook and ASTM C840 shall govern installation conditions not covered by this Specification. The more stringent specifications shall apply.

.2 Hangers:

.1 Install hangers for suspended wallboard ceilings to support the grillage independent of walls, columns, pipes, ducts and the like. Erect plumb and securely anchor to the structure. Submit details of proposed method to the Consultant for approval. If so requested, test hangers to prove that anchorage is adequate to support the proposed loading. Erect hangers plumb and securely anchor to structural steel or support channels fastened to structural steel (DO NOT FASTEN TO STEEL DECK).

.2 Space hangers at 1200mm maximum o.c. along the carrying channels and not more than 150mm from ends (or as required to conform with fire tested assemblies where applicable.

.3 Carrying Channels:

.1 Space channels at 1200mm maximum o.c. (or as required to conform with fire tested assemblies where applicable).

.2 Run channels transversely to structural framing members.

.3 Where splices are necessary, lap members at least 200mm and wire each end with two laps; avoid clustering or lining up splices.

.4 Attach to hangers by bending hanger under runner and securely wire in place with a saddle tie.

.5 Provide 25mm clearance between channels and abutting walls and partitions.

.4 Cross Furring:

.1 Install drywall screw channels transversely across runner channels, joists or other supports.

.2 Space drywall screw channels at 600mm o.c. and not more than 150mm from perimeter walls. Provide 25mm clearance between channels and abutting walls and partitions. Use closer spacing if so noted on drawings.

.3 Secure drywall screw channels to each support with approved clip or attachment; splice joints by messing minimum 200mm and tying channels together with double strand 16 gauge tie wire.

.4 Level drywall screw channels to a maximum tolerance of 4mm over 3600mm.

.5 Drywall shall not be fixed directly to open web steel joists and the like. Provide cross furring as specified.

.5 Opening:

.1 Frame openings with suitable channels; check clearances with respective Trades. Provide support for edges of boards at all cut-outs and openings in ceilings.

.2 Provide all additional hangers and supports for fixtures as required.

.3 Provide additional hangers and framing for enclosure of radiant heating panels.

.6 Bulkheads:

.1 Furr out bulkheads in areas indicated and as required to conceal mechanical, electrical or other services in rooms where drywall finishes are scheduled, and elsewhere if called for on drawings.

.2 Use methods and materials as previously specified in this section. Drywall panels at bulkheads shall be as specified for walls.

3.3 STEEL STUD SYSTEM (PARTITION) INSTALLATION

.1 Conform to the guidelines for metal framing contained in The Gypsum Construction Handbook, CSA A.82.31, and these specifications. The most stringent requirements shall apply.

.2 Attach metal runners at floor and ceiling to structural elements with suitable fasteners located 50mm from each end and spaced 600 mm. o.c. with toggle or molly bolts spaced 400mm o.c.

.3 Position studs vertically, engaging floor and ceiling runners, and spaced 400mm o.c., unless otherwise noted on drawings. When necessary, splice studs with 200mm nested lap and one positive attachment per stud flange. Place studs in direct contact with door frame jambs, abutting partitions, partition corners and existing construction elements. Where studs are installed directly against exterior walls install rubberized cork stip between studs and wall surfaces to provide thermal break.

.4 Anchor studs for shelf-walls and those adjacent to door and window frames, partition intersections and corners to ceiling and floor runner flanges with an approved crimping tool. Securely anchor studs to jamb and head anchor clips of door or borrowed-light frames by bolt or screw attachment. Over metal door and borrowed-light frames, place horizontally a cut-to-length section of runner, with a web-flange bent at each end, and secure with one positive attachment per flange. Position a cut-to-length stud (extending to ceiling runner) at vertical panel joints over door frame header.

.5 Stiffen partitions exceeding 3m long or 2.7m high with 19mm. cold rolled channels. Fix horizontally and provide the number of rows necessary to ensure a rigid installation. Provide other partition reinforcing necessary to support wall hung components, cupboards, closets and the like. Use 2 studs at jambs of openings and corners.

.6 Where horizontal runs of service lines are to be installed within the partition, erect studs with web openings aligned.

.7 Provide reinforcing and necessary stiffeners to support hollow metal frames and screens. Reinforcing to be capable of supporting screens rigidly and solid without deflection.

3.4 CHASE WALL INSTALLATION

.1 Align two parallel rows of floor and ceiling runners spaced apart as indicated. Attach to concrete slabs with concrete stub nails or power driven anchors 600 mm o.c. Attach to suspended ceilings with toggle or molly bolts 400mm o.c. Attach to wood framing with suitable fasteners 600mm o.c.

.2 Align metal studs vertically in runners, 200mm o.c. with flanges in the same direction and with studs on opposite sides of chase directly across

from each other. Anchor studs to floor and ceiling runner flanges with an approved metal crimping tool.

.3 Cut cross bracing to be placed between rows of studs from gypsum panels, 400mm high by chase wall width. Space braces at quarter points not to exceed 600mm o.c. vertically and attach to stud webs with six 25mm screws 200mm o.c. maximum on each side.

.4 Bracing with 64mm metal studs may be used in place of gypsum panels. Anchor web at each end of metal brace to stud web with two 10mm pan head screws. When chase wall studs are not opposite, install metal stud cross braces 400mm o.c. horizontally and securely anchor each end to a continuous horizontal 64mm runner screw-attached to chase wall studs with the cavity.

.5 Adapt cross bracing as necessary to avoid interference with service.

3.5 WALL FURRING INSTALLATION

.1 Direct Furring Channel Attachment - Attach metal furring channels, vertically or horizontally spaced 400mm o.c. to masonry or concrete surfaces with hammer-set ro power-driven fasteners or concrete stub nails staggered 600mm o.c. on opposite flanges. Nest channels 200mm at splices and anchor with two fasteners in each wing. Where furring channel is installed directly to exterior wall, install thermal break strip between furring channel and wall. For horizontally placed channels attach maximum 100mm from floor and ceiling.

.2 Bracketed Furring Channel Attachment:

.1 Attach adjustable wall furring brackets with serrated edges up, 900mm o.c. horizontally, 1200mm o.c. vertically, within 100mm of columns or other abutting construction, within 150mm of floor and ceiling, and as required above and below openings. Use 50mm cut nails in mortar joints of brick or clay tile or concrete block, or in field of lightweight aggregate blocks; use 16mm concrete stub nails or power driven nails or other suitable fasteners in monolithic concrete. Place fastener in top hole of bracket.

.2 Lay cold-rolled channels horizontally with flanges down, on furring brackets, plumb with other channels, and tie with double strand 16 ga. or triple strand 18 ga. wire at each junction with cold rolled channel.

.3 Free Standing Furring - In locations where wall furring is indicated as self-supporting, use steel studs and furring channels installed to provide a rigid frame to receive wall board.

3.6 APPLICATION OF GYPSUM BOARD

.1 Do not apply gypsum board until bucks, anchors, blocking, electrical and mechanical work are approved.

.2 Apply all gypsum board parallel to framing. Position all ends over studs. Use maximum practical lengths to minimize end joints. Fit ends and edges closely, but not forced together.

.3 Stagger joints on opposite sides of partition.

.4 Apply single, double or triple layers of gypsum board to metal furring as indicated using screw fasteners.

.5 Maximum screw spacing for single-ply gypsum board and face ply of 2-ply gypsum board to be 300mm o.c.

.6 Maximum spacing of screws for base-ply of 2-ply gypsum board over steel framing to be 300mm o.c. along edges of the gypsum board and 600mm o.c. into stud or furring channel in the field of the gypsum board.

.7 Use cement board as backer board wherever tile is to be installed to walls of shower partitions.

3.7 ADHESIVE APPLICATION

.1 Where gypsum board is called to be laminated to masonry walls, application shall conform to Gypsum Association Publication GA-216-2013, Section 11, “Adhesive Application of Gypsum Panel Products to Interior Masonry, Concrete, or Brick Walls”.

.2 Do taping and filling, as specified below, for paint finish.

3.8 CONSTRUCTION OF SUSPENDED AND FURRED CEILINGS

.1 Apply gypsum panels of maximum practical length with long dimension at right angles to drywall furring channels. Position end joints over furring channel web and staggered in adjacent rows.

.2 Closely fit together, ends and edges but not forced together.

.3 Fasten panels to drywall furring channels with screws spaced a maximum of 300mm o.c. in field of panels and along abutting ends and edges.

.4 Provide control joints in ceilings as noted but maximum 7500 mm o.c. each way or at change in direction.

.5 Provide framing and drywall finish in stairwells, where required to enclose underside of stairs and landings.

.6 Where noted on plans, provide bulkheads with steel framing and drywall finish.

3.9 WALL FURRING

.1 Apply gypsum panels parallel to framing. Position all edges over drywall furring channels with joints staggered in successive courses.

.2 Use maximum practical lengths to minimize end joints. Fit ends and edges closely, but not forced together.

.3 Fasten panels to channels with screws spaced a maximum 300mm oc.

3.10 APPLICATION OF ACCESSORIES

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Joints shall be made tight, accurately aligned and rigidly secured.

.2 Reinforce all vertical and horizontal exterior corners with cornerbead fastened with screws 200mm oc on both flanges along entire length of bead.

.3 Where assembly terminates against masonry or other dissimilar material, apply ledge trim over panel edge and fasten with screws or staples spaced 300 mm. oc.

.4 Power drive screws at least 9mm. from edges or ends of panel to provide uniform dimple 0.8mm deep.

.5 Where recessed reglets are noted on drawings, built into drywall assembly to provide edges flush with drywall.

3.11 TAPING AND FILLING

.1 Finish in accordance with GA-214, as follows:

.1 Exposed gypsum board to Level 5 finish, suitable for finish painting with semi-glass and gloss coatings. Use full skim coat of joint compound over entire surface to achieve smooth and uniform appearance.
.2 Concealed gypsum board to minimum Level 1 finish. Where a fire-resistance rating is required, finishing level must conform to ULC rated assembly design.

.2 Finish face panel joints and internal angles with joint system consisting of self-adhering cross-fibre fibreglass joint tape and joint compound installed according to manufacturer's directions and feathered out into panel faces. Note: If self-adhering joint tape is not used, taping compound will be required.

.3 Be sure drywall surface is dry and clean.

.4 Center and apply CGC Fiberglass Drywall Tape directly over joint, pressing firmly to ensure even adherence to surface. Eliminate wrinkles by pressing entire length of tape with drywall knife. Avoid overlapping tape at intersections. Cut tape with drywall knife.

.5 Cover taped joint with a layer of setting-type joint compound, forcing compound through the tape with a drywall knife or trowel to completely fill and level the joint. Allow joint to dry, and sand lightly. Apply second coat of setting-type or drying-type joint compound, feathering approximately 50mm beyond first coat. Let dry and sand lightly as required.

.6 To finish inside corners, bend tape with to form a “U” shape. Apply tape along one side only. Press tape into corner for approximately 30mm, then apply the other side. Work downward, alternating sides in this manner until tape is pressed firmly in place. Apply setting-type joint compound as specified above, first on one side for the length of the corner and then repeating the process on the second side.

.7 Finish fastener heads, corner bead and trim as required with two to three coats of joint compound, feathered out onto panel faces and sanded to a smooth surface.

.8 Provide skim coat over entire face of boards to ensure smooth surface for painting.

.9 Fill screw head depressions to bring flush with adjacent surface of gypsum board so as to be invisible after painting is completed.

.10 Sand dried taping compound lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.11 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for painting.

.12 Painting shall be done in accordance with Section 09 91 00.

END OF SECTION

CERAMIC TILING

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1	General Requirements	Division 01
.2	Concrete Finishing	Section 03 35 00
.3	Concrete Unit Masonry	Section 04 05 22
.4	Joint Sealants	Section 07 92 00
.5	Gypsum Board	Section 09 29 00
.6	Resilient Flooring	Section 09 65 00
.7	Washroom Accessories	Section 10 28 13

1.2 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI)/Ceramic Tile Institute (CTI)

.1 ANSI A108.1-99, Specification for the Installation of Ceramic Tile (Includes ANSI A108.1A-C, 108.4-.13, A118.1-.10, ANSI A136.1).

.2 CTI A118.3-92, Specification for Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive (included in ANSI A108.1).

.3 CTI A118.4-92, Specification for Latex Cement Mortar (included in ANSI A108.1).

.4 CTI A118.5-92, Specification for Chemical Resistant Furan Resin Mortars and Grouts for Tile Installation (included in ANSI A108.1).

.5 CTI A118.6-92, Specification for Ceramic Tile Grouts (included in ANSI A108.1).

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM C144-04, Specification for Aggregate for Masonry Mortar.

.2 ASTM C207-06, Specification for Hydrated Lime for Masonry Purposes.

.3 ASTM C847-06, Specification for Metal Lath.

.4 ASTM C979-05, Specification for Pigments for Integrally Coloured Concrete.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-M86(R1988) , Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.2 CGSB 71-GP-22M-78(AMEND.), Adhesive, Organic, for Installation of Ceramic Wall Tile.

.3 CAN/CGSB-75.1-M88, Tile, Ceramic.

.4 CAN/CGSB-25.20-95, Surface Sealer for Floors.

.4 CSA Group (CSA)

.1 CSA A123.3-05, Asphalt Saturated Organic Roofing Felt.

.2 CAN/CSA-A3000-03(R2006), Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.5 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

.6 Terrazzo Tile and Marble Association of Canada (TTMAC)

.1 Tile Specification Guide 09 30 00 2006/2007, Tile Installation Manual.

.2 Tile Maintenance Guide 2000.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.

.1 Include manufacturer's information on:

.1 Ceramic tile, marked to show each type, size, and shape required.

.2 Chemical resistant mortar and grout (Epoxy and Furan).

.3 Cementitious backer unit.

.4 Dry-set cement mortar and grout.

.5 Divider strip.

.6 Elastomeric membrane and bond coat.

.7 Reinforcing tape.

.8 Levelling compound.

.9 Latex cement mortar and grout.

.10 Commercial cement grout.

.11 Organic adhesive.

.12 Slip resistant tile.

.13 Waterproofing isolation membrane.

.14 Fasteners.

.3 Provide samples in accordance with Section 01 33 00- Submittal Procedures.

.1 Base tile: submit, 300 x 300 mm sample panels of each colour, texture, size, and pattern of tile.

.2 Floor tile: submit, 300 x 300 mm sample panels of each colour, texture, size, and pattern of tile.

.3 Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, colour, and size.

.4 Adhere tile samples to 11 mm thick plywood and grout joints to represent project installation.

.4 Closeout Submittals in accordance with Section 01 78 00 – Closeout Submittals.

.1 Submit three (3) copies of TTMAC Hard Surface Maintenance Guide, for inclusion in maintenance manuals.

.2 Provide document listing specific warnings of any maintenance products or practices that could possible damage the finish work.

1.4 QUALITY ASSURANCE

.1 Quality Assurance Submittals:

.1 Manufacturer's Instructions: manufacturer's installation instructions.

.2 Manufacturer's Field Reports: manufacturer's field reports specified.

.3 The work of this section shall be carried out by a company that is a member in good standing of the Terrazzo, Tile and Marble Association of Canada.

.4 This work shall be done under proper supervision by person’s skilled in the methods following the recommendations of the manufacturer of the Products involved and having a minimum of two years proven experience.

.5 The ceramic tile Subcontractor shall provide proof of having successfully completed at least two years proven experience.

.6 Epoxy grout installation shall be carried out only by an installer experienced in the use of this Product with strict conformance to the manufacturer’s installation and cleaning recommendations.

.7 The epoxy grout manufacturer/supplier shall visit the site prior to commencement of grouting to review installation and cleaning procedures with the ceramic tile Subcontractor.

.8 Prevent any traffic over completed floors for a period of 72 hours after completion.

.9 Provide protection of finished floors subject to construction traffic.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle materials in accordance with Manufacturer’s written instructions.

1.6 AMBIENT CONDITIONS

.1 Maintain air temperature and structural base temperature at ceramic tile installation area above 12 degrees C for 48 hours before, during, and 48 hours after, installation.

.2 Do not install tiles at temperatures less than 12 degrees C or above 38 degrees C.

.3 Do not apply epoxy mortar and grouts at temperatures below 15 degrees C or above 25 degrees C.

1.7 MOCK-UPS

.1 Construct mock-up panels in accordance with Section 01 45 00 – Quality Control.

.2 Construct mock-up panels of finished ceramic tile work, 2.5m by 2.5m in size, of each ceramic tile type.

.3 Construct mock-up panels where directed by the Consultant.

.4 The procedure for Cleaning the grout from the tile shall be carried out in the presence of the Owner's representative, the Consultant, and the Contractor for a minimum of three washes.

.5 Allow 48 hours for inspection of mock-up panels by the consultant before proceeding with work.

.6 When accepted, mock-up panels will demonstrate minimum standard for this work. The approved mock-up panels may remain as part of the finished work.

1.8 MAINTENANCE

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 78 00- Closeout Submittals.

.2 Provide minimum 2 boxes of each type and colour of tile required for project for maintenance use. Store where directed.

.3 Maintenance material same production run as installed material.

.2 Provide four copies of the TTMAC Maintenance Guide, latest edition, for inclusion in the Maintenance Manual.

.3 Give specific warning of any maintenance practice or material which may damage or disfigure the finish work or alter the coefficient of friction (i.e. slip resistance) of the finished surface.

1.9 WARRANTY

.1 Provide a warranty for ceramic tile work in accordance with the General Conditions, but for a period of three (3) years.

.2 The warranty shall cover the complete installation provided under this section against defective material and workmanship.

PART 2 PRODUCTS

2.1 FLOOR TILE

.1 Porcelain Floor Tile (POR-N OR POR): to CAN/CGSB-75.1, Type 4, Class MR 1, square edges, slip resistant surface. A DCOF value of ≥0.42 is the standard for tiles specified for wet areas with minimal footwear spaces expected to be walked upon when wet, as stated in ANSI A137.1-2012, Section 9.6. All curves, and other cuts where indicated on the drawings shall be laser cut by the tile manufacturer and shall be delivered ready for setting. All materials to match corner interior and exterior trims and shapes. Refer to Architectural Finishes Drawings for location of Anti-slip porcelain floor tile (POR).

.1 Acceptable Products for POR floor tile:

.1 Regal Series, Porcelain.

.1 Supplied by Olympia Tile and Stone.;

Tel: 416-785-6666.

.2 Size: 30cm x 60cm.

.3 Colour: Grey.

.4 Finish: Matte.

2.2 WALL TILE

.1 Ceramic Wall Tile (CWT): to CAN/CGSB-75.1, Type 5, Class MR 4, modified square edges. Matching edge trim to suit application.

.1 Acceptable Products:

.1 Unicolour Series, Porcelain Wall Tile:

.1 Supplied by Olympia Tile and Stone.; Tel: 416-785-6666.

.2 Size: 10cm x 60cm.

.3 Finish: Matte.

.4 Installation: Vertical Stackbond.

.5 Colours:

.1 CWT Colour in Kitchen Areas: Super White.

.2 CWT Colour in Washrooms: Taupe.

.2 Acceptable Products at Showers:

.1 CMT1 at Shower Floors – Quebec Collection, Unglazed Mosaic. Supplied by Olympia Tile/Stone International Inc.
Colour: Mottled Grey FS
Size: 480mm by 480mm sheets with 50mm by 50mm tiles.

.2 CMT2 at Shower Ceilings – Quebec Collection, Unglazed Mosaic. Supplied by Olympia Tile/Stone International Inc.
Colour: Arctic White FS
Size: 480mm by 480mm sheets with 50mm by 50mm tiles.

2.3 BASE TILE

.1 Base: All materials to match porcelain floor tile, interior and exterior corners, trims and shapes indicating field colour or accent bands as indicated on drawings.

.2 At POR floor tile and CWT walls, provide 100mm high POR base with continuous metal top edge described below under 2.8 Accessories.

2.4 TRIM SHAPES

.1 Conform to applicable requirements of adjoining floor and wall tile.

.2 Use slip resistant trim shapes for horizontal surfaces of showers, and drying area curbs.

.3 Use trim shapes sizes conforming to size of adjoining field wall tile, including existing spaces, unless specified otherwise.

.4 Internal and External Corners: provide trim shapes as follows where indicated.

.1 Bullnose shapes for external corners including edges.

.2 Coved shapes for internal corners.

.3 Special shapes for:

.1 Base to floor internal corners to provide integral coved vertical and horizontal joint.

.2 Base to floor external corners to provide bullnose vertical edge with integral coved horizontal joint. Use as stop at bottom of openings having bullnose return to wall.

.3 Wall top edge internal corners to provide integral coved vertical joint with bullnose top edge.

.4 Wall top edge external corners to provide bullnose vertical and horizontal joint edge.

2.5 MORTAR, ADHESIVE MATERIALS AND MIXES

.1 Cement: to CSA-A5, type 10.

.2 Sand: to ASTM C144, passing 16 mesh.

.3 Hydrated lime: to ASTM C207.

.4 Latex additive: formulated for use in cement mortar and thin set bond coat.

.5 Water: potable and free of minerals and chemicals which are detrimental to mortar and grout mixes.

.6 Adhesives: to be supplied by grout supplier.

.1 Maximum VOC limit 65 g/L to SCAQMD Rule 1168.

.7 Mortar Bed for Floors: 1 part Portland cement, 4 parts sand, 1 part water. Adjust water volume depending on water content of sand. Use latex additive in modification of mortar bed. Alternatively use Flextile Ltd., 4:1 Dry Pack Mortar and No.44 Latex Additive. Or Flextile Ltd., 4:1 Dry Pack Mortar and No. 43 Latex Additive.

.8 Levelling coat: 1 part Portland cement, 4 part sand, minimum 1/10 part latex additive, 1 part water including latex additive. Alternatively use Flextile Ltd., No.59 Flex-Flo or No.5900 Flex-Flo Plus.

.9 Measure mortar ingredients by volume.

.10 Dry Set Mortar: mix to manufacturer's instructions.

2.6 BOND COAT

.1 Dry set cement mortar: to ANSI A108.1.

.2 Organic adhesive: to ANSI A136.1 CGSB 71-GP-22M.

.1 Maximum VOC limit 65 g/L to SCAQMD Rule 1168.

.3 Latex Cement mortar: to ANSI A108.1, two-component universal dry-set mortar.

.4 Epoxy bond coat: non-toxic, non-flammable, non-hazardous during storage, mixing, application, and when cured. To produce shock and chemical resistant mortars having the following physical characteristics:

.1 Compressive Strength: 246 kg/cm^2.

.2 Bond Strength: 53 kg/cm^2.

.3 Water Absorption: 4.0% Max.

.4 Ozone Resistance, 200 hours @ 200 ppm: no loss of strength.

.5 Smoke Contribution Factor: 0.

.6 Flame Contribution Factor: 0.

.7 Finished mortar and grout to be resistant to urine, dilute acid, dilute alkali, sugar, brine and food waste products, petroleum distillates, oil and aromatic solvents.

.8 Bond Coat: maximum VOC limit 65 g/L to SCAQMD Rule 1168.

.5 Chemical-Resistant Bond Coat:

.1 Epoxy Resin Type: CTI A118.3.

.2 Furan Resin Type: CTI A118.5.

.3 Bond Coat: maximum VOC limit 65 g/L to SCAQMD Rule 1168.

2.7 GROUT

.1 Colouring Pigments:

.1 Pure mineral pigments, limeproof and nonfading, complying with ASTM C979.

.2 Colouring pigments to be added to grout by manufacturer.

.3 Job coloured grout are not acceptable.

.4 Use in Commercial Cement Grout, Dry-Set Grout, and Latex Cement Grout.

.2 Cement Grout: to ANSI A108.1.

.1 Use one part white cement to one part white sand passing a number 30 screen.

.3 Commercial Cement Grout: to CTI A118.6.

.4 Dry-Set Grout: to CTI A118.6.

.5 Latex Cement Grout: to ANSI A108.1, fast curing, high early strength, polymer-modified, stain resistant, sanded mix for floors, unsanded mix for walls and floors with polished tiles commercial tile grout.

.6 Chemical-Resistant Grout:

.1 Epoxy grout: to ANSI A108.1, having quality, colour and characteristics to match epoxy bond coat. Adhesive and grout by same manufacturer.

.2 Furan grout: to CTI A118.5.

2.8 ACCESSORIES

.1 Reinforcing mesh: 50 x 50 x 1.6 x 1.6 mm galvanized steel wire mesh, welded fabric design, in flat sheets.

.2 Divider strips:

.1 Laminated strips, core 32 x 3 mm black neoprene, outsides (both sides) brass 32 x 1.29 mm complete with anchors, both sides spaced at 150 mm on centre.

.3 Cleavage plane: polyethylene film to CGSB 51-34.

.4 Metal lath: to ASTM C847 galvanized finish, 10 mm rib at 2.17 kg/m^2

.5 Transition Strips: purpose made metal extrusion; anodized aluminum type.

.6 Porcelain Tile to Resilient Flooring: Satin anodized profile with sloped exposed surface, 4mm high leading edge, integrated trapezoid-preforated anchoring leg. Schluter-RENO-U, size to suit tile thickness.

.7 Reducer Strips: purpose made metal extrusion; anodized aluminum type; maximum slope of 1:2.

.8 **Porcelain Wall Base Cap at all Floors**: Satin anodized aluminum profile with integrated trapezoid-perforated anchoring leg, and complete with prefabricated corners. Schlüter-RONDEC, size to suit tile thickness. Provide the same profile at the leading edge of the continuous 100mm high porcelain tile curb in Entry Lobby 101.

.9 Junction Strips: Schulter Systems products, for junctions with other floor coverings. Finish: Satin finish anodized aluminum. Profiles as follows:

.1 Reno-V: Sloped transition to low flooring.

.2 Schiene: Tile edge at surface of equal height.

.3 Deco: Transition at tile and hard surface of equal height.

.10 Prefabricated Movement Joints: purpose made, having a Shore A Hardness not less than 60 and elasticity of plus or minus 40 percent when used in accordance to TTMAC Detail 301EJ.

.1 Control joints: Schluter Systems “Dilex-AKWS” movement joint, 6mm wide, with aluminum anchors perforated for bonding into

mortar and PVC movement material forming joint surface. Colour to be selected by Consultant, to match grout as closely as possible.

.11 Sealant: in accordance with Section 07 92 00- Joint Sealants.

.12 Sealants: maximum VOC limit 250 g/L to SCAQMD Rule 1168.

.13 Floor sealer and protective coating: to tile and grout manufacturers recommendations.

2.9 MIXES

.1 Cement:

.1 Scratch coat: 1 part cement, 1/5 to 1/2 parts hydrated lime to suit job conditions, 4 parts sand, 1 part water, and latex additive where required. Adjust water volume depending on water content of sand.

.2 Slurry bond coat: cement and water mixed to creamy paste. Latex additive may be included.

.3 Mortar bed for floors: 1 part cement, 4 parts sand, 1 part water. Adjust water volume depending on water content of sand. Latex additive may be included.

.4 Mortar bed for walls and ceilings: 1 part cement, 1/5 to 1/2 parts hydrated lime to suit job conditions, 4 parts sand and 1 part water. Adjust water volume depending on water content of sand. Latex additive may be included.

.5 Levelling coat: 1 part cement, 4 parts sand, minimum 1/10 part latex additive, 1 part water including latex additive.

.6 Bond or setting coat: 1 part cement, 1/3 part hydrated lime, 1 part water.

.7 Measure mortar ingredients by volume.

.2 Dry set mortar: mix to manufacturer's instructions.

.3 Organic adhesive: pre-mixed.

.1 Adhesives: maximum VOC limit 65 g/L to SCAQMD Rule 1168.

.4 Mix bond and levelling coats, and grout to manufacturer's instructions.

.5 Adjust water volumes to suit water content of sand.

2.10 PATCHING AND LEVELLING COMPOUND

.1 Cement base, acrylic polymer compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.

.2 Have not less than the following physical properties:

.1 Compressive strength - 25 MPa.

.2 Tensile strength - 7 MPa.

.3 Flexural strength - 7 MPa.

.4 Density - 1.9.

.3 Capable of being applied in layers up to 50 mm thick, being brought to feather edge, and being trowelled to smooth finish.

.4 Ready for use in 48 hours after application.

2.11 CLEANING COMPOUNDS

.1 Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.

.2 Materials containing acid or caustic material are not acceptable.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 WORKMANSHIP

.1 Do tile work in accordance with TTMAC Tile Installation Manual 2006/2007, "Ceramic Tile", except where specified otherwise.

.2 Apply tile or backing coats to clean and sound surfaces.

.3 Fit tile around corners, fitments, fixtures, drains and other built-in objects. Maintain uniform joint appearance. Cut edges smooth and even. Do not split tiles.

.4 Maximum surface tolerance 1:800.

.5 Make joints between tile uniform and approximately 1.5 mm wide, plumb, straight, true, even and flush with adjacent tile. Ensure sheet layout not visible after installation. Align patterns.

.6 Lay out tiles so perimeter tiles are minimum 1/2 size.

.7 Sound tiles after setting and replace hollow-sounding units to obtain full bond.

.8 Make internal angles square, external angles bullnosed.

.9 Use bullnose edged tiles at termination of wall tile panels, except where panel abuts projecting surface or differing plane.

.10 Install divider strips at junction of tile flooring and dissimilar materials.

.11 Allow minimum 24 hours after installation of tiles, before grouting.

.12 Clean installed tile surfaces after installation and grouting cured.

.13 Make control joints at 5.5m maximum in each direction or a length to width ratio of 2.5 to 1. Make joint width same as tile joints. Fill control joints with sealant in accordance with Section 07 92 00- Joint Sealants. Keep building expansion joints free of mortar and grout.

3.3 WALL TILE

.1 Install in accordance with TTMAC detail

3.4 FLOOR AND BASE TILE

.1 Install in accordance with TTMAC detail

3.5 FLOOR SEALER AND PROTECTIVE COATING

.1 Apply in accordance with manufacturer's instructions.

3.6 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.7 EXAMINATION AND PREPARATION

.1 Surfaces shall be clean, dimensionally stable, cured, and free of contaminants such as oil, sealers and curing compounds.

.2 Concrete Substrate Finish: Cure concrete for a minimum of 28 days.

.1 Thin-set applications: steel trowel and fine broom finish.

.2 Mortar bed applications: screed finish.

.3 Mortar bed applications with a cleavage membrane: Steel trowel finish.

.3 Substrate Surface Variation:

.1 Mortar bed applications: 6mm in 3000mm maximum.

.2 Thin-set applications: 3mm in 3000mm and 1.5mm in 305mm maximum.

.3 Vertical surfaces: 3mm in 2400mm.

.4 Examine areas in which the work of this section is to be applied and notify the Consultant of any deficiencies which must be corrected before work can commence.

.5 Do not proceed with the work until improper conditions are corrected.

.6 Protect other work during installation and protect tile work until properly set, grouted and sealed.

.7 Co-ordinate the work of this section related to the work of other sections.

.8 Apply a leveling coat on uneven surfaces, or surfaces which do not guarantee a plumb or level finish to the tile.

3.8 INSTALLATION AND WORKMANSHIP

.1 Apply tile or backing coats to clean and sound surfaces.

.2 Bring every fourth course, vertical and horizontal, to plumb and level continuous lines.

.3 Thoroughly back-up with mortar all cove, cap, nosing, trimmer, and moulded or shaped pieces and secure firmly in place.

.4 Fit tile around corners, fixtures, drains and other built-in objects. Maintain uniform joint appearance. Cut edges smooth, even, and free from chipping. Edges resulting from splitting are not acceptable. Rub exposed edges smooth with abrasive stone.

.5 Leave or cut opening to correct sizes to receive accessories, fittings, or other built-in work.

.6 Drill tile for hardware and for pipes where possible. Otherwise, at pipes and fittings, fit tile closely so that escutcheons cover cut edges of tile.

.7 Maximum finished surface tolerance shall be 1:800.

.8 Make joints between tile uniform, plumb, straight, true, even and flush with adjacent tile with a tolerance of 1mm per 3mm of joint width.

.9 Ensure sheet layout is not visible after installation. Align patterns. Align joints of wall tile with floor tile.

.10 Lay out tiles so that fields are centred on areas, and according to the drawings with perimeter and cut tiles a minimum 1/2 size. Maintain height of panels in full courses to nearest indicated dimension.

.11 Keep 2/3 of the depth of grout joints free of setting material.

.12 Sound tiles after setting and replace hollow- sounding units to obtain full bond.

.13 Make internal angles square, external angles rounded.

.14 Use round edged tiles at termination of wall tile panels, except where panel abuts projecting surface or differing plane.

.15 Install divider strips at junction of tile flooring and dissimilar materials.

.16 Allow a minimum of 24 hours after installation of tiles before grouting. Grouting shall be in accordance with manufacturer’s directions. Fill joints solidly.

.17 Finished grout shall be uniform in colour, smooth and without voids, pinholes or low spots. Cover setting bed completely.

.18 Protect tiles from grout staining. Test in advance and pre-seal tile if required. Follow grout manufacturer=s recommendations for grout and residue removal. Remove excess grout and polish with clean cloths.

.19 Clean installed tile surfaces after installation and grouting has cured. Final cleaning is specified in Section 01 74 00 – Cleaning and Waste Management.

.20 Finished tile work shall be free of tiles which are pitted, chipped, cracked or scratched.

.21 Install expansion joints where indicated. Install specified control joints at 6000mm on centre in each direction unless indicated otherwise. Make joint width same as tile joints. Where indicated, fill control joints with sealant in accordance with Section 07 92 00 - Sealants. Keep building expansion joints free of mortar and grout. Match colour of sealant to colour of grouted joints.

.22 Caulk around piping and fittings extending through tiled surfaces. Tool to a smooth, flush surface, free from air bubbles and contamination. Provide backer rod under sealant.

.23 Protect installed areas from traffic until setting materials have cured for the periods specified in the TTMAC Tile Installation Manual.

.24 Barricade grouted areas to prevent foot traffic for 24 hours after grouting.

.25 Apply floor sealer and protective coating in accordance with the manufacturer’s instructions.

.26 Transition Strips:

.1 Install specified transition strips where ceramic tile flooring meets dissimilar flooring.

.2 Install transition strips in mortar, fully bonded to floors following the manufacturer’s recommendations.

.3 Install strips under doors at openings.

.4 Thoroughly back-up with mortar all hollow areas at underside of transition strips.

3.9 CLEANING

.1 Proceed in accordance with Section 01 74 00 - Cleaning and Waste Management.

END OF SECTION

ACOUSTIC CEILINGS

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1 Gypsum Board Section 09 29 00.
.2 Mechanical Equipment Division 20, 22.
.3 Electrical Equipment Division 26, 27, 28.

1.2 REFERENCE STANDARDS

.1 ASTM C635: Specifications for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
.2 ASTM C636: Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
.3 CAN/CGSB 92.1: Sound Absorptive Prefabricated Acoustical Units. Unless otherwise noted under description of ceiling system the N.R.C. .4 N.R.C.: Range shall be 60-65 (Table 1 of CAN/CGSB 92.1).
.4 Ceiling S.T.C.: Unless otherwise noted under description of ceiling system the S.T.C. rating shall be 35 or better.
.5 Light Reflectance: Unless otherwise noted under description of ceiling system, panels shall have a light reflectance co-efficient designation of L.R.1 (0.75 minimum). Table 3 of CAN/CGSB 92.1 refers.

1.3 CEILING SYSTEMS

.1 This Specification includes the ceiling assembly systems listed below, noted in schedules and shown on reflected ceiling plans, including ceiling panels, suspension system and trim.

.2 Ceiling systems shall be 610mm x 610 mm lay in exposed Tee system, non- rated.

1.4 SHOP DRAWINGS

.1 Reflected ceiling plans indicate proposed layout but this shall not relieve Contractor of responsibility for co-ordination of the work and provision of Shop Drawings where field conditions call for variation from proposed layout.
.2 Submit shop drawings accurately locate lighting fixtures, ventilating grilles, sprinkler heads, exit lights and other ceiling fittings.

.3 Conform to Section 01 33 23 – Shop Drawings, Product Data and Samples.

3.6 SAMPLES

.1 Upon award of the Contract submit duplicate 300mm by 300mm sample panels of each acoustical unit proposed for installation in the project. All panels subsequently used on the job shall match the approved sample.

.2 Submit one representative model sample of each suspension system members for approval prior to commencement of installation.

.3 Ceiling system sample shall show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes and acoustical unit installation.

3.7 DELIVERY AND STORAGE

.1 Transport, handle and store material in manner to prevent warp, twist and damage to tile and board edges and surfaces in accordance with the manufacturer's recommendations.

.2 Any warped and/or damaged boards, tile and trim shall be rejected and be replaced by new, straight, undamaged and acceptable materials at no cost to the Owner.

.3 Store material in warm, dry place away from water and the elements. Protect against undue loading stresses and shock.

.4 All packaged material shall be delivered in original manufacturers' wrappers and containers with labels and seals intact.

3.8 PROTECTION

.1 Exercise care in the execution of work under this Section to prevent damage to finished surfaces and adjacent work, and mechanical and electrical installations.

3.9 EXTRA PANELS

.1 Provide 2 full boxes of acoustic panels of each type specified for use in maintenance work. Obtain receipt from the Consultant or Owner's representative on site.

.2 Do not use panels supplied to Owner for maintenance work to make good any damaged or removed tile required by Contract.

.3 Clearly label all boxes and delivery and store the boxes as directed by the Owner.

3.10 SPECIAL CLEANING

.1 Clean, repair or replace dirty, discoloured or defective units or exposed suspension members to Consultant's satisfaction.

3.11 ENVIRONMENT AND REGULATORY REQUIREMENTS

.1 Commence installation after building enclosed and dust- generating activities completed.

.2 Permit wet work to dry prior to commencement of installation.

.3 Maintain uniform minimum temperature of 15 deg. C. and humidity of 20% to 40% prior to, during and after installation.

.4 Comply with Ontario Hydro Electrical Inspection Bulletin No. 30-4-3 regarding support of luminaires in suspended ceilings. Submit to the Consultant a certificate confirming that the ceiling support grid provides support for lighting fixtures in accordance with Ontario Hydro requirements.

.5 Deliver finish materials in unopened packaging provided by manufacturer.

.6 Store materials in work area 48 hours prior to installation, in protected dry areas.

3.12 QUALITY ASSURANCE

.1 Installer is to be experienced in performing work of this section and who has specialized in installation of work similar to that required for this project.

.2 Installer is to have a minimum of five (5) years of experience in performing the work described.

3.13 WARRANTY

.1 The Warranty stipulated in the General Conditions of the Contract shall be deemed to include the following definition in reference to Work specified in this Section. The following will be considered defects without being limited thereto:

.1 Failure of the suspended ceiling to remain water level.
.2 Lifting or sagging of tile and board between supports.
.3 Staining and discolouration of factory finishes.
.4 Development of corrosion of galvanized ferrous metal.
.5 Development of cracks, splits and other surface deterioration in acoustic panels.
.6 Failure of hanging wire anchorage.

.2 The warranty period shall be two (2) years, commencing on the date of Substantial Performance of the Work.

.3 Warranties shall be issued to the Owner within two (2) Working Days following the date of Substantial Performance of the Work.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Acoustic Ceiling Panels (ACT and ACT-N):

.1 Typical non-fire rated ceilings, to CAN/CGSB-92.1
.2 Type: Mineral composition acoustical units, sag resistant.
.3 Pattern: Non-directional fissured.
.4 Edge type: Square.
.5 Colour: White.
.6 Size: 16mm minimum thickness. Provide 610mm x 610mm. Refer to architectural reflected ceiling plans for location of each size.
.7 Shape: Flat
.8 Flame spread rating of 25 or less.
.9 Smoke developed class of 50 of less.
.10 Acceptable Products:

.1 CertainTeed Ceilings, Vantage 10, VAN-197.
.2 CGC Interiors: Radar ClimaPlus 2410.
.3 Armstrong World Industries Canada Ltd., Fine Fissured 1729.

.2 Suspension:

.1 Acceptable Products, contingent on compatibility with specified ceiling tiles:
.1 CGC, Suspension system Donn “DX” 24mm wide faced T-bar.
.2 Armstrong World Industries Canada Ltd.: Prelude ML Exposed Tee System.
.3 CertainTeed Ceilings: Classic Aluminum Capped Hook System.
.4 Chicago Metallic Corporation: Series 1200 Suspension System.

.2 Exposed interlocking tee grid system, formed out of cold rolled zinc-bond steel 0.54mm thick. Provide fire rated grid where fire ratings noted.

.3 Main Tees: 38mm x 25.4mm double web rectangular bulb top with capping plate in precoat baked-on white paint finish and incorporating holes for hangers and slots for connecting pieces, and capable of supporting 12.5 kg per 1200mm. for continuous spans and 6.5 kg per 1200mm span for single span without exceeding a deflection of 1/360 of the span.

.4 Standard Cross-Tees: 25.4 x 25.4mm double web, bulb top, capping plate in precoated white baked-on finish, capable of supporting 11.3 kg per 600mm span without exceeding a deflection of 1/360 of span, and with positive interlock with main tees.

.5 Structural Cross-Tees as main tees, but with crimped ends for lapping bottom flange of main tees and interlocking tack ends to engage slots in main tees.

.6 Accessories:

.1 Splice plate, clips, screws, etc. as required to complete the installation. All galvanized finish.

.7 Concealed flat spline: 0.71mm flat steel spline.

.8 Edge Trim:

.1 0.635mm zinc bonded, cold rolled steel mould.

.2 Trim shall be minimum 22mm x 22mm angles.
.3 Provide 50mm wide shadowline trim at perimeter of corridor ceilings.

.9 Finish to tees and edge trim: flame resistant white baked enamel satin finish to match panel finish, 2 coats on exposed surfaces, 1 coat elsewhere.
.10 Carrying Channels: 38mm x 19mm cold rolled galv. weighing 1.042 kg per metre.
.11 Tie Wire: 1.6mm galvanized soft annealed steel
.12 Hangers: 2.6mm galvanized steel wire.
.13 Screws: Corrosion resistant, self-tapping Philips truss head, of length and gauge to suit installation.
.14 Ceiling Hanger Pins (for fixing to metal): capacitor discharge ceiling hanger pins, by Continental Studwelding Ltd., or approved equivalent, of type approved by Consultant.

PART 3 – EXECUTION

3.1 INSTALLATION - GENERAL

.1 Employ mechanics skilled in this Trade and install work in strict accordance with the system manufacturer's printed directions to produce a first class, true finish, free from dropping, warpage, soiled or damaged tile.

.2 Make provisions for thermal movement.

.3 Install hanger inserts in a manner approved by Consultant.

.4 Locate hangers directly over Main Tees and as close to intersections as possible. Secure hangers firmly to concrete inserts, steel joists and beams, bracing, etc. Do not install hangers to metal deck, provide separate grid off joists if required.

.5 Erect ceiling grid plumb and square with accurately fitted locked-in joints in true alignment, secure and rigid and with provision for thermal movement. Water level ceiling to tolerance of 1mm in 1m and maximum deviation of 4mm. from mean level.

.6 Frame around recesses fixtures, diffusers, grilles, and the like and provide heavier section hangers and supports as necessary to support same. Provide hanger within 150mm. of each fixture corner.

.7 Consult with Electrical and Mechanical Trades for requirements and provide access to valves and switches.

.8 Ensure that all hangers and carrying members are designed and spaced to support entire ceiling system including recessed lighting fixtures. Note, weight of fixtures is approximately 9-13.5 kg.

.9 Install panels only after all mechanical and electrical equipment, conduits, piping, telephone distribution, etc. are in place.

.10 Co-ordinate ceiling work to accommodate components of other sections, to be built into acoustical ceiling components, such as light fixtures, diffusers, speakers and sprinkler heads.

.11 Neatly cut acoustical units to fit tightly around all building elements that penetrate ceiling.

3.2 INSTALLATION OF LAY-IN SUSPENSION SYSTEM

.1 Install suspension system in accordance with ASTM-C636 except where specified otherwise. Install suspension system to manufacturer's instructions and certification organization’s tested design requirements where referenced.

.2 Generally hangers shall be spaced at not more than 1200mm o.c. directly above main runner tees, except at fixtures, where they shall be 600mm o.c. or closer as required to adequately support fixtures. Locate hangers as close as possible to tee junctions. Locate first hanger within 300mm of perimeter wall.

.3 Install main tee runners continuous at 1200mm o.c. with interlocking structural cross-tees each side of fixtures at right angles to main tees. Install standard cross-tees generally at 90 degrees to main tees and as required to achieve pattern shown on reflected ceiling plans. Secure joints by web of tees; snaplock into place forming rigid connections. Main tees shall be as long as possible with butt ends joined by means of splice plates locked into webs.

.4 Frame up around light fixtures, grilles, diffusers, speakers, openings, etc. as required.

.5 Secure edge moldings to walls, bulkheads and other vertical surfaces at perimeter edges of acoustic ceilings. Note special moldings required.

.6 Securely fix hangers to tees by bending ends 90 degrees at the correct height and inserting through holes in top of main tees, then wiring around open side at least 3 turns twisting ends together. Flats shall be bolted to tees. Secure to concrete inserts in similar manner.

.7 Do not erect ceiling suspension system until work above ceiling has been inspected by the Building Inspector.

.8 Do not secure hangers to fluted steel floor or roof deck. Secure hangers to overhead structure using attachment methods as required for particular structure and acceptable to the Consultant. Where structural spacing exceeds ceiling hanger spacing, provide double carrying channels nested and placed perpendicular to and on top of bottom flange of steel beams or on top of the lower chords of the open web steel joists, and secured to each joist with three loops of 1.2mm galvanized soft steel wire.

.9 Where obstructions interfere with the placement of ceiling hangers, provide double carrying channels nested and hung from the structure above on both sides of the obstruction.

.10 Provide isolation hangers at all hangers where indicated as required for specific ceiling assemblies.

.11 Install hangers on main tees spaced at maximum 1200mm centres and within 150mm from ends of main tees and tee splices.

.12 Lay out with border units not less than 50% of standard unit width and according to reflected ceiling plans.

.13 Ensure suspension system is coordinated with location of related components.

.14 Install typical wall moulding to provide correct ceiling height.

.15 Completed suspension system shall support super-imposed loads, such as lighting fixtures, diffusers, grilles, speakers and other ceiling mounted fixtures.

.16 Support at light fixtures and diffusers with additional ceiling suspension hangers within 150mm of each corner and at maximum 600mm around perimeter of fixture. Install an additional hanger immediately above each fastener for ceiling mounted curtain tracks.

.17 Interlock cross member to main runner to provide rigid assembly. Ensure all main tee splices and cross tee end clips are fully engaged.

.18 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.

.19 Finished ceiling system shall be square with adjoining walls and level within 6mm in 3000mm.

3.3 LAY-IN PANEL INSTALLATION

.1 End panels shall not be less than half full size and installation in each area shall be symmetrical, with end tiles and abutting opposite vertical wall surface to be of the same width. Do all necessary cutting and fitting neatly and accurately to suit grid openings and accommodate fixtures, grilles, detectors, speakers and the like located on the ceiling panels.

.2 Lay directionally patterned acoustic panels in one direction, parallel to the longest direction of the grid concerned.

.3 Place panels between tees so that edges bear evenly on flanges.

.4 Confirm with reflected ceiling plans.

.5 Provide fire rated enclosures as required around light fixtures and mechanical equipment in fire rated ceilings, according to applicable ULC Design Criteria.

.6 Where mechanical equipment is located above the ceiling, panels shall be suitably and inconspicuously marked by the use of small colour-coded stickers. Mechanical equipment to be located shall include valves, dampers, heat exchangers, heat pumps, VAV boxes, electrical disconnects, as applicable, and other such equipment not visible from below.

3.4 CLEANING

.1 Upon completion, clean acoustic tile of all finger marks and other defacements.

.2 Remove all accumulated rubbish and excess materials from the site.

.3 Clean acoustic tile and replace any damaged tiles immediately before occupation of building by Owner.

END OF SECTION

RESILIENT FLOORING

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Concrete Floor Finishing	Section 03 35 00.
.2	Porcelain tile installation	Section 09 30 13.

1.2 REFERENCE STANDARDS

.1 ASTM Standards

- .1 F141: Resilient Floor Coverings.
- .2 F386: Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces.
- .3 F511: Quality of Cut (Joint Tightness) of Resilient Floor Tile .
- .4 F710: Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
- .5 F1344: Specification for Rubber Floor Tile.
- .6 F1861: Specification for Resilient Wall Base
- .7 F2055: Size and Squareness of Resilient Floor Tile by Dial Gage Method.
- .8 E662: Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
- .9 E1907: Methods of Evaluating Moisture Conditions of Concrete Floors to Receive Resilient Floor Coverings.
- .10 F970: Standard Test Method for Static Load Limits

.2 CAN/ULC-S102.2 Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies

.3 RFCI

- .1 IP #1 Recommended Installation Practice for Homogeneous Sheet Flooring, Fully-Adhered.
- .2 IP #2 Recommended Installation Practice for Vinyl Composition Tile (VCT).
- .3 Recommended Work Practices for Removal of Resilient Floor Coverings.

1.3 SUBMITTALS

.1 Submit samples as per Section 01 33 23.

1.4 EXTRA MATERIALS

.1 At completion of this Work hand over to Owner minimum 2% of each type and colour of flooring installed.

.2 Material to be in wrapped packages or fully labelled as to produce and colour.

1.5 WARRANTY

.1 Submit manufacturer's warranty warranting material and performance for a period of five (5) years following the date of Substantial Performance of the Work.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Adhesives:

.1 Solvent-free white acrylic, as recommended by manufacturers of vinyl composite tile, rubber flooring, and base.
.2 VCT adhesive: Mapei Ultrabond ECO 711, Roberts Consolidated Premium VCT Adhesive 2057, or Flextile Flextech 710.
.3 Rubber base adhesive: Mapei Ultrabond ECO 575 or equal. Adhesive must produce good and permanent waterproof bond between wall surfaces and cove base.

.2 Transition strips at dissimilar materials:
.1 At transition between resilient flooring and porcelain tile, provide Schluter, Schiene Transition Strip in aluminum or brass alloy with lip of edge strip extending under and with shoulder finishing flush with top of resilient floor.

.3 Resilient Base (RB, RB-100): to CAN/CSA-A126.5, Type 1, rubber.
.1 Style B: coved typical, Johnsonite/Tarkett: Rubber Wall Base, DC.

.2 Minimum 1200mm length and 100mm high by 3mm thick, with grooved back.
.3 Colours will be selected by the Consultant from the standard range.

.4 Vinyl Composition Tile (VCT-N):
.1 To ASTM-F1066, 3mm thick, 300mm by 300mm size.
.2 Colours will be selected by the Consultant from the standard range.
.3 Two colours will be selected as follows:
.1 VCT1 – main field colour.
.2 VCT2 – accent colour.
.4 Acceptable Manufacturers:
.1 Armstrong: Standard Excelon, Imperial Texture
.2 Olympia Tile: Flextile, Flex-Thru Architectural Collection
.3 Tarkett: VCT II.
.4 Pattern: Provide corner to corner (grid layout) pattern.

.5 Resilient Rubber Sheet Sports Flooring in Gym (RSF-N):
.1 Sheet Flooring to ASTM F2034.
.2 Slip Resistance: Tested in accordance with ASTM D2047; meeting or exceeding A.D.A recommendations of 0.6.
.3 Construction: Homogeneous sheet floor covering.
.4 Minimum Thickness and Wear Layer: 7.2mm.
.5 Net Fit Seams and Welding Rods: Provide for net fit seams and welding rods to match in colour to sheeting flooring.

.6 Consultant to pick any standard or premium colours from any of the acceptable products described above. One colour will be selected.

.7 Acceptable Manufacturers and Products:
.1 Tarkett, Omnisport 3.5.
.2 Caliber Sport Systems, V-Sport 350.

PART 3 - EXECUTION

3.1 INSPECTION AND TESTING

.1 Check floor surfaces for evidence of carbonation, dusting, excessive moisture or other defects affecting bond of adhesive. Ascertain nature of curing and/or sealing compound used on concrete and its compatibility

with flooring adhesive. Take all required remedial measures. Remove compounds if necessary to ensure that adhesive bonds to concrete.

.2 Test concrete slab, using anhydrous calcium chloride test, in conformance with ASTM F1869. Do not proceed until moisture vapour emission rate is equal or less than 2.44kg/100m2/24hours (3lbs/1000sq.ft./24hours).

.3 Confirm ph level of concrete is acceptable to manufacturers of adhesive and tile. Generally, ph level is to be 9 or less.

.4 Perform bond testing to confirm compatibility between concrete slab and adhesives.

.5 Provide test results to manufacturers of products proposed for use, and obtain approval of conditions before commencing installation.

3.2 INSTALLATION – GENERAL

.1 Do not start installation of resilient flooring until all other trades have completed their work and just prior to completion of building.

.2 Obtain approval from manufacturers for all adhesives, caulking, patching and levelling agents, and installation methods, before proceeding with the work of this section.

.3 Ensure flooring materials are clean of any contaminants which would interfere with proper bonding.

3.3 PREPARATION

.1 On concrete floors, level depressions and cracks with non-shrinking latex joint filler. Patching and levelling products must be compatible with adhesives; obtain approval from manufacturer of adhesive. Do not use products containing gypsum.

.2 Report large cracks to Consultant. Do not proceed until remedied. Prime surface with approved primer.

.3 Thoroughly clean concrete floors of any substances deleterious to bond of adhesive.

.4 Close off areas where tile work is in progress to prevent deposit of dust or grit on slabs where tile is being laid.

3.4 INSTALLATION - RESILIENT FLOORING

.1 Dry lay floor tiles prior to adhesive installation. Position the tiles point to point, laid quarter turned in relation to the adjacent tile. Make all final cuts around the area perimeter. Verify the proper orientation and layout with the Consultant prior to final adhesive installation.

.2 Use only water-proof adhesives, approved by flooring manufacturer for installing rubber flooring system.

.3 Apply adhesive to subfloor, using trowel and rate of application recommended by manufacturer for application over concrete subfloor. Remove wet adhesive at seams or off tile surface immediately with a cloth dampened with rubbing alcohol or water. Note that attempting to remove dried adhesive or caulking can result in damage to tile.

.4 Install tiles point to point and align as noted above. Position tile and butt edges tightly. Lower tiles into adhesive. Stay off tile surface or use a kneeling board.

.5 After all tiles have been installed, roll the floor, in both directions, with a roller recommended by tile manufacturer for specific installation. Roll a second time one hour later. Inspect the floor 2-1/2 hours after installation and roll a third time, if necessary. Use a hand roller in areas which cannot be reached with a large roller. Inspect floor surface, especially seams, and remove any adhesive on the surface.

.6 At perimeter, provide a min. 6mm bead of epoxy caulking. Leave neat caulk line; any excess to be removed immediately.

.7 Avoid all traffic for at least 12 hours and limit to light traffic for a period of 72 hours after the installation. Avoid cold or excessive heat, including direct sunlight during this 72 hour period.

.8 72 hours after installation is completed, implement initial maintenance procedures, as per manufacturer’s printed maintenance instructions.

3.5 APPLICATION - COVE BASE

.1 Fill cracks and level irregularities of surfaces to which base is to be applied with filler approved by adhesive manufacturer so as to provide solid backing over entire area behind base.

.2 Cement cove base to vertical surfaces so that gaps do not occur behind base, so that front lip of base cove bears firmly and uniformly on floor surface, and so that good and permanent bond is produced between base and surface to which it is applied.

.3 For right angled external corners use preformed matching cove corner units. Make end joints flush with gap.

.4 At wall ends and openings where ends of preformed corners come close together or touch or overlap, cut each corner unit equally so that a neat, inconspicuous joint is formed in middle of wall end or opening or so that filled gap, if gap is necessary, is not less than 38mm wide and located in middle of wall or end of opening.

3.6 CLEANING

.1 Remove surplus adhesive from face of tiles as work progresses.

.2 Upon completion of work remove all markings and heel scuffs. Broom clean.

.3 Prior to occupation by Owner, broom clean all resilient floors and remove all noticeable stains and marks.

.4 All wet mopping and waxing will be done by the custodian staff.

END OF SECTION

PAINTING

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

.1	Concrete Unit Masonry	Section 04 22 00.
.2	Structural Steel	Section 05 12 00.
.3	Metal Fabrications	Section 05 52 00.
.4	Rough Carpentry	Section 06 10 00.
.5	Hollow Metal Doors and Frames	Section 08 11 13.
.6	Gypsum Board System	Section 09 29 00.
.7	Shop Priming Specified in various	Sections of the Specification.
.8	Factory applied paint coatings unless otherwise specified.	
.9	Mechanical	Division 20, 22.
.10	Electrical	Division 26, 27, 28.

1.2 SCOPE OF WORK

.1 With exceptions specified above or specifically called for in other Sections of the Specification, all paintwork is included in the scope of this Section of the Specification. Colours will be specified at a later date by the Consultant.

.2 In locations where Drawings do not call for paint or similar finish on walls and/or ceilings, the intent of this Specification is that items, new work and existing surfaces in areas affected by the Work of this project, including miscellaneous metal work, shall be painted.

.3 Work includes moisture testing and surface preparation of substrates as required for acceptance of paint, including cleaning, small crack repair, patching, caulking, and making good surfaces, and specific pre-treatments, sealing, and priming of surfaces.

.4 Check conditions of all existing surfaces to be repainted before commencing new work, including assessing the level of degradation of the surface, the type of coating existing, and the thickness of the existing coating. Perform adhesion tests on all existing coatings to be repainted to ensure that surfaces are sound and well adhered before applying new coatings. It is expected that the Contractor will have visually assessed the existing conditions during the pre-tender site visit, and no contract extras

will be considered for addressing conditions which were readily apparent at that time.

.5 Paint all new exterior surfaces which normally require painting, including hollow metal doors, screens, galvanized steel lintels, ladders and hardware and gas lines. Paint existing exterior concrete piers and beams.

.6 Perform interior painting called for in Room Schedule and Door Schedule and noted on drawings. Paint all new walls, ceilings, bulkheads, and all surfaces which normally receive a paint finish, whether noted on schedules, or not noted. Walls shall be completely painted before installation of tackboards, whiteboards/markerboards and millwork, etc.

.7 All heating units, recessed convectors, grilles, pipes, access panels, hangers and miscellaneous exposed metal work (other than stainless steel, anodized aluminum and baked enamel) to be painted to match the surfaces on which they occur, unless otherwise directed by Consultant.

.8 For special painted graphics, colour changes, accent stripes, etc. see drawings.

.9 In all renovated areas, paint affected walls as specified for new construction. All other walls in the room are to be cleaned and painted with one coat. If more than one colour is used in the room, confirm colours with Consultant.

.10 Paint exposed drywall and the like in locations where finish is not otherwise specified or noted. Do not paint such surfaces in mechanical shafts, unless specifically noted.

.11 Paint all exposed structural steel and steel roof deck and mechanical ducts in finished areas.

.12 Paint exposed structure and metal deck in all mechanical and storage rooms, except Water Meter and Electrical Rooms.

.13 Paint pipes, conduit, ducts and related thermal insulation and all prime painted mechanical and electrical equipment and supports located in mechanical and electrical rooms and in all locations where Drawings call for paint or similar finish on walls and/or ceilings. Paint all mechanical equipment exposed on the roof. Exposed pipes shall be painted to

Owner's Colour Coding/Piping schedule to suit use (i.e. hot water, etc.), included below.

.14 Paint all gas piping, inside and out, whether exposed or concealed. Do not paint other pipe, conduit, ducts, insulation and the like where concealed above ceilings or in service shafts.

.15 Make good paint finish on shop coated work where damaged.

.16 Paint visible portions of steel shelf angles, lintels and structural steel.

.17 Paint edges and all faces of metal doors.

.18 Paint interior of ducts and diffusers visible from exterior on room side.

.19 Painting, as referred to herein shall include paint, enamel, stain, varnish and other finishes herein specified and normally applied to the various materials by the painting Subcontractor.

1.3 REFERENCE STANDARDS

.1 Do painting and finishing to CAN/CGSB-85-GP series standards including Appendix A and to material manufacturer's instructions and to The Master Painters Institute (MPI) Architectural Painting Specification Manual and Maintenance Repainting Manual, except where specifically specified otherwise. The most stringent standards shall apply.

.2 All coatings must conform to Regulation SOR/2009-264, Volatile Organic Compound (VOC) Concentration Limits for Architectural Coatings Regulations, and the VOC limits set therein.

.3 All paints and coatings used must conform to Green Seal Standard GS-11 for paints and coatings based on performance requirements and reduced use of hazardous substances and reduced volatile organic compounds.

1.4 QUALIFICATIONS

.1 The Painting Subcontractor must be a member in good standing of the Ontario Painting Contractors' Association and have a minimum of ten (10) years proven satisfactory experience.

.2 Manufacturer's Qualifications: The paint Products of the Paint Manufacturer shall be as listed in Chapter 5 - Approved Products List of the MPI Manual.

1.5 INSPECTION

.1 A cash allowance has been included for independent painting inspections. The cost of the painting inspection is to be paid from the Cash Allowance included in the Contract. Refer to Section 01 10 00 – General Instructions.

.2 Prior to commencing the work of this section the painting Subcontractor shall arrange for OPCA inspection in accordance with the requirements of the OPCA Quality Assurance Program.

.3 Painting shall not commence until the inspection company has been notified and the Inspector makes the initial site visit.

.4 Supply the Inspector with a schedule of materials intended for use on the job at the commencement of the painting.

.5 The Inspector will issue Inspection Reports during the Project. On completion of the job, the final Inspection Report will be issued.

.6 Lighting: Painting shall not proceed unless the permanent lighting is in place and operational or a minimum of 161 lm/m5 lighting is provided on the surfaces to be painted.

.7 Ventilation: In areas where painting is proceeding provide adequate continuous ventilation and heating to maintain temperatures above 7^0C for 24 hours before, during and 24 hours after paint application.

.8 Do not paint exterior work immediately following rain, frost or dew. Do not paint interior work where condensation has formed or is likely to form. Proceed only when proper environmental conditions are achieved.

.9 Avoid applying paint to surfaces when exposed to direct sunlight.

1.6 WORK ENVIRONMENT

.1 Do not apply paint finish in areas where dust is being generated.

.2 Maintain environmental conditions within limits recommended by manufacturer, for optimum results. Do not apply coatings under environmental conditions outside manufacturer's absolute limits.

.3 Conform to requirements of MPI Architectural Specification Manual including recommendations for surface preparation.

.4 Temperature: No painting shall be performed when surface and ambient temperatures are below 5^0C. The minimum temperature for Latex paints shall be 10^0C for both interior work and exterior work.

.5 Relative humidity shall not be higher than 85%.

.1 Moisture Content of Surfaces:

.2 Tests shall be by electronic moisture meter.

.1 Wood: Maximum moisture content of 15%.

.2 Concrete and Concrete Masonry Units: Maximum moisture content of 12% for solvent type paint. Concrete and masonry walls must be installed at least 28 days and must be visually dry on both sides before painting commences.

.3 Concrete Floors: Shall be tested for moisture by Acover patch test.

.4 Plaster and Gypsum Board and Cement Board: Maximum moisture content of 12%.

1.7 ACCEPTANCE OF WORK IN PLACE

.1 Submit written confirmation of acceptance of existing conditions, to the Consultant, prior to commencing painting work. Painting may not commence without submission of this confirmation.

.2 Receipt of this confirmation will be considered a prerequisite for certification of payment for this work.

.3 Notify the Consultant, in writing, immediately if any existing condition is encountered that will prevent the attainment of satisfactory results in this work

1.8 REGULATORY REQUIREMENTS

.1 Conform to requirements of applicable Volatile Organic Compound (VOC) concentration limits for Architectural Coatings Regulations.

.2 Conform to the latest edition of Industrial Health and Safety Regulations issued by authorities having jurisdiction regarding site safety, including, but not limited to, ladders, scaffolding, and ventilation.

.3 Conform to requirements of local authorities having jurisdiction regarding the storage, mixing, application, and disposal of all paint and related waste materials.

.4 Notify the OPCA on award of contract and make application for assignment of an inspector using the appropriate forms.

.5 Fully cooperate at all times with the requirements of the OPCA in the performance of their duties, including providing access and assistance as required to complete inspection work.

1.9 SUBMITTALS

.1 Samples:
- .1 Submit triplicate samples consisting of 300mm x 200mm panels of each type of paint finish specified.
- .2 Panels shall be of same material as that on which sample coatings are to be applied in the field where possible.
- .3 Identify each sample as to job, name of paint manufacturer, finish, colour, name and number, sheen and gloss units and name of Contractor.
- .4 Retain one set of approved samples on site until completion of the Work.

.2 Submit manufacturer’s data sheets for each paint product, including:
- .1 Product characteristics.
- .2 Surface preparation instructions and recommendations Primer requirements and finish specifications.
- .3 Storage and handling recommendations.
- .4 Application methods.
- .5 Cautions.
- .6 VOC data.

.7 Complete Material Safety and Data Sheets (MSDS) for each product.

.3 Submit written confirmation of acceptance of existing conditions, as specified above.

1.10 STORAGE AND HANDLING

.1 Store paint and painter's materials in clean, dry locations approved by the Consultant. Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.

.2 All paint shall be in unopened containers, labelled with:

.1 manufacturer's name,
.2 product name, product type,
.3 instructions for surface preparation and product application,
.4 VOC content,
.5 environmental issues,
.6 batch date, and
.7 colour name and number.

.3 Provide C02 fire extinguisher minimum 9 kg capacity in paint storage area.

.4 Dispose of materials in accordance with the requirements of authorities having jurisdiction.

.5 Paint materials shall be delivered to the job site in original sealed and labeled containers bearing the manufacturer's name, type of paint, brand name, colour designation, and instructions for mixing and reducing, and application requirements.

.6 Take all necessary precautionary and safety measures to prevent fire hazards and spontaneous combustion. Take appropriate precautions, including no smoking restrictions, where toxic and explosive solvents are used.

1.11 SIGNS

.1 Provide legible signs throughout the Work reading "WET PAINT" in prominent positions during painting and while paint is drying.

.2 Use 75mm high letters on white card or board.

1.12 TEMPORARY COVERS AND PROTECTION

.1 Protect floors and other surfaces with temporary covers such as dust sheets, polyethelene film or tarpaulins. All to Consultant's approval.

.2 Mask identification plates occurring on equipment, switch boxes, and fire rating labels, etc. which require painting.

.3 Protect, remove and replace hardware, accessories, lighting fixtures, and similar items as required except primed for paint door closers which shall be painted. Light switches and electrical communication outlet plates to be removed and reinstalled on completion of painting.

.4 Keep oily rags, waste and other similar combustible materials in closed metal containers; take every precaution to avoid spontaneous combustion, remove waste and combustible materials daily.

.5 Clean surfaces soiled by spillage of paint, paint spattering and the like. If such cleaning operations damage the surface, repair and replace damaged work at no cost to the Owner.

1.13 RETOUCHING

.1 Do all retouching, etc. to ensure that the building may be handed over to the Owner in perfect condition, free of spatter, finger prints, rust, watermarks, scratches, blemishes of other disfiguration.

.2 After fully decorating and retouching a room or other area, notify Consultant. After inspection and final approval by Consultant post sign 'DECORATING COMPLETE - NO ADMITTANCE WITHOUT PERMISSION'.

1.14 TEST AREAS

.1 In areas to be repainted, test existing coatings for adhesion before applying new coatings, in accordance with the recommended practices in the MPI Repainting Specification Manual. Check for loose paint using a scraper and check for adhesion by cutting through the coatings and performing duct tape tests, or other acceptable means of testing adhesion.

Once adequate adhesion is confirmed, apply a test section of the proposed new coating, allow to dry, and perform adhesion tests in area of new coating to confirm compatibility with existing coatings before proceeding with repainting work. Perform tests in all areas and on all surface types to ensure positive repainting results. Advise Consultant of any areas in which existing or new coatings fail adhesion tests. Do not proceed with the work until a recommended course of action is agreed upon by all parties. Commencement of work will signify acceptance of existing conditions.

.2 In areas of new construction, A room or area in the building will be designated by the Consultant as a test area to establish standard of workmanship, texture, gloss and coverage.

.3 Prior to any painting being started, request a meeting on Site between Consultant, Contractor, and Subcontractor and Inspector to review conditions, surfaces, anticipated problems and to clarify quality of workmanship acceptable to Consultant.

.4 Apply finishes to each type of surface within room with correct material, coats, colour, texture and degree of gloss in sample area and have same approved prior to providing Work of this Section.

.5 Retain test area until after completion of Work. Test area to be minimum standard for the Work.

.6 Failure to comply with the above will be cause for Consultant to request all Work previously painted to be repainted.

1.15 WASTE MANAGEMENT AND DISPOSAL

.1 Remove and dispose of excess material and waste resulting from the work of this Section.

.2 All excess materials and empty containers shall be removed from the site and disposed of or recycled in accordance with local regulations.

.3 Obtain information regarding applicable Provincial and local government regulations for disposal of paint, stain, wood preservative finishes, and related thinners and solvents.

.4 All waste materials shall be separated and recycled. Collect waste paint by type and provide for delivery to recycling or collection facility. Materials that cannot be reused shall be treated as hazardous waste and disposed of in an appropriate manner.

.5 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

.6 Cleaning and Disposal Procedures:
- .1 Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case shall equipment be cleaned using free draining water.
- .2 Retain cleaners, thinners, solvents, and excess paint and place in designated containers and ensure proper disposal.
- .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
- .4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
- .5 Ensure empty paint cans are dry prior to disposal or recycling.
- .6 Close and seal tightly partly used cans of materials including sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.
- .7 Set aside and protect surplus and uncontaminated finish materials not required by the Owner and deliver or arrange collection for verifiable re-use or re-manufacturing.

1.16 MAINTENANCE MATERIALS

.1 Provide one sealed can, one litre capacity, of each product in each colour used in the Work for Owner's use in maintenance Work.

.2 Container to be new fully labelled with manufacturer's name, type of paint, and colour.

.3 Maintenance material shall be of the same run as the installed material.

1.17 WARRANTY/GUARANTEE

.1 Furnish a 100% Maintenance Bond, valid for three (3) years from date of Substantial Performance, or from date of completion of Work if work is not complete at date of Substantial Performance, will be required.

.2 Subcontractor's Maintenance Bond shall warrant that the work has been performed in accordance with the standards and requirements of the MPI Architectural Painting Specification Manual, most recent edition.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Paint and finishing materials - highest grade, first line quality, low VOC products provided by any of the following manufacturers:

.1 Benjamin Moore & Co.
.2 The Sherwin-Williams Company
.3 PPG Canada
.4 Para Paints.

.2 Paints, enamels, fillers, primers, varnishes and stains - ready mixed products of one of the manufacturers listed. Substitutes will not be allowed.

.3 Thinners, cleaners - type and brand recommended by the paint manufacturer, or Inspector.

.4 Only products manufactured by paint manufacturer stated at time of submission of samples will be allowed on Site unless other materials specifically specified herein. No painting to be performed until paint manufacturer identified and acceptance received from the Consultant and Inspector.

.5 Deliver materials to Site in original unbroken containers bearing brand and maker's name. The presence of any unauthorized material or containers for such, on Site shall be of sufficient cause for rejection of ALL paint materials on Site at that time, and all previous painted work repainted with proper material.

2.2 COLOUR SCHEDULE

.1 Consultant will provide detailed colour schedule at a later date. Conform to schedule including patterns, colours, and locations for all finishes.

.2 A minimum of ten (10) paint colours may be selected by the Consultant.

.3 In each room, the Consultant may select one wall where an accent colour may be applied.

.4 Refer to room finishing notes for detailed application instructions.

2.3 FINISHING SYSTEMS

.1 Interior Work:

.1 Gypsum Board:

.1 Walls (typical): INT 9.2M Institutional Low Odour/ Low VOC, semi-gloss finish, 1 coat Primer; MPI #149, Finish: 2 coats MPI #147.

.2 Walls (corridors, mechanical, electrical room and stair): INT 9.2F Epoxy- Modified Latex (over latex primer sealer), Semi-Gloss finish. Acceptable paint: Sherwin-Williams, Pro Industrial Zero VOC Waterborne Catalyzed Epoxy or Equivalent.

.3 Ceilings (typical): 2 coats of one of the following:
2 coat Dulux Lifemaster Interior Acrylic Ceiling Flat # 59170 Zero
VOC or equal by one of the approved manufacturers.

.4 Ceiling (corridors, mechanical, electrical, custodian and washrooms): INT 9.2F Epoxy-Modified Latex (over latex primer sealer), Flat Finish. Acceptable paint: Sherwin-Williams, Pro Industrial Zero VOC Waterborne Catalyzed Epoxy or Equivalent.

.5 All drywall, whether requiring finish painting or not, must receive prime coat.

.2 Concrete Block, paint (typical):

.1 INT 4.2E (modified), Institutional Low Odour/ Low VOC, semi-gloss finish, 4 coat system.

.2 2 coats latex blockfiller; MPI #4.

.3 2 coats finish; MPI #147.

.4 Provide gloss finish, MPI #148, where noted as "gloss" in Room Finish Schedule.

.3 Concrete Block, glaze and wet areas:

.1 INT 4.2J (modified), Epoxy-modified Latex Finish, 4 coat system

.2 2 coats latex blockfiller; MPI #4

.3 2 Coats epoxy-modified latex finish; MPI #115

.4 Provide in all corridors, custodian room, mechanical room and washrooms, and where noted as "glazed" in Room Finish Schedule.

.5 Acceptable Paint: Sherwin-Williams, Pro Industrial Zero VOC Waterborne Catalyzed Epoxy or Equivalent.

.4 Cast in Place Concrete walls, ceilings:

.1 INT 3.1M Institutional Low Odour/ Low VOC, semi-gloss finish.

.2 1 coat MPI #149.

.3 2 coats MPI #147.

.5 Woodwork (Opaque Finish):

.1 INT 6.4T Institutional Low Odour/ Low VOC, semi-gloss finish.

.2 1 coat latex primer MPI #39.

.3 2 coats institutional low VOC latex finish; MPI #147.

.6 Stain Finish:

.1 LEED Complaint Stain.

.2 Coats Varnish, Water Based, clear gloss; MPI #130.

.7 Ferrous Metal:

.1 INT 5.1S Institutional Low Odour/ Low VOC, semi-gloss finish.

.2 1 coat MPI #107.

.3 2 coats MPI #147.

.8 Shop Primed Ferrous Metal:

.1 INT 5.1S Institutional Low Odour/ Low VOC, semi-gloss finish.

.2 Confirm type of shop primer used with structural steel supplier.
.3 Confirm compatibility of all coatings with manufacturers.
.4 Touch up prime coat where damaged, with compatible primer, type MPI#107.
.5 2 coats interior latex, MPI #147

.9 Galvanized Metal:
.1 Includes all hollow metal doors, frames and screens and pipe rails.
.2 INT 5.3N Institutional Low Odour/ Low VOC, semi-gloss finish
.3 1 coat galvanized Primer MPI #134
.4 2 coats Acrylic Semi-Gloss MPI #147

.10 Insulation on Pipes & Ducts:
.1 INT 6.8F Institutional Low Odour/ Low VOC, semi-gloss finish
.2 1 coat Primer MPI #17
.3 2 coats Acrylic Semi-Gloss MPI #147

.11 Mechanical Equipment:
.1 Institutional Low Odour/ Low VOC, semi-gloss finish
.2 As specified for metal types.

.12 Piping, Conduit & Ductwork (uncoated):
.1 INT 5.3N Institutional Low Odour/ Low VOC, semi-gloss finish
.2 1 coat galvanized Primer MPI #134
.3 2 coats Acrylic Semi-Gloss MPI #147

.13 Surfaces behind grilles, within 30mm of grille:
.1 INT 5.3N Institutional Low Odour/ Low VOC, flat finish
.2 1 coat galvanized Primer MPI #134
.3 2 Coats Acrylic Flat, Black; MPI #143

.14 Concrete Floors:
.1 1 Coat Water-Borne Epoxy (diluted 10-20% with water) MPI #115.

.2 2 Coats Water-Borne Epoxy MPI #115.
.3 VOC emissions of coating not to exceed 200 g/l.

.15 Zinc-Coated Metal:
.1 INT 5.3M with Epoxy-Modified Latex (over water based galvanized primer), Semi-gloss Finish.
.2 Acceptable Paint: Sherwin-Williams, Pro Industrial Zero VOC Waterborne Catalyzed Epoxy, or Equivalent.

.16 Exposed Steel Floor and Roof Deck and Steel Floor and Roof Structure:
.1 INT 5.1CC, Waterborne Dry Fall (over galvanized steel or quick dry shop primer, Flat Finish.

.17 Steel Stair Stringers and Stair Balustrades:
.1 INT 5.1K Epoxy-Modified Latex (over rust-inhibitive primer), Semi-gloss Finish.
.2 Sherwin-Williams, Pro Industrial Zero VOC Waterborne Catalyzed Epoxy, or Equivalent.

.18 High Temperature Pipe and Fittings: INT 5.2A Heat Resistant Enamel, Semi-gloss Finish.

.19 NOTE: Use heat resistant paint where required.

.2 Exterior Work:

.1 To MPI Manual Chapter 2.
.2 Painted Wood: EXT 6.3L Latex (over latex primer), Semi-Gloss Finish.
.3 Stained Wood: EXT 6.3N Satin, Semi-transparent, Water Based.
.4 Soffit Sheathing: EXT 9.1A Latex, Flat Finish.
.5 Ferrous Metal: EXT 5.1F Epoxy (over epoxy primer and high build epoxy) Finish.
.6 Zinc-Coated Metal: EXT 5.3C Epoxy (over epoxy primer) Finish.

.3 Paint systems are to be of premium grade.

.4 Use low odour, zero VOC products.

PART 3 - EXECUTION

3.1 PREPARATION OF SURFACES

.1 Prepare surfaces in accordance with the following standards and to MPI Architectural Specification Manual Chapters 2 and 3; the most stringent requirements shall apply. Preparation of surfaces must be reviewed with painting inspector. Prepared surfaces must be inspected before application of prime coat.

.1 Prepare wood surfaces to CGSB 85-GP-lM. Use CAN/CGSB 1.126 vinyl sealer over knots and resinous areas. Use CGSB 1-GP -103M wood paste filler for nail holes. Tint filler to match.

.2 Touch up damaged spots of shop paint primer on steel with CAN/CGSB 1.40M to CGSB 85-GP-14M.

.3 Prepare galvanized steel and zinc coated surfaces to CGSB 85-GP-16M. This includes wiped coated steel surfaces.

.4 Prepare masonry and concrete surfaces to CGSB 85-GP-31M.

.5 Prepare wallboard surfaces to CGSB 85-GP-33M. Fill minor cracks with plaster patching compound for stained woodwork.

.6 Prepare concrete floors to CGSB 85-GP-32M.

.7 Prepare copper piping and accessories to CGSB 85-GP-20M.

.8 Apply prime coat on wood scheduled for paint finish before installation.

.9 Back prime wood scheduled for transparent finish. Do not prime surfaces scheduled for transparent finish.

.10 Remove all surface contamination such as oil, grease, loose paint, mill scale, dirt, foreign matter, rust, mould, mildew, mortar, efflorescence, and sealers from existing surfaces to assure sound bonding to tightly adhering old paint.

.11 Scape peeling paint off existing masonry surfaces and apply a compatible masonry sealer, approved for use by the paint manufacturer, before applying new coatings.

.12 Glossy surfaces must be clean and dull before repainting. Wash with abrasive cleanser, or, wash thoroughly and dull by sanding.

.13 Spot prime any existing bare areas with an appropriate primer.

.14 Check for compatibility between existing and new coatings by applying a test patch of the recommended coating system, covering at least 2 to 3 square feet. Allow surface to dry one week before testing adhesion per ASTM D3359. If the coating system is incompatible, complete removal is required.

.15 NOTE: ABOVE NOTED SURFACES MAY NOT ALL BE APPLICABLE TO THIS PROJECT.

3.2 APPLICATION

.1 Apply coatings in accordance with manufacturer's printed instructions.

.2 Use suitable, clean equipment in good condition.

.3 Maintain dust-free suitable conditions on the surfaces free from machine, tool or sandpaper marks, insects, grease, or any other condition liable to impair finished work to prevent production or good results.

.4 At all hollow metal doors and frames, prime coat must be inspected and signed off by painting inspector before painting work may proceed.

.5 Apply evenly, uniform in sheen, colour and texture, free from brush or roller marks, well brushed or rolled in and free of crawls, runs, join marks or other defects.

.6 Permit paint to dry between coats. Touch up uneven spots after applying first coat. Tint various coats of multiple coat work in light shades of the final colour selected, to distinguish between coats.

.7 Give Consultant and Inspector due notice and sufficient opportunity (minimum 48 hours) to inspect each coat. Do not proceed with subsequent coat until preceding coat approved. Consultant reserves the right to order complete retreatment if this condition is not observed.

.8 Painting coats are intended to cover surfaces perfectly; if in painter's opinion, formula specified is inadequate to provide a first class finished surface, report to the Consultant and have formulas rectified before commencing work. Surfaces imperfectly covered shall receive additional coats at no additional cost. Provide additional coat where ever dark colours are used.

.9 Use paint unadulterated. Use same brand of paint for primer, intermediate and finish coats. Factory mix all paints.

.10 Paint finish shall be applied by roller except in the case of wood trim, door frames, base board and similar work of small surface area which shall be painted by brush. Do not use roller for applying finish other than paint.

.11 Spray painting will not be permitted unless specifically approved in writing by the Consultant in each instance. Consultant may withdraw approval at any time and prohibit spray painting for reasons such as carelessness, poor masking or protection measures, drifting paint fog, disturbance to other Trades, or failure to obtain a dense, even, opaque finish. Spray painting shall be full double coat, i.e. at least two passes for each coat. Do not use spray or roller on wood or metal surfaces, brush only unless approved in writing by Consultant.

.12 Paint entire surfaces, including areas where millwork or other items are to be installed.

.13 Finish edges of doors with paint or stain treatment as required to match face of door. Seal hidden edges of wood doors with one coat of shellac and one coat gloss varnish or two coats paint. Repaint tops and edges of wood doors after fitting.

.14 Even up stained woodwork in colour as required by nature of wood and as directed by Consultant. Apply same finish on trim, fitments cupboards and other protecting ledges as on surrounding work, disregard sight lines.

.15 Carefully hand smooth and sandpaper wood between coats (including priming). Apply one coat sealer before applying first coat paint filler to knots or sap blemishes on wood surfaces to receive paint or stain finish.

.16 After first coat, fill nail holes, splits and scratches, using putty coloured to match finish.

.17 Remove rust, oil, grease and loose shop paint from metal work by brushing or with wire brushes and make good shop coat before proceeding with final finish. Feather out edges to make touch up patches inconspicuous.

.18 Clean castings with wire brush before application of first paint coat.

.19 Do not etch galvanized metal. Use zinc rich primer. This includes metal door frames and the like with wiped zinc coating.

.20 Note that primer is required on all hollow metal doors, frames and screens. Three coat system is required. Sand between all coats.

.21 Remove form oil or parting compounds from concrete surfaces. Use Xylol or approved compound.

.22 Paint interior of pipe spaces, ducts, etc. visible through grilles or through linear metal ceilings in black matt finish.

.23 Conform with Consultant's colour schedule and exactly match approved samples.

.24 Mechanical and Electrical Pipes, Ducts and Conduits:

.1 Commence Work when piping installation is complete in the area concerned.
.2 Do not paint plated or other prefinished surfaces, unless otherwise noted.
.3 Paint conduit in same colour as background paint.
.4 Apply formulae specified even though surface prime painted at shop prior to delivery. Touch up shop priming where damaged.
.5 Use heat resistant epoxy paint on pipes and surfaces where operating surface temperature exceeds 65 degrees C.
.6 Paint exposed pipes and ducts and their supports and related items in colours to suit colour coding included below; confirm with Consultant. Refer to Mechanical Division 20 for further instructions.

3.3 REPAIRS

.1 Cracks occurring in walls or ceilings requiring patching during "Warranty Period" shall be repainted in such a way that the patch is not visible at a distance of 1m.

.2 If patch painting is not acceptable, repaint entire wall, or ceiling.

END OF SECTION

TOILET COMPARTMENTS

PART 1 - GENERAL

3.1 SECTION INCLUDES

.1 Phenolic-core toilet partitions.

.2 Phenolic-core urinal screens.

3.2 REFERENCES

.1 References, General: Versions of the following standards current as of the date of issue of the project or as required by applicable code apply to the Work of this Section.

.2 ASTM International (ASTM):

.1 ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

.2 ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

.3 ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

.4 ASTM A743/A743M - Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.

.5 ASTM B86 - Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings.

.6 ASTM B221 - Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

.3 International Code Council (ICC)/American National Standards Institute (ANSI):

.4 ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities, as applicable to toilet compartments designated accessible.

3.3 RELATED SECTIONS

.1 Section 09 30 13 - Tiling, coordination with layout and installation.

.2 Section 10 28 13 - Washroom Accessories, for accessories.

3.4 SUBMITTALS

.1 Submit under provisions of Section 01300.

.2 Product Data: Manufacturer's data sheets on each product to be used, including:

.1 Preparation instructions and recommendations.
.2 Storage and handling requirements and recommendations.
.3 Installation methods.

.3 Shop Drawings: Submit manufacturer's shop drawings for each product specified, including the following:

.1 Plans, elevations, details of construction and attachment to adjacent construction.
.2 Show anchorage locations and accessory items.
.3 Verify dimensions with field measurements prior to final production of toilet compartments.

.4 Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

.5 Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square representing actual product, color, and patterns.

3.5 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Minimum 10 years experience manufacturing similar products.

.2 Installer Qualifications: Minimum 2 yearS experience installing similar products.

.3 Single Source Requirements: To the greatest extent possible provide products from a single manufacturer.

.4 Accessibility Requirements: Comply with requirements applicable in the jurisdiction of the project, including but not limited to ADA and ICC/ANSI A117.1 requirements as applicable.

.5 Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

.1 Finish areas designated by Architect.
.2 Do not proceed with remaining work until workmanship is approved by Architect.
.3 Refinish mock-up area as required to produce acceptable work.

3.6 PRE-INSTALLATION MEETINGS AND COORDINATION

.1 Convene minimum two weeks prior to starting work of this section.

.2 Coordinate requirements for blocking, reinforcing, and other concealed supports to ensure that toilet compartments can be supported and installed as indicated.

3.7 DELIVERY, STORAGE, AND HANDLING

.1 Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

.2 Handling: Handle materials to avoid damage.

3.8 PROJECT CONDITIONS

.1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

3.9 SEQUENCING

.1 Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

3.10 WARRANTY

.1 Manufacturer's Warranty: Provide manufacturer's standard form in which manufacturer warrants against defects in materials and workmanship during the following period:

.1 Phenolic-Core Toilet Partitions: 25 years.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

.1 Acceptable Manufacturer: Manufacturer: Provide listed products of Hadrian Manufacturing Inc., 965 Syscon Road, Burlington, ON, Canada, L7L 5S3, 905-333-0300, www.hadrian-inc.com.

.2 Substitutions: The Owner will consider products of comparable manufacturers during the tender phase only, as a substitution, pending the Contractor's submission of adequate documentation of the substitution in accordance with procedures in Division 1 of the Project Manual.

2.2 PHENOLIC-CORE TOILET PARTITIONS AND URINAL SCREENS

.1 Phenolic-Core Toilet Compartments:

.1 Standard: 58-inch- (1473-mm-) high doors and panels.

.1 Basis of Design Product: **Hadrian Standard**.

.2 Style: Headrail braced and Floor mounted.

.2 Phenolic-Core Urinal Screens: To match panels in construction and finish.

.1 Basis of Design Product: **Hadrian Urinal Screen**.

.2 Wall hung.

.3 Phenolic Door, Panel, and Pilaster Construction, General: Decorative surface papers impregnated with melamine resins, pressed over kraft paper core sheets impregnated with phenolic resin and bonded together under high pressure and temperature.

.4 Doors and Pilasters: No-sightline interlocking doors and pilasters. 3/4-inch- (19-mm-) thick with no sightline rebate and 45-degree chamfered edges.

.5 Partition Panels: 1/2-inch- (13-mm) thick, straight cut with 45-degree chamfered edges.

.6 Headrails: 1 inch (25 mm) by 1.75 inch (44 mm), #4 brushed finish, extruded aluminum with anti-grip design. Minimum 0.060-inch (1.5 mm) wall thickness. Securely attach to wall and pilasters with manufacturer’s fittings to make a rigid installation.

.7 Floor Shoes: 4-inch- (76 mm-) high stainless steel.

.8 Sleeve Shoes: 3-inch (50 mm-) high stainless steel.

2.3 HARDWARE AND ACCESSORIES

.1 Hinges: Surface mounted, 11-gauge stainless steel with adjustable cams for self-closing operation. Attach to doors and pilasters with manufacturer’s standard stainless steel fasteners.

.2 Indicator Latches: Manufacturer’s standard brushed nickel zamac indicator latch assembly with antimicrobial coating showing red in the window when in locked position and green when unlocked.

.3 Door Pulls: Manufacturer's standard brushed nickel zamac pulls with antimicrobial coating at outswinging doors that comply with accessibility requirements.

.4 Wall Connections: [Three stainless steel stirrup brackets] [Continuous stainless steel channels] at panel to wall, panel to pilaster, and pilaster to wall connections, Grade 304 stainless steel, #4 brushed finish.

.5 Fasteners: Manufacturers standard stainless steel fasteners, vibration resistant, twin lead, with pan heads.

2.4 PERFORMANCE REQUIREMENTS

.1 Surface-Burning Characteristics: Comply with ASTM E84; tested by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

.1 Flame-Spread Index: [25] [75] or less.

.2 Smoke-Developed Index: 450 or less.

.2 Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible. Comply with AODA and Ontario Building Code Section 3.8 Requirements.

2.5 MATERIALS

.1 Zinc Aluminum Magnesium and Copper Alloy (Zamac): ASTM B86.

.2 Stainless Steel Sheet: ASTM A240 or A666, 300 series.

.3 Stainless Steel Castings: ASTM A 743/A 743M.

.4 Aluminum: ASTM B221.

2.6 FABRICATION

.1 General: Fabricate toilet compartments to sizes indicated on Drawings. Coordinate requirements and provide for attachment of toilet accessories. Provide cutouts for through-partition toilet accessories where required.

.2 Doors: Pre-drill holes for latches and hinges. Factory install rubber bumpers secured with press fit and adhesive.

.3 Pilasters: Pre-drill holes for hinges.

.4 Anchors: Manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters and walls to suit floor and wall conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

.5 Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide, in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide, out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments designated as accessible.

2.7 FINISH

.1 Face Sheet Colors: Dark Grey.

PART 3 – PRODUCTS

3.11 EXAMINATION

.1 Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.

.2 Confirm location and adequacy of blocking and support required for installation.

.3 Do not proceed with installation until conditions meet manufacturer's requirements.

3.12 INSTALLATION

.1 General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices penetrating structural floor to depth indicated in manufacturer’s written instruction.

.2 Headrail-Braced Compartments: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster. Adjust so tops of doors are parallel with overhead brace when doors are in closed position.

.3 Floor-Mounted Compartments: Secure pilasters to floor and level, plumb, and tighten. Adjust so tops of doors are level with tops of pilasters when doors are in closed position.

.4 Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

.5 Install products in strict compliance with manufacturer's written instructions and recommendations, including the following:

.1 Verify blocking and supports in walls and ceilings has been installed properly at points of attachment.
.2 Verify location does not interfere with door swings or use of fixtures.
.3 Use fasteners and anchors suitable for substrate and project conditions
.4 Install units rigid, straight, plumb, and level.
.5 Conceal evidence of drilling, cutting, and fitting to room finish.
.6 Test for proper operation.

3.13 ADJUSTING, CLEANING AND PROTECTION

.1 Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 15 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

.2 Adjust hardware for proper operation after installation. Set hinge cam on in-swinging doors to hold doors open when unlatched. Set hinge cam on out-swinging doors to hold unlatched doors in closed position.

.3 Touch-up, repair or replace damaged products.

.4 Clean exposed surfaces of compartments, hardware, and fittings. Clean partition and screen surfaces with materials and cleansers in accordance with manufacturer's recommendations.

.5 Remove packaging and construction debris and legally dispose of off-site.

END OF SECTION

WASHROOM ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Washroom Accessories and Equipment:

.1 Coat Hook
.2 Fixed Frame Mirror
.3 Double-Roll Toilet Tissue Dispensers
.4 Sanitary Napkin Disposal Bin
.5 Soap Dispenser
.6 Shower Curtain Rod and Shower Curtain

1.2 RELATED SECTIONS

.1 Section 09 30 13 - Tiling, coordination with layout and installation.

1.3 SUBMITTALS AND SHOP DRAWINGS

.1 Product Data: Submit manufacturer's data sheets for each product specified, including the following:

.1 Installation instructions and recommendations.
.2 Storage and handling requirements and recommendations.
.3 Cleaning and maintenance instructions.
.4 Replacement parts information.

.2 Schedule: Submit a washroom accessory schedule, indicating the type and quantity to be installed in each washroom area. Use room numbers as indicated on the Drawings.

.3 Country of Origin: Manufacturer must supply, with first submittal, Country of Origin information for each type of washroom accessory for this project.

.5 Emergency Signs:
.1 Submit drawn-to-scale details for individually fabricated lettering indicating word and letter spacing.
.2 Submit drawn-to-scale details for individually fabricated lettering indicating word and letter interchangeable components, mounting methods, schedule of signs.

.3 Submit representative sample of each type of sign, sign image and mounting method.

.4 Submit colour samples of sign lettering and banding, and each type of acrylic panel specified for review by the Consultant.

1.4 QUALITY ASSURANCE

.1 Manufacturer: Provide products manufactured by a company with a minimum of 10 years successful experience manufacturing similar products.

.2 Single Source Requirements: To the greatest extent possible provide products from a single manufacturer.

.3 Accessibility Requirements: Comply with requirements applicable in the jurisdiction of the project, including but not limited to ADA and ICC/ANSI A117.1 requirements as applicable.

.4 Hazardous Materials: Comply with EU Directive “Restrictions of Hazardous Substances (RoHS) requirements.”

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations. Protect from damage.

1.6 WARRANTY

.1 Manufacturer’s Warranty for Washroom Accessories:
.1 Manufacturer’s standard 1 year warranty for materials and workmanship.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

.1 Specified manufacturer's catalogue references establish minimum acceptable standards for Work of this Section. Products shall be as manufactured by Frost Products Ltd., or Bobrick Washroom Equipment Ltd., and Watrous/ASI (where noted) unless noted otherwise.

.2 Basis of Design Products: Based on the quality and performance requirements of the project, specifications are based solely on the products of Bobrick Washroom Equipment, Inc. www.bobrick.com. Location of manufacturing shall be the United States.

.3 Substitutions: The Architect will consider products of comparable manufacturers as a substitution, pending the Contractor's submission of adequate documentation of the substitution in accordance with procedures in Division 01 of the Project Manual.

2.2 ACCESSORIES

.1 Coat Hook:
- .1 Refer to architectural drawings for locations and quantities.
- .2 Vandal Resistant Safety Coat Hook of stainless steel with maximum 50mm projection, with snap down safety hook.
- .3 Acceptable Products: Bobrick B-983 or Frost 1150-SS.

.2 Fixed Frame Mirrors:
- .1 Materials: Type 430 stainless steel; bright polished finish with vertical grain finish on exposed surfaces.
- .2 Stainless steel channel frame; one piece, 50mm by 50mm, 90 mitred corners, concealed fasteners and locking screws.
- .3 Corners: Welded, ground, and polished smooth.
- .5 Mirror:
  - .1 6mm thick tempered glass.
  - .2 Select float glass mirror guaranteed for 15 years against silver spoilage.
  - .3 Edges: Protected by plastic filler strips.
  - .4 Back: Protected by full-size, shock-absorbing, water-resistant, nonabrasive, 1/8 inch (3mm) thick polystyrene padding.
- .6 Back and Inner Stiffener Frame: Galvanized steel, one-piece welded construction with slots for mounting screws and integral screw-head lock.
- .7 Concealed wall hanger with theft resistant mounting.

.8 Acceptable Products:
.1 Size: 610mm wide by 1220mm in height;
.1 Bobrick B-1658 2448 or Frost 941TG-2448.

.5 Double-Roll Toilet Tissue Dispenser: Supplied and installed by the Owner.

.6 Sanitary Napkin Disposal Bin:
.1 Surface mounted, stainless steel, continuous hinged door, self-closing, enclosed within “napkin disposal”, removable stainless steel receptacle fitted with spring clip for deodorizer block.

.2 Cabinet: All-welded, 18-8, Type 304, heavy gauge stainless steel with satin finish on exposed surfaces.
.4 Door: 18-8, Type 304, 22 gauge (0.8mm) stainless steel with satin finish; equipped with a tumbler lock keyed like other washroom accessories.
.5 Door Hinge: Full-length stainless steel piano-hinge.
.6 Disposal Panel: 18-8, Type 304, 22 gauge (0.8mm) stainless steel with satin finish; hemmed bottom edge hemmed.
.7 Disposal Panel Hinge: Spring-loaded, full-length stainless steel piano-hinge; with an international graphic symbol identifying sanitary napkin disposal.
.8 Waste Receptacle: Removable, leak-proof, rigid molded polyethylene.
.9 Capacity: 1.2 gallons (4.6 L).
.10 Acceptable Products: Bobrick Classic Series Model B-254 or Frost 641.

.8 Soap Dispenser:
.1 Automatic Soap Dispenser.
.2 Wall mounted.
.3 Supplied by Owner and installed by the Contractor.
.4 Install the following quantity of soap dispensers in locations to be confirmed by the Owner.

.9 Shower Rods with Curtains at new shower entry:
.1 Stainless steel, 32mm (1-1/4”) od, minimum 1.214 mm (18ga) wall thickness,
complete with end flanges and 1064 mm x 1830 mm [(42” x 72”) (1778 mm x

1830 mm) (70” x 72”)] Waterproof, scrubbable, mildew-proof, non combustible white vinyl, minimum 7 ga thick shower curtain.

.2 Supply stainless steel shower curtain hooks as per manufacturer’s recommended quantity.

.3 Acceptable Products:

.1 Bobrick, Model No. B-6047, 204-2 and 204-1.

.2 Bradley, Model No. 9531, 9533 and 9536.

.3 Frost, Model No. 1145S c/w 1144-501, 1144-502.

.4 ASI Group Canada Inc., Model No. ASI-1204, ASI-1200-V and ASI-1200SHU

PART 3 – EXECUTION

3.1 INSTALLATION

.1 Install products in strict compliance with manufacturer’s written instructions and recommendations, including the following:

.1 Verify blocking has been installed properly.

.2 Verify location does not interfere with door swings or use of fixtures.

.3 Comply with manufacturer’s recommendations for backing and proper support.

.4 Use fasteners and anchors suitable for substrate and project conditions.

.5 Install units rigid, straight, plumb, and level, in accordance with manufacturer’s installation instructions and approved shop drawings.

.6 Conceal evidence of drilling, cutting, and fitting to room finish.

.7 Test for proper operation.

3.2 CLEANING AND PROTECTION

.1 Clean exposed surfaces of compartments, hardware, and fittings using methods acceptable to the manufacturer.

.2 Touch-up, repair or replace damaged products until Substantial Completion.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 10 00 General Instructions

1.2 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-44.40 for Steel Clothing Locker.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and data sheets for metal lockers and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.

.2 Indicate on drawings: type and class of locker, thicknesses of metal, fabricating and assembly methods, assembled banks of lockers, end/back panels, trim, doors, filler panels, slanted tops, finishes, bases, hooks, locking method, shelves, rods, handle, ventilation method .

.4 Samples:

.1 Submit duplicate [50 x 50] mm samples of colour and finish on actual base metal.

.2 Samples will be returned for inclusion into work.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location, off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect metal lockers from nicks, scratches, and blemishes .

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and retur [by manufacturer, of pallets, padding, packaging materials, crates, in accordance with Section 01 74 19- Waste Management and Disposal .

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

.1 Lockers (L1): to CAN/CGSB-44.40, Type 1-Single full-height locker, Class 1 - One complete locker, freestanding and self-supporting.

.1 Manufacturer: Perfix Inc.

.2 Type: Single metal freestanding, self-supporting unit with metal base.

.3 Model Number: 1-181872-1-00, 2-13100-DEP.

.4 Size: 460mm x 460mm and 1828mm in height.

.5 Assembly: welded construction.

.6 Top: Flat to.

.7 Back: Finished back as lockers are freestanding and exposed to view.

.8 Doors: single-wall construction with door swing.

.9 Door handle: full height integral recessed handle as part of door.

.10 Locker accessories per bay: 1 Shelf, 1 Coat Hanger Bar, 3 Hooks

.11 Colour: Backed enamel paint. Colour to be selected from the standing colours provided by Perfix inc.

.12 Refer to proposed architectural floor plan drawings for quantities.

2.2 ACCESSORIES

.1 Locking system: built-in cylinder locks supplied by locker manufacturer.

.2 Options: to CAN/CGSB-44.40, hanger rods, steel base, coat hooks, metal, steel end panels, steel trim including jamb trim, corner angles and filler trim as required to secure freestanding bays side by side.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates and surfaces to receive metal lockers previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to metal locker installation.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval from Consultant.

3.2 INSTALLATION

.1 Assemble and install lockers in accordance with manufacturer's written instructions.

.2 Securely fasten lockers to grounds and nailing strips.

.3 Install filler panels (false fronts) where indicated and where obstructions occur.

.4 Install finished back and end panels to exposed ends and backs of locker banks.

.5 Install locker numbers and locks.

3.3 ADJUSTING

.1 Adjust metal lockers for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section - 01 74 11- Cleaning .

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section - 01 74 11- Cleaning.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal locker installation.

END OF SECTION

MANUFACTURED SPECIALTIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Mobile Ready Rack Units in Gear Room114.

1.2 RELATED SECTIONS

.1 General Requirements Division 01

1.3 SUBMITTALS AND SHOP DRAWINGS

.1 Submit in accordance with Section 01 33 00 - Submittals.

.2 Shop Drawings:

.1 Submit Shop Drawings or Product data sheets.

.2 Indicate materials, thicknesses, sizes and dimensions, finishes, colours, construction details, and mounting methods.

.3 Samples:

.1 Submit colour samples for selection by the Consultant.

PART 2 - PRODUCTS

2.1 MATERIALS AND ACCEPTABLE MANUFACTURERS/SUPPLIERS

.1 Mobile Ready Rack Units:

.1 Acceptable Manufacturer: Ready Rack Inc.

.2 Model: Mobile Red Rack

.3 Model Type RR: Single, mobile ready rack, 610mm x 610mm x 2058mm in height (24”x24”x81”H). Refer to proposed architectural floor plan for quantities.

.4 Model Type RR2: double-sided, mobile ready rack, 610mm x 610mm x 2058mm in height (24”x24”x81”H) for one rack side (x2 for double-sided). Refer to proposed architectural floor plan for quantities.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Provide manufacturer's installation procedures and coordinate with the Contractor the placement of blocking and anchorage devices as may be required, concealed within all partitions.

.2 Install components of this section to meet manufacturer's recommendations.

.3 Locations and mounting heights, and arrangement and spacing shall be as indicated On the drawings. Where not indicated on the drawings, confirm location and height with the Consultant and Owner prior to installation.

.4 Install products in strict compliance with manufacturer's written instructions and recommendations, including the following:

- .1 Comply with manufacturer's recommendations for backing and proper support.
- .2 Use fasteners and anchors suitable for substrate and project conditions.
- .3 Install units rigid, straight, plumb, and level, in accordance with manufacturer's installation instructions and approved shop drawings.
- .4 Conceal evidence of drilling, cutting, and fitting to room finish.

.5 Test for proper operation.

3.2 ADJUSTING AND CLEANING

.1 Refinish damaged surfaces so that completed installation presents a consistent appearance with no visible defects.

.2 Clean and polish all exposed surfaces. Exercise care to avoid damage to coatings.

.3 Remove debris and packaging materials.

END OF SECTION

WINDOW SHADES

PART 1 - GENERAL

1.1 SCOPE OF WORK

.1 Supply and install all manual window shades and blackout blind assemblies and associated accessories, complete with all hardware and fittings, as required to secure window shades to interior finish of exterior wall assembly.

.2 Supply and install single roll window shade assemblies at existing windows in the following rooms;
- .1 Lounge 132
- .2 Dining and Kitchen 132A
- .3 Ex. Gym/Fitness 108

.4 Supply and install dual window shades and blackout blinds in the following rooms:
- .1 Dorm Room D2 127B
- .2 Dorm Room D4 127D
- .3 New Platoon Chief's Office 137
- .4 New Captain's Office 138
- .5 New Captain's Office 139

.5 Refer to proposed architectural floor plan drawing for location and quantity of existing windows. Site verify all window sizes for supply and installation of window shades and blackout blinds.

1.2 RELATED WORK

.1 Gypsum Board — Section 09 29 00

1.3 SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 33 23.
- .1 Clearly indicate fabrication details, plans, deviations, hardware and installation details. Indicate finishes, dimensions, operator details, anchorage details and accessories details.
- .2 Show full-size details, edge details, attachments, etc,
- .3 Indicate material types and finishes.

.4 Take measurements on site of spaces and conditions to which work must conform. Indicate field dimensions on shop drawings.

.2 Samples: Submit samples of shade fabric and hardware, for confirmation of colour selections by Consultant.

.3 Submit Test Reports affirming that the shade fabric conforms to flame retardance criteria as tested in accordance with CAN/ULC-S109.

.4 Operation and Maintenance Manuals: Provide manufacturer's care and maintenance information for inclusion in maintenance manuals.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver product in manufacturer's standard protective packaging.

.2 Do not product, including all components and accessories, to Project site until immediately prior installation.

.3 Store material flat, in a dry area, protected from the elements.

.4 Handle materials so as to prevent damage to finished surfaces.

1.5 PROTECTION

.1 Protect installed work from damage, with protective coverings, until building is turned over to the Owner.

.2 Comply with the printed directions, issued by surface manufacturers.

1.6 WARRANTY

.1 Provide a warranty for window shades/blackout blinds in conformance with the Contract Requirements, but for a period of five (5) years.

.2 The warranty shall cover the complete installation against defective materials and workmanship.

.3 Warranties shall be issued to the Owner within two (2) Working Days following the date of Substantial Performance of the Work.

PART 2 PRODUCTS

2.1 MATERIALS AND FABRICATION

.1 Window Shading System: Linear shade tube and all necessary accessories for anchorage of the shading system to the exterior wall assembly or finished ceiling assembly as required.

.1 Shade Fabric: Inherently anti-static, flame retardant, fade and stain resistant, light filtering, providing 3% openness factor. Fabric weights to range between 6.00 oz/sq.yd. – 20.70 oz/sq.yd., containing fiberglass, PVC, polyester, acrylic, vinyl laminates, cotton, and vinyl coatings. Finish selected by architect from manufacturer's available contract colors.

.2 Blackout Fabric: 100% opaque, vinyl-coated glass fibre shade material laminated with two-ply PVC blackout film. If sewn, needle holes shall not permit light penetration. The fabric shall be washable with soap and water. Colour will be selected by the Consultant from the manufacturer's standard range. The fabric shall be dimensionally stable, hang flat without buckling or distortion and shall be certified by an independent laboratory to pass flame retardant tests according to CAN/ULC-S109.

.2 Controls:

.1 Clutch Operated: Engineered heavy duty chain drive pulley operating system consisting of metal clutch housing and locking plug containing minimum 6 ribs and inserted at minimum of 2-1/4" into roller tube. Lift torque enhancement provided by Counter Balance System with integrated spring support module. Utilization of adjustment-free continuous qualified T304 stainless steel ball chain with 110 lbs breaking strength for precise control, smooth operation and ensuring a uniform look. Chain tensioner to be compliant with WCMA safety standard A100.1-2010 and must prevent the clutch system from moving the roller shade through lowering and raising if not properly installed as specified in ANSI Standard Section 6.5.2. Components will be maintenance free from adjustments or lubrication for trouble-free operation.

.2 Shade Assembly Roll:

.1 Provide Single Roller Shade in rooms that require only window shade as described in 1.1 Scope of Work above. Provide universal mount steel brackets with 1 solar roller shade.

.2 Provide Dual Roller Shades in rooms that require window shade and blackout blind as described in 1.1 Scope of Work above. Provide universal mount steel brackets with 2 separate solar and room darkening blackout roller shades operating independently of each other. Provide side tracks for full height of the existing for blackout shades to ensure 0% light transmission when blackout blind is drawn.

.3 Roller Tube: Circular-shaped aluminum tube extruded from alloy and temper 6063 T-6**.** 2”outside diameter extruded tube to have a .063” wall thickness (2.5” outside diameter to have a .079” wall thickness). Heavily reinforced with minimum six internal ribs providing additional tensile strength and allows for secure placement of clutch & end plug.

.4 Heavy Duty Tube Bearing Plug: Die cast metal and reinforced idler assembly containing spring loaded end plug with positive locking wheel allows for up to 7/8” adjustment and provides for a secure installation and removal of shade. Locking tube bearing plug contains minimum 6 ribs and inserted a minimum of 2-3/8” into roller tube.

.5 Bottom Bar: Extruded aluminum weight in a Sealed Pocket Hem Bar, or RB Bottom Bar for fabrics that are not seamable. Bottom bar is for tracking adjustments and provides uniform look.

.6 Mounting Hardware: Manufacturer’s standard heavy duty bracket constructed of hardened 1/8” thick steel to support full weight of shade with bracket & screw hole covers to provide uniform look. Integrated leveling device for enhanced level adjustment of overall shade. Locking mechanism on bracket adapter provides for a secure installation and removal of the shade.

.7 Fascia: L-shaped removable aluminum extrusion valance that attaches to brackets and conceals roller shade.

.8 Roller Shade Pocket: Extruded aluminum alloy U shape housing for recessed mounting in acoustical tile or drywall

ceilings. 5.25” (or 9”) in diameter with aluminum closure mount.

.9 Blockout System for blackout blinds only: Extruded aluminum side channel with concealed mounting brackets. Bottom bar with nylon wool pile to prevent light leakage.

2.2 ACCEPTABLE MANUFACTURERS AND PRODUCTS

.1 Acceptable Manufacturers and Products:
- .1 Solarfective Products Limited: Manual Teleshades (TS Series)
  - .1 Solar Fabric: Solarblock 300 Series, 3% Openness, Colour: Grey White.
  - .2 Black-out/Room-Darkening Shading System with SolarStop Blackout Fabric.

.2 Equivalent products may be submitted for review by the following manufacturers;
- .1 Hunter Douglas Contract Window Coverings.
- .2 Nysan Shading Systems Ltd.
- .3 Glamour Line Window Coverings.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Installation:
- .1 Install window shades at each window shown on Drawings. Refer to location of window shades and black-out blinds as described in 1.1 Scope of Work above.
- .2 Install all components of the shading system including control equipment.
- .3 Provide support brackets as required to prevent deflection of components.
- .4 Use non-corroding metal fasteners for installation.
- .5 Adjust system to provide for smooth operation without binding.
- .6 Adequate clearance shall be provided to permit unencumbered operation of shade and hardware.

.2 Demonstration:Demonstrate to the Owner’s personnel the operation and maintenance requirements for the equipment of this section.

1.2 CLEANING AND PROTECTION

.1 After installation is complete, clean surfaces of installed work. Cleaners shall be of type recommended by the screen manufacturer and shall be performed in accordance with manufacturer's maintenance instructions.

.2 Provide protection in a manner acceptable to the manufacturer, to ensure window shades are without damage or deterioration at time of occupancy of the building by the Owner.

END OF SECTION

Contents

Part 1 - General Provisions

1.01 General Requirements

.1 Conform to requirements of the Ontario Building Code, Municipality of Clarington, Town of Bowmanville. and the Authorities Having Jurisdiction (AHJs); note that there may be more than one AHJ.

.2 Applicable Codes, Standards and Bylaws shall be strictly adhered to. Obtain necessary permits, approvals, and inspections from the Authorities Having Jurisdiction (AHJs).

.3 Perform all mechanical work detailed in the Documents to provide a complete and fully functional operating system to the satisfaction of the Consultant.

.4 The most rigorous of these Specifications and the Base Building Standards shall form the basis for acceptance of the Work.

1.02 Definitions

.1 The word "provide" shall mean "supply, install, connect, test and commission".

.2 The term "work" means all equipment, permits, materials and labor to provide a complete mechanical installation as required and detailed in the drawings and specifications.

1.03 Submittals

.1 Submit shop drawings, unless otherwise specified, for each major item of equipment such as plumbing fixtures, pumps, air handling units, radiation, coils, and special systems.

.2 Shop drawings shall be complete with contractors reviewed stamp. Allow five (5) days for Mechanical Sub-consultant review.

.3 Resubmit shop drawings returned for correction until ‘reviewed’ or ‘reviewed as noted’ status has been achieved.

.4 Documentation and systems acceptance: Provide the following on substantial performance of the work:

.1 As-built drawings: Record accurately installed (as-built) Mechanical Work as “red-line” mark-ups on white prints. Mechanical Trade’s “red-line” as-built drawings shall be transferred to an editable AutoCAD format “as-built drawing” by the Mechanical Trade Contractor. Submit both copies for review. Keep one up-to-date set on site.

.2 Operating and Maintenance (O&M) Manuals

.1 O&M Manuals shall be submitted to the Consultant for review.

.2 O&M Manuals shall include Reviewed shop drawings, Testing, Adjusting and Balancing (TAB) Reports, equipment data sheets, written warranty, operating instructions, and maintenance procedures.

.3 Provide piping pressure tests (fire protection, domestic water, HVAC piping) indicating system tested, pressure held, time of test and date, and certified by the Consultant.

.4 O&M Manuals shall be separated with dividers in appropriate sections.

.3 Make all corrections requested by the Consultant and resubmit for review.

.4 Air balancing report: the Work of Division 15 will not be considered totally performed until completion of air balancing even if undertaken by separate contract from the Work of Division 15.

1.04 Permits, Fees, And Inspections

.1 Apply for, obtain, and pay for all permits, licenses, inspections, examinations, and fees required for the work prior to commencement of construction. Include all sales taxes and the GST.

.2 Arrange for inspection of all work by the authorities having jurisdiction over the work.

.3 In case of conflict, the codes take precedence over the contract documents. In no instance reduce the standard or scope of work or intent established by the drawings and specifications by applying any of the codes referred to herein.

.4 Request in writing for a completed rough-in and final inspection of the mechanical systems. When the final inspection request is made all deficiencies must be complete, balancing reports submitted, systems ready for operation, equipment has been commissioned, operating and maintenance manuals submitted, all tags, charts and nameplates completed, all fixtures and equipment cleaned, spare parts provided, record drawings complete, control systems operational and the Owner’s staff instructed in all phases of the system operation.

1.05 Contract Drawings

.1 The drawings for mechanical work are performance drawings, diagrammatic, intended to convey the scope of work and indicate general arrangement and approximate location of equipment, fixtures and systems runs. The drawings do not intend to show architectural, interior design and structural details.

.2 Do not scale drawings. Obtain information involving accurate dimensions from dimensions shown on architectural and structural drawings, and by site measurement.

.3 Make, at no additional cost, any changes, or additions to materials, and/or equipment necessary to accommodate structural conditions (ducts around beams, columns, etc.)

.4 Alter, at no additional cost, the locations of materials and/or equipment as directed that do not necessitate additional material.

.5 Confirm on the site the exact location and mounting elevation of fixtures as related to architectural and structural details.

.6 Record set of drawings to be always kept on site and changes to piping, ductwork and equipment shall be recorded on same.

1.06 Examination Of Site And Documentation

.1 Existing site conditions affecting the work of this trade shall be reviewed prior to Bid submission. Failure to do so shall not relieve Mechanical Trades of full contract responsibility. Include for any alternate routing of new or rerouting of existing services to accommodate all site conditions in the Bid Price. Determine exact dimensions and other restrictive conditions on site, not from drawings.

.2 Prior to submitting Bid, the Mechanical Trades shall report all discrepancies to the Consultant and verify the locations of all existing services that are being extended and the routing of new services. Report any ambiguities, discrepancies, departures from building by-laws and/or from good practice. Additional payments will not be made for extra labour or material necessary due to location or nature of beams, joists, walls, furred ceilings, or finishes with which Contractor should be familiar.

.3 Reuse existing materials and equipment wherever possible. Provide new materials and equipment as required to ensure a complete installation.

1.07 Phasing And Scheduling Of Work

.1 Comply with the General Contractor’s construction schedule. Include the cost of premium time in the Bid Price for work provided during nights, weekends, or other times outside normal working hours, necessary to maintain all mechanical services in operation and to meet the project schedule.

.2 Where project phasing is required, refer to the phasing plan(s) included with the Documents. Include all costs associated with completing the Work in sequential phases as outlined in the phasing plan(s).

1.08 Coordination Drawings

.1 Prepare drawings in conjunction with all trades concerned, showing sleeves and openings for passage through structure, and all inserts, equipment bases, and supports, and relate these to suitable grid lines and elevation datum.

.2 When requested, provide weights of major items of equipment.

.3 Prepare interference and co-ordination drawings for all areas where the work of this division could conflict with and/or obstruct the work of other trades and/or other sections of this division. Submit drawings for review by the Consultant.

1.09 Coordination

.1 Co-ordinate installation of new ductwork, sprinkler, and plumbing lines to suit installation of all other components being installed in ceiling space or extending into ceiling space. Review mechanical, electrical, and architectural drawings to become familiar with installation requirements of these components. Problems with installation of these components due to installation of new ductwork, sprinkler and plumbing lines will result in the Contractor having to relocate new ductwork, sprinkler, and plumbing lines at their own cost.

.2 Co-ordinate arrangement, mounting, and support of mechanical equipment to allow right of way for piping and conduit installed at required slope.

.3 Co-ordinate location of access panels and doors for mechanical items that are behind finished surfaces or otherwise concealed. Provide access doors and panels to suit the finish that it will be installed onto.

.4 Co-ordinate sleeve selection and application with selection and application of firestopping.

.5 Co-ordinate sizes and locations of required concrete pads and bases to support mechanical equipment.

1.10 Product Standards And Alternatives

.1 Use only new materials, capitals and code approved in accordance with all laws, regulations, and Authorities Having Jurisdiction (AHJs).

.2 All material and equipment shall meet or exceed base building standards and have Landlord/Owner’s approval before ordering.

.3 Base Bid Price on equipment specified. Show alternative equipment and itemized cost savings with Bid submission.

.4 Equipment substitutions proposed following award of contract will not be considered without written explanation.

.5 The quality and performance characteristics of substituted product shall be equivalent in all respects to the specified product. Substitution of any product other than specified must assure no deviation below the stated capacities, air flow rate, heat transfer rate, filtration efficiency and air mixing quality. Power requirements must not be exceeded and, where specifically defined, sound power levels must not be exceeded. Equipment weight and space requirements shall not be in excess of those allowed in the design. Applications for "equal" or "alternate" must address these factors.

.6 Where no other acceptable manufacturers are indicated, provide the exact make specified. Requests for acceptance of manufacturers not listed must be submitted not less than seven working days prior to closing date of the tender and submissions must bear proof of acceptance by the Consultant if used in the tender.

.7 All substitute products shall be reviewed by the Consultants; do not proceed with substituted equipment without Consultant's written authorization. Revise Record Drawings, incorporating alternates and/or substitutes and all related changes.

.8 Any additional costs incurred by affected Trades for substituted equipment shall be borne by the Mechanical Trades without additional compensation.

1.11 Rights Reserved

.1 Rights are reserved to furnish any additional detail drawings, which in the judgement of the Consultant may be necessary to clarify the work, and such drawings shall form a part of this contract.

1.12 Expediting And Delivery

.1 Provide new material and equipment as specified and to the acceptance of the Consultant. Manufacturer’s names are listed to set a standard of quality, performance, capacity, appearance, and serviceability.

.2 Where no other acceptable manufacturers are indicated, provide the exact make specified. Requests for acceptance of manufacturers not listed must be submitted not less than seven working days prior to closing date of the tender and submissions must bear proof of acceptance by the Consultant if used in the tender.

1.13 Superintendence

.1 Maintain at the job site, at all times, qualified personnel and supporting staff, with proven experience in erecting, supervising, testing and adjusting projects of comparable nature and complexity.

1.14 Skillfulness

.1 Install equipment, piping, ductwork, and cables in a skillful manner to present a neat appearance to function properly to the satisfaction of the Consultant. Install runs parallel and perpendicular to building lines, in chases, behind furring or above ceilings, where such concealment is possible. In areas where systems are to be exposed install neatly and group to present a tidy appearance.

.2 Install equipment and apparatus requiring maintenance, adjustment or eventual replacement with due allowance therefore.

.3 Include in the work all requirements of manufacturers shown on the shop drawings or manufacturers installation instructions.

.4 Replace work unsatisfactory to the Consultant without extra cost.

.5 Make provision to accommodate future plant and equipment indicated on drawings.

.6 Protect from damage all equipment delivered to the site and during installation. Any damage or marking of finished surfaces shall be made good to the satisfaction of the Consultant.

.7 The Contractor and all sub-trades are responsible to repair or replace any item damaged while performing work outlined in this contract.

1.15 Noise And Vibration

.1 Mechanical equipment is to operate without objectionable noise or vibration. If, in the opinion of the Consultant, the equipment operates with excessive noise or vibration, then the equipment must be replaced, or noise or vibration eliminated.

.2 Connections to noise-producing and vibrating equipment must be made with flexible connection. Refer to details for more information.

.3 Vibration isolators are to be provided where indicated or required.

1.16 Interruption Of Services

.1 Comply with Landlord/Owner’s requirements for system planned interruption to existing services. Interruption of service must occur at the times and for the duration stipulated by the Landlord/Owner. Carry out all preparatory work, measurements, and similar, without interruptions of existing services.

.2 Arrange with Landlord/Owner for necessary shutdowns of all systems and include all overtime costs in the Bid Price for tie-ins and work within other tenant spaces to be completed on weekends and at other times suitable to Landlord/Owner and other occupants.

1.17 Cleaning

.1 During construction, keep site reasonably clear of rubbish and waste material resulting from work. Clean the Work area on a daily basis.

.2 After completion of the Work, remove rubbish and debris from the site, arrange and pay for disposal of all waste materials. Repair any damage caused. Clean all polished, painted and make plated work bright.

.3 Leave systems operating and premises in good order working. Clean areas to acceptance of the Landlord/Owner.

.4 Carry out additional cleaning operating of systems as specified in other sections of the specification.

1.18 Completion

.1 Consultant's Final Inspection is imperative. Contractor shall contact the Consultant and the Landlord/Owner's Representative to arrange for a final inspection at substantial completion of mechanical work.

.2 Should mechanical work be covered up at the time of the Final Inspection, including services enclosed behind finished drywall, above finished ceilings, or concealed by finished millwork, the Mechanical Trades shall arrange for the Work to be exposed to complete the inspection.

.3 When the final inspection request is made all deficiencies must be complete, balancing reports submitted, systems ready for operation, equipment has been commissioned, operating and maintenance manuals submitted, all tags, charts and nameplates completed, all fixtures and equipment cleaned, spare parts provided, record drawings complete, control systems operational and the Landlord/Owner's staff instructed in all phases of the system operation.

.4 The Mechanical Work will not be considered Substantially Performed until completion of air and water balancing, even if undertaken by separate contract from the Mechanical Trades.

.5 On completion of work, present to the Landlord/Owner a final unconditional certificate of approval from the Authorities Having Jurisdiction (AHJs).

1.19 Instruction To Owner

.1 Instruct the owner's representatives in all aspects of the operation of systems and equipment.

.2 Arrange for and pay for services of service engineers and other manufacturers' representatives required for instruction on specialized portions of the installation.

.3 Submit to the Consultant at the time of final inspection a complete list of systems stating for each system:

.1 Date instructions were given to the owner's staff.
.2 Duration of instruction.
.3 Name of persons instructed.
.4 Other parties present (manufacturer's representative, Consultants, etc.).

.4 Signatures of the owner's staff stating that they properly understood the system installation, operation, and maintenance requirements.

1.20 Additional Work

.1 Before proceeding with any changes, submit for review and approval by the Consultant; approval shall come in the form of a Change Order signed by the Landlord/Owner.

.2 Change quotations shall be submitted complete with an itemized cost breakdown of all materials, equipment and labour costs associated with each submission for additional or deleted work. Failure to provide will result in rejection.

.3 All Mechanical Change Notices shall be priced using mechanical labour unit costs in accordance with Mechanical Contractors Association of America (MCAA) Labor Estimating Manual.

.4 It is understood that each change may have a variety of non-typical or abnormal factors that will require adjustments. Under no circumstances shall the cumulative total of additional factors exceed 20% of the hours established using Base Labour units.

.5 Provide copies of the Allpricer published list prices used to estimate material and equipment costs, less discount of 20%.

.6 The mark-up for overhead and profit shall be limited to and be calculated per Division 1 specifications.

1.21 Commissioning

.1 Contractor shall provide commissioning for all the new and modified equipment as part of the Work.

.2 Test and demonstrate all automatic equipment is operating as per sequence of operation (example: test boiler controls package and associated circulating pump interface as an integrated system).

.3 Provide on-site training instruction to the Owner of the proper operation and maintenance of all Mechanical Equipment installed for a minimum of two 4-hour sessions (total 8 hours).

.4 Pressure Testing:

.1 Do not insulate piping systems until pressure testing has been completed, and proven tight. Should leaks develop in any part of the piping system, remove, and replace defective sections, fittings, and other piping system ancillaries.
.2 Flushing and testing shall be completed prior to connection into building system.
.3 Hydrostatically test piping at not less than 1.5 times working pressure of final system, but not less than 75 psi (520 kPa), for a period of not less than 12 hours without pumping.
.4 Test piping system in sections as required by the progress of work.
.5 Test gas piping in accordance with CGA standard and Authorities Having Jurisdiction (AHJs).

.5 Existing Equipment:

.1 Verify with building property manager that existing equipment and controls are maintained and operating as originally designed.

.6 Terminal Units:

.1 Verify that filters, coils, and nozzles are clean, air is balanced,
.2 Calibrate and check all Terminal Unit controls and ensure they are operating as intended.
.3 Repair and clean all Terminal Units.

.7 VAV Boxes, control dampers:

.1 Verify that dampers, actuators, and thermostats are operating as intended.

.8 Commissioning Report:

.1 Provide a Commissioning Report that includes a description of all Commissioning Activities undertaken and the results thereof. Commissioning Report shall be in a format acceptable to the Consultant.

.9 Provide record data of test results to the Consultant for review. Include a copy of all the test results in the Commissioning Report.

1.22 Warranty

.1 Submit written warranty to Landlord/Owner covering remedy of defects in work at completion of work. Submit similar written warranty for one (1) year from date of Substantial Performance for any part of work accepted by Landlord/Owner.

.2 Repair and/or replace any such defects which appear in work within warranty period without additional expense to owner; ordinary wear and tear and wilful damage by, or carelessness of owner's staff or agents excepted. Where such defects occur, be responsible for costs incurred in making defective work good, includes repair or replacement of building finishes, other materials, or damage to other equipment caused by such defects, or by subsequent replacement or repairs.

.3 During the one-year warranty period, the Mechanical Trades shall respond to the site on a 24 hour "call out" period whereby at any time of day or night appropriate Trades shall attend to all faults and complaints, remedy all defects, replace all malfunctioning items, and maintain the complete installation in a clean and tidy condition to the satisfaction of the Consultant.

Part 2 - Demolition

.4 Demolition work will be executed in accordance with the latest edition of:

.1 CAN/CSA-S350-M1980 Code of Practice for Safety in Demolition of Structures;
.2 Occupational Health & Safety Act;
.3 Ontario Building Code;
.4 Ontario Fire Code.

.5 Visit the site, examine the existing conditions, and become familiar with the extent of the necessary removal, relocation, reconnecting, and rerouting of mechanical equipment and services as necessary for the completion of the project. The drawings indicate the approximate locations of services as far as these are known. Immediately advise Consultant in writing when unknown services are encountered.

.6 Review and confirm with the architect/designer's drawings for the complete extent of demolition and alteration.

.7 Ensure that all mechanical, life safety services, and services for existing equipment in areas outside the areas of this work are required to remain in service, unless otherwise approved by the Owner.

.8 Use only those existing entrances and stairs designated by the Owner for access to the egress from the existing buildings and various floors when work of this contract is to be carried out. No traffic through other areas of the building will be permitted without the prior consent of the Owner. Protect walls of passenger elevators to approval of Owner prior to use. Accept liability for damage, safety of equipment and overloading of existing equipment.

.9 Remove and replace any mechanical equipment on walls or ceilings that will be demolished and rebuilt.

.10 Disconnect, capping and make-safe all gas, water, sewer, storm and other services affected by the Work being demolished.

.11 Package and turn-over any Owner supplied existing equipment, materials and associated controls that is removed or unused under this contract.

.12 Be responsible and pay for any damage to the Base Building incurred by work of this division, or repair to the satisfaction of the Consultant.

.13 Carry out the work with minimum of noise, dust, and disturbance.

.14 Ensure that all existing equipment which are to be reused and/or relocated is thoroughly inspected and refurbished to ensure correct operation when put back into service.

.15 Include in the Bid Price for all shipping and placement in a designated on-site storage location.

Part 3 - Basic Materials And Methods

1.23 Existing And New Equipment

.1 Reuse existing materials and equipment wherever possible. Provide new materials and equipment as required to ensure a complete installation. All existing equipment, materials and associated controls not used in this contract shall be packaged and turned over to the Owner. Include in the tender for all shipping and placement in a designated on-site storage location. Remove any equipment or material not wanted by the Owner from the site.

.1 Reused material and equipment
.2 Do not reuse flexible ductwork.

.2 All existing mechanical equipment (VAV boxes, dampers, heat pumps, valves, etc.) to be relocated out of new drywall ceiling areas.

.3 Existing Equipment: Verify with building property manager that existing equipment and controls are maintained and operating as originally designed.

.1 Induction Units: Verify that filters, nozzles, and coils are clean, air is balanced, control valves and thermostats are operating, etc.
.2
.3 VAV Boxes: Verify that dampers, actuators, and thermostats are operating, etc.

.4 All existing external duct insulation to be inspected and repaired as required.

.5 Repair and clean all induction units. Calibrate and check all induction unit controls.

.6 Existing roof top unit to be thoroughly reconditioned. Clean coils, cabinet interiors, fan scrolls, fan blades, etc. Replace worn belts. Thoroughly test all controls and replace faulty components. Lubricate all bearings where required. Change filters where required.

.7 Where specified, install all equipment provided by the Tenant. Receive, store, install equipment, and accept full responsibility for its correct operation.

.8 Prior to operating any existing or new equipment during any stage of construction, approval from the Owner and Consultant must be received in writing.

.9 All power wiring and equipment starters for mechanical equipment and associated devices including connections shall be provided under the Electrical Contract, Division 16, unless noted otherwise in the specification. Confirm the power characteristics on site prior to processing shop drawings and ordering equipment. All control wiring, line, or low voltage shall be by this Contractor.

.10 Where the drawings indicated equipment to be furnished by the Owner, or by Trades outside of this Contract, provide mechanical rough-in for each unit pursuant to its shop drawings, and make final connections and other mechanical facilities for a complete installation.

.11 Provide all rigging as may be required for all system materials and equipment. Provide all required supplementary steel supports necessary for mounting or hanging equipment. Equipment being suspended from the floor structure, or supported from or on the roof, with a weight greater than 500 pounds, shall have supports reviewed by a structural Consultant. All required structure as recommended by the Consultant, shall be included in the tender.

1.24 Materials And Connections To Equipment Furnished By Others

.1 Where materials are furnished by others for installation under this division, the sub-Contractor shall notify the supplier of dates they will be ready for delivery as specified in the general conditions. The sub-Contractor shall receive, unload, handle, store, protect and insure the material until ready for actual installation. Upon receipt of material furnished by others, the sub-Contractor shall spot-check or check the entire shipment and promptly advise the Consultant in writing of any damage and/or missing components. Any material which is subsequently lost or damaged due to negligence on the part of the sub-Contractor shall be promptly replaced (or repaired to the satisfaction of the owner) at the sub-Contractor's expense.

.2 Where the drawings indicated equipment to be furnished by others, provide mechanical rough-in for each unit pursuant to its shop drawings, and make final connections and other mechanical facilities for a complete installation.

1.25 Temporary Filters

.1 Cover open end of all base building return air openings including registers, return or exhaust air ducts which are to remain operational during construction with 1" (25mm) thick filter media secured by metal band pulled tight around duct.

.2 Filters shall be replaced weekly.

.3 Remove filters upon construction completion.

.4 Maintain this condition until plastering, drywall and other finishing operations are complete.

1.26 Equipment Hangers And Supports

.1 Provide any additional structural steel channels, angles, inserts, beam champs and similar accessories required for hanging or supporting equipment. All new and relocated existing services and equipment must be supported from the building structure. Design steel to support and distribute operating and static loads. All drilling, approved type inserts and hangers shall be included.

.2 Support suspended equipment from the bottom or from manufacturer's designated suspension points. Support tanks and similar equipment with adequate beam strength by saddles with curvature to match the equipment. Continuously support all other equipment.

.3 Auxiliary structural members shall be included and installed where required to accommodate hangers.

.4 Provide base supports for all pipe risers.

.5 Fabricate steel supports in contact with water or humidity conditions from materials having approved corrosion resistance or galvanize after fabrication or brush welds clean and apply a prime coat of rust inhibiting paint.

.6 All supports shall be connected to the top of joists and beams where applicable.

.7 Suspension from metal deck is not allowed.

.8 Suspending one hanger from another is not permitted.

1.27 Pipe Hangers And Supports

.1 All new and relocated existing services must be supported from the building structure. All drilling, approved type inserts and hangers shall be included.

1.28 Sealant, Inserts, And Sleeves

.1 All new penetrations through floors to be sealed with approved non-shrink, waterproof, and fireproof sealant.

.2 Mechanical service penetrations of required fire separations shall be fire stopped using a ULC listed fire stopping assembly. Repair and/or provide all spay fire-proofing affected by the Mechanical Work to maintain required ratings.

.3 Seal to be airtight around all ductwork and piping penetrations through partitions, baffles above ceilings, and through floors that are not fire rated.

.4 Provide sleeves for all new piping passing through floor and roof slabs, beams, concrete walls, and slab-to-slab partitions, etc.

1.29 Cutting, Patching, And Core Drilling

.1 Any required cutting, patching and core drilling required to perform the Mechanical Work shall be included by the Mechanical Trades. Perform cutting in neat and true fashion, with proper tools and equipment to owner's approval. Patch surfaces to exactly match existing finishes. Utilize tradespeople skilled in particular trade or application worked on to Landlord/Owner's approval.

.2 X-Ray concrete structure in accordance with Landlord/Owner structural engineer's requirements. Verify exact location of core drilling to check for existence of any services (example: electrical conduit, structural re-bar) with Landlord/Owner and Landlord/Owner's structural engineer.

.3 Provide details of new openings through structural components for engineer's approval. Incur all related costs to obtain structural engineer’s approval.

.4 For exterior and/or underground penetrations, provide waterproof, weather-tight, fire rated materials in compliance with local governing authority and code requirements to seal openings.

.5 Patch fire rated partitions and floor to maintain ULC listing for rating upon removal of mechanical services originally spanning fire rated assembly.

.6 Ensure areas of both sides of surface being cut are protected from debris. Be responsible for damage done to existing building and services caused by cutting or drilling.

1.30 General Requirements For All Valves

.1 Generally, valve locations are indicated or specified on drawings or specified in Sections of the Specification, however, regardless of locations shown or specified, following requirements shall apply:

.1 Provide shut-off valves to isolate systems, at base of vertical risers, in branch take-offs at mains and risers on floors, to isolate equipment, to permit work phasing as required, and wherever else required for proper system operation and maintenance;

.2 Install shut-off valves with handles upright or horizontal, not inverted, and located for easy access;

.3 Unless otherwise specified, provide a check valve in discharge piping of each pump;
.4 Valve sizes are to be same as connecting pipe size;
.5 Valves are to be permanently identified with size, manufacturer's name, valve model or figure number and pressure rating, and wherever possible, valves are to be a product of the same manufacturer;

.2 For valves in insulated piping, design of valve stem, handle and operating mechanism is to be such that insulation does not have to be cut or altered in any manner to permit valve operation.

1.31 Flashing And Counter Flashing

.1 Flashing and counter flashing for exterior mechanical service penetrations or penetrations of water-proofed floors shall be provided by Mechanical Trades.

.2 Flash all mechanical parts passing through, or built into a roof, outside wall or waterproof floor.

.3 Use prefabricated aluminum or PVC flashings for roof, and membrane or copper for walls and floors.

.4 Ensure all openings are weather, water and fireproof, using an approved flexible sealant.

1.32 Access Doors

.1 Access doors shall be provided for all inaccessible mechanical equipment and services requiring inspection or service. Finish shall suit architect/designer’s requirements.

.2 All access doors shall be 12”x12” (300mm x 300mm), except provide 24”x24” (600mm x 600mm) where personnel entry is required.

.3 Provide to the appropriate trade for installation co-ordinate exact location with other trades and architect. Provide for plaster surfaces, recessed 16-gauge prime painted steel door and welded metal lath, ready to take plaster. Provide with concealed hinge and stainless-steel studs with brass sleeves.

.4 Provide to suit wall surface or type of construction, other factory prime coated access doors of welded 12-gauge steel, flush type with concealed hinges, lock, and anchor straps.

.5 Provide fire rated access doors in fire rated partitions. Provide hinged access doors equal to fire rating of wall or ceiling in which installed.

.6 Lay-in type ceiling tiles, properly marked, may serve as access panels. Provide stick-on circular tab (approximately ¼" diameter), located on a tee supporting ceiling tile used as access panel, for all new equipment located in ceiling space. (example: VAV terminals)

1.33 Rigging And Hoisting

.1 Mechanical Trades shall be responsible for all lifting, hoisting and transportation of all equipment on site from the point of delivery to the point of installation.

.2 Provide all rigging and hoisting as may be required for all system materials and equipment.

.3 Provide all required supplementary steel supports necessary for mounting or hanging equipment. Equipment being suspended from the floor structure, or supported from or on the roof, with a weight greater than 500 lb. (227 kg), shall have supports reviewed by a Structural Engineer.

.4 All required supplementary structure as recommended by the Consultant, shall be included in the Bid Price.

1.34 Concrete Work

.1 Provide minimum 4" (100 mm) concrete housekeeping pads, unless noted otherwise, complete with reinforcing steel under all floor mounted mechanical equipment and supports. Extend pads over the full equipment base and isolator area.

1.35 Mechanical Wiring

.1 All power wiring for mechanical equipment shall be provided by Electrical Trades unless noted otherwise. Confirm the voltage and phase characteristics on site with the Electrical Trades prior to producing shop drawings and ordering equipment.

.2 All control wiring, line or low voltage, shall be by Mechanical Trades; follow Electrical Trades wiring specifications.

1.36 Chemical Treatment

.1 Perform piping system cleaning and water treatment services under the supervision of the Base Building Water Treatment Specialist.

.2 Clean and degrease the piping systems prior to connection to the base building system. Clean strainer baskets as often as necessary during cleaning and degreasing. Verify chemical treatment and antifreeze concentrations with the Base Building Water Treatment Specialist.

.3 Add chemical solution to system, circulate for periods required, drain and refill. Repeat chemical treatment rinse. Refill the system, and connect to base building condenser water system.

.4 Maintain chemical levels from the time the system is filled after cleaning, up to Substantial Performance of the Contract.

.5 Provide service visits during Warranty period as required to stabilize and commission the systems. Perform corrosion tests to verify performance requirements are being achieved. Document recommendations and submit a written report to the Owner's representative after each visit.

.6 Pipes intended to carry potable water shall be flushed and disinfected before being placed in service.

.1 Disinfection procedures shall conform to AWWA C601 and AWWA C651, and the requirements of the Authorities Having Jurisdiction (AHJs).

.7 Where stainless steel piping is used for domestic water applications, piping systems shall be annealed, de-greased and pickled and will be subject to formal cleaning and disinfecting along with all other parts and components of the domestic water system as per ASTM A-380.

Part 4 - Air Distribution

1.37 General Requirements

.1 Provide ductwork and hangers in accordance with SMACNA and ASHRAE standards.

.2 Fabricate ductwork from galvanized sheet metal with a minimum coating of 0.60 oz/sq. ft. (1.83 grams/sq. m) (G60 coating) unless other materials are specifically named.

.3 Seal all transverse joints in supply, return and exhaust ductwork with high velocity duct sealer (Bakelite 530-09 or equivalent). Duct tape not acceptable.

1.38 Flexible Ductwork

.1 At the inlet of each VAV terminal control unit, provide a minimum of three (3) diameters of straight flex duct. Maximum length 4’-0” (1200mm).

.2 Flexible ducts serving diffusers shall be installed as one continuous piece and shall not exceed 10'-0" (3m) lengths.

.3 Connect flexible ductwork to with a minimum of three (3) self-tapping screws, seal with duct sealer and wrap with glass fab tape.

.4 Flexible ductwork to be supported from building structure where it is not self-supporting and must not be allowed to lie on ceiling or other equipment.

.5 Externally insulated flex duct to be Thermaflex type M-KE, Flexmaster Low Pressure Acoustic or approved equal.

.6 Uninsulated flex duct to be Flexmaster T/L spun aluminum or approved equal. Ducting such as aluminum foil, PVC, Mylar, fibreglass mesh and other fibre type will not be accepted.

1.39 Balancing Dampers:

.1 Provide air balancing damper for each branch duct tee-off.

.2 Provide splitter dampers as shown on drawings. Construct of not less than 22-gauge material. Where installed in ducts up to 12” (300mm) deep, provide single blade, and in ducts greater than 12” (300mm) provide multi-blade with linkages, each blade being not wider than 9” (228mm).

.3 Provide spin-on connectors complete with balancing damper at take-off for grilles and diffusers from main duct.

1.40 Grilles, Diffusers And Registers

.1 As manufactured by Nailor, E.H. Price or equal as accepted by the Consultant. Refer to Equipment Schedules.

1.41 Lined Ductwork

.1 Provide internally lined ductwork as indicated on the drawings. Lining to be 1” (25mm) thick, 1.5 lb/cu. ft (25 kg/cu.m) density fibreglass with neoprene coating. Seal all cut edges of insulation with Bakelite 200-32 or equivalent to ensure fibreglass does not come into contact with air stream.

.2 Duct sizes to increase accordingly to maintain equivalent free area.

.3 All transfer air ductwork to be internally lined.

1.42 Fire Dampers

.1 Provide fire dampers as per wall type layout requirements. ULC listed and labelled type B or C, non-asbestos. Provide latched access doors in ductwork for access to all fire dampers. Minimum 12"x12" (300mm x 300mm) access required.

1.43 Smoke Dampers

.1 To be installed at locations shown on drawing ULC listed and labeled. All smoke damper units to be equipped with linkages for mounting of actuators for smoke control operation. Unit to be positive seal and able to maintain smoke barrier in lobby and corridor. Provide all electric actuators. Actuators to be mounted outside duct. Supply voltage of actuators shall be 120V, 1 phase. Control voltage of actuators shall be 24 Vdc; to facilitate actuator upon fire alarm. Contractor to provide all necessary hardware to achieve this operation.

1.44 Ceiling Dampers

.1 ULC listed and labeled. For diffusers, damper to be complete with thermal blanket.

1.45 Exposed Return Air Openings

.1 All services above return air grilles to be painted flat black.

1.46 Transfer Air Openings

.1 Provide transfer air openings as indicated without ductwork extension shall be the responsibility of the Mechanical Trades to advise size and location required to General Trades.

1.47 Flexible Connections

.1 ULC listed and labelled, neoprene coated, glass fabric, factory fabricated as approved by local authorities. Connection must not be under tension.

Part 5 - Fans

1.48 General Requirements

.1 Fans to be suspended from structure complete with vibration isolation and flexible connections. Fan power wiring by Electrical Trades, control wiring by Control Trades. Refer to Equipment Schedules for manufacturer, model, and performance.

.2 Provide V-belt drives, unless noted otherwise, selected for 200% service factor, based on motor nameplate data. Provide variable pitch motor pulley for motors up to 5HP (3.7 kW). For motors larger than 5 HP (3.7 kW) provide for at least one drive change to adjust fan speed for site conditions.

.3 Equip fans with backdraft dampers unless motorized dampers are noted.

1.49 Power Roof Ventilators Exhaust)

.1 Provide centrifugal fan ventilators constructed of aluminum with aluminum birdscreen over outlet.

.2 Provide belt drives with adjustable pitch sheaves. Units shall be selected for quiet operation. Provide a factory installed disconnect switch.

.3 Provide ventilators with factory fabricated self-flashing sound curbs, suitable for the respective fan.

1.50 Ceiling Circulating Fans

.1 Provide 36” (915 mm) diameter ceiling fans with sealed chrome steel ball bearings, totally enclosed motor, statically and dynamically balanced fan wheels, baked enamel finish and speed controller.

Part 6 - Natural Gas Piping

.2 Install natural gas service to meet CGA, TSSA and The Ontario Gas Utilization Code and all other Regulations as may be required by the Authorities Having Jurisdiction (AHJs).

.3 ASTM A53 Schedule 40 with 200psi (1380kPa) rated screwed malleable fittings; welded in concealed areas and X-rayed if required by Authorities Having Jurisdiction (AHJs).

.4 Provide vents to atmosphere for all safety switches and regulators as required by Code.

Part 7 - Plumbing

1.51 General Requirements

.1 Provide all parts of the plumbing system including all required venting in accordance with the Ontario Building Code, Part 7.

.2 Install all fixtures, drains, cleanouts, brass, and specialties to manufacturer's requirements.

.3 Pipe installation: Install straight, parallel, and close to walls and ceilings, with specified pitch. Use standard fittings for direction changes.

.4 Install groups of piping parallel to each other on trapeze hangers; Space piping to permit application of insulation, identification, and service access.

.5 Install eccentric reducers in horizontal piping to permit drainage and eliminate air pockets.

.6 Where pipe sizes differ from connection sizes of equipment, install reducing fittings close to equipment. Reducing bushings are not permitted.

1.52 Potable (Drinking) Water

.1 Domestic Water: Type L copper marked certified for compliance with ASTM B88-83 standard with wrought copper or cast bronze pressure solder fittings to ANSI B22.18 and ANSI B16.18 respectively. (Buried piping: Soft temper type K with soldered fittings).

.2 Soldered fittings in potable water systems: Provide lead, antimony, cadmium, and zinc free solders composed of tin/copper/silver or nickel components.

.3 Use nontoxic lubricant or Teflon tape applied to male thread.

.4 Clean ends of pipes or tubing and recesses of fittings to be brazed or soldered. Assemble joints without binding.

.5 Run water piping from service connection to fixtures and equipment. At lavatories install supplies as high as possible. Install brass and copper pipe and tubing free from surface damage. Replace damaged pipe or tubing.

.6 Lay copper tubing so that it is not in contact with dissimilar metal and will not be kinked or collapsed.

.7 Provide washroom groups and branch take-offs from mains with isolating valves. Install stop valve in each fixture supply.

.8 Provide PRV's to match base building standard, where required at new domestic water connections.

1.53 Storm And Sanitary Drainage

.1 Internal Suspended:

.1 Cast iron pipe and fittings to CSA B70
.2 DWV copper to ASTM B306 with 50-50 soldered cast brass drainage fittings to CSA B158.1 or wrought copper fittings to ANSI B16-29.

.2 Below Grade:

.1 Cast iron pipe and fittings to CSA B70, or PVC pipe and fittings.
.2 Provide all trenching and backfilling required for Mechanical Trades work.

.3 Run storm and sanitary drainage piping to main sewers with uniform grade, minimum 2% unless noted otherwise.

.4 Extend condensate drains from air conditioning equipment terminating over floor drains or service sink.

.5 Verification of Inverts:

.1 Existing drain locations and invert elevations shall be verified on site prior to commencement of work.
.2 On projects with existing drainage piping that will be utilized, provided snaking of pipework and camera drain inspections as necessary to ensure a functional system.

1.54 Vent Piping

.1 DWV Grade copper to ASTM B306 with 50-50 soldered cast brass or wrought copper drainage fittings to CSA B158.1 and ANSI B16-29 respectively or cast-iron pipe and fittings to CSA B70.

1.55 Fittings

.1 Valves: All valves to have minimum certified rating of 1380 kPa (200 psi) WOG.

.2 Ball Valves: Full port bronze or brass body with stainless-steel ball, blowout proof stem rated at 400 WOG.

.3 On water services, install drain valves with hose thread end adjacent to and downstream of shut-off valves. Slope water piping to drain points.

.4 Provide shut-off valves on supply and return piping connections to all fixtures and pieces of equipment.

.5 Drain Valves:

.1 Install ¾" (20 mm) drain valves with hose thread end cap and chain in water services adjacent to and downstream of shut-off valves and at all system low points. Slope water piping to drain points.

.6 Provide ball or butterfly valves for all shut-off requirements.

.7 Ball Valves:

.1 Ball valves shall be 2-piece full port design constructed using lead free forged copper silicon alloy brass body and end adapter.
.2 Free valves shall be NSF certified for use in potable (drinking) water systems requiring reduced lead content.
.3 Seats and stem packing shall be virgin PTFE. Stem shall be bottom loaded, blowout proof design with fluorocarbon elastomer O-ring to prevent stem leaks. Valve shall have chrome plated lead-free brass ball and adjustable packing gland.
.4 Soldered end valves ½" to 2" (12mm to 50mm) to be UL listed FM approved and certified to NSF/ANSI standard 61/8. Valve sizes ¼" to 2" (6mm to 50mm) shall be rated to 600psi (41 bar) WOG non-shock and 150psi (10.3 bar) WSP.

.8 Butterfly Valves:

.1 NSF Certified for potable (drinking) water use, resilient seated butterfly valves sizes 2" to 12" (50mm to 300mm), wafer or lug body design.

.2 200psi (13.8 bar) pressure rating constructed of a ductile iron body, an aluminum bronze, and a 316 stainless-steel shaft, and EPDM seat material. Mounting pad is designed to accommodate 10 position lever handles; provide gear operators where indicated. Butterfly valves shall be designed and manufactured for use with ANSI 125 or 150 Class flanges and to comply with API 609 and MSS-SP-67.

.9 Strainers:

.1 Sizes ¼" to 4" (6mm to 100mm): NSF Certified for potable (drinking) water, wye-pattern lead free cast copper silicon alloy strainer shall have a solid retainer cap with gasket. Strainer shall be rated to 400psi (27.6 bar) WOG @ 210ºF (99ºC); 125psi (8.6 bar) WSP @ 353ºF (178ºF) for sizes 1⁄4" – 3" and 300psi (20.7 bar) WOG @ 210ºF (99ºC); 125psi (8.6 bar) @ 353ºF (178ºC) for size 4".

.1 Body: lead free cast copper silicon alloy

.2 Retainer Cap: ¼" to 4" (6mm to 100mm: Lead Free copper silicon alloy

.3 Cap Seal: ¼" to 3" (6mm to 75mm): EPDM O-Ring; 4" (100mm): Garlock gasket

.4 Standard Screen: ½" to 2 ½" (12mm to 65mm): 304 stainless-steel #20 mesh; 3" (75mm): 3⁄64" (1.2mm) 304 stainless-steel perforated screen; 4" (100mm): 1/8" (3mm) 304 stainless-steel perforated screen

.5 Maximum Working Pressure: ¼" to 3" (6mm to 75mm): 400psi (27.6 bar) WOG @ 210ºF (99ºC) 125psi (8.6 bar) WSP @ 353ºF (178ºF); 4" (100mm): 300psi (20.7 bar) WOG @ 210ºF (99ºC) 125psi (8.6 bar) WSP @ 353ºF (178ºF)

.2 Sizes 2" to 12" (50mm to 300mm): NSF Certified for potable (drinking) water, wye pattern, cast iron strainer with a double coated, heat fused, FDA approved epoxy coating on the interior and exterior surfaces for FDA sanitary applications. Flanges to conform to ANSI B16.1 Class 125, 304 stainless-steel perforated screens, and a drain/blowoff connection furnished with a closure plug. Pressure rating 200psi (13.8 bar) WOG.

.1 Maximum Operating Pressure: 200psi (13.8 bar) WOG, non-shock, @ 210°F (99°C), 125psi (8.6 bar) WSP @ 353°F (178°C)

.10 Check Valves:

.1 Swing Check Sizes ¼" to 2" (6mm to 50mm) soldered ends: NSF Certified for potable (drinking) water, lead free swing check valve suitable for installation in either horizontal or vertical orientation with upward flow.

.1 References: MSS SP-80 Design & Tested; MSS SP-139, “Copper Alloy Gate, Globe, & Check Valves”; ASME B16.18, “Cast Copper Alloy Solder Joint Pressure Fittings”
.2 Body: ASTM B584-C89836 Bronze
.3 Cap: ASTM B584-C89836 Bronze
.4 Hanger: 304 stainless-steel or ASTM B584 C89836 Bronze
.5 Pin: 304 stainless-steel
.6 Seat: C27451 lead free brass
.7 Plug: ASTM B16 Brass
.8 Temperature Range: -20°F to 406°F
.9 Cold Working Pressure rating: 200 psi (13.8 Bar) at 100°F
.10 Saturated Steam Pressure rating: 125 psi (8.6 Bar) at 353°F

.2 Swing Check Sizes 2” to 20” (50mm to 500mm) flanged ends: NSF Certified for potable (drinking) water, lead free, full port, swing check valve compatible with ANSI Class 125 and Class 150 Flanges.
.1 References: MSS SP-71 – “Gray Iron Swing Check Valves Flanged and Threaded - Type 1”; ASME B16.10 “Face-to-Face and End-to-End Dimensions of Valves”
.2 Bonnet: Cast Iron (ASTM A126 CL B)
.3 Body Gasket: Graphite
.4 Side Plug: Cast Lead Free Bronze
.5 Gasket: PTFE
.6 Hanger Pin: Cast Lead Free Bronze
.7 Hanger: Ductile Iron (ASTM A536 65-45-12)
.8 Disc Ring: Cast Lead Free Bronze (2” to 6”); Cast Iron (ASTM A126 CL B) (8” to 20”)
.9 Disc: Cast Iron (ASTM A126 CL B)
.10 Seat Ring: Cast Lead Free Bronze (2" to 6"); Cast Iron (ASTM A126 CL B) (8" to 20")
.11 Body: Cast Iron (ASTM A126 CL B)
.12 Cold Working Pressure rating: 200 psi (13.8 Bar) at 100°F (2” to 12”); 150 psi (10.3 Bar) at 100°F (14” to 20”)
.13 Saturated Steam Pressure rating: 125 psi (8.6 Bar) at 353°F (2” to 12”); 100 psi (6.9 Bar) at 338°F (14” to 20”)
.14 Temperature Range: -20°F to 406°F

1.56 Accessories

.1 Provide backflow prevention for the coffer maker and humidifier unit.

.2 Trap seal primers: Enpoco Fig. TSP-1 cast bronze with 1/2" copper-to-copper connections or 3/8" soft copper connected to nearest W.C.-flush valve flush tube. Connect at back of flush tube with chrome-plated exposed piping. Unit to be connected to existing supply piping with backflow preventer in washroom and to serve elevator machine room and sump pump pit prime line.

.3 Water hammer arrestors: Enpoco "Hammertrol" series "HT" with pre-charged stainless-steel bellows in a stainless-steel casing sized according to manufacturer's recommendations in washroom supply piping.

1.57 Plumbing Equipment

.1 Domestic Hot Water Storage Tank

.1 As per size and capacity indicated on the Drawings.
.2 Heater to be fully insulated complete with inlet diffuser, drain valve, high limit shut off and self-contained control system. Provide 6” (150mm) deep metal drain pan below water heater. Pipe ½” drain and ½” pressure relief lines as indicated on detail. Provide unions and shut-off valves at water heater and inlet and outlet.

.2 Domestic Cold-Water Meter:

.1 Provide positive displacement cold water meter complete with remote readout.
.2 Unit to be bronze with suitable adaptors to fit piping as shown on drawing.
.3 Meter capacity up to 150 US GPM (9.5 l/s).
.4 Include self-powered 2 wire generator with wall unit remote readout and 100 ft (30m) of wire as provided by manufacturer.
.5 Provide lockable valved bypass to allow for meter maintenance.

1.58 Plumbing Fixtures

.1 All plumbing fixtures, where indicated on plan, shall be provided by Mechanical Trades unless otherwise indicated on the drawings.

.2 Fixtures shall be piped with all necessary appurtenances (i.e. vents, sanitary, hot and cold connections). Install all components in strict accordance with the manufacturer's recommendations. Install shock arrestors.

.3 Fixture installation: Install all fixtures, drains, cleanouts, brass, and specialties to manufacturer's requirements.

.4 Connect fixtures, complete with supplies and drains, separately trapped, supported level and square. Provide chrome plated piping for all exposed water supply, waste, and vent connections complete with C.P. escutcheons.

.5 Provide supports to set fixtures square and level.

.6 Obtain Architects acceptance of mounting heights of all wall mounted fixtures.

.7 Fixtures mounted on glazed tile surfaces: Provide ground faces to finished surfaces.

.8 Install water hammer arrestors for each fixture or group of fixtures.

.9 Floor Drains

.1 Provide with trap primers connected to nearest cold water flush valve, or to automatic primer. Prime all floor drain traps and sump pump pits.

.2 Finished Area Round Floor Drain (FD-1): Equal to Watts “FD-200-B” on-grade epoxy coated cast iron floor drain with anchor flange, weepholes, adjustable **round** heel proof heavy duty **nickel bronze strainer**, and no hub (standard) outlet.

.3 Finished Area Square Floor Drain (FD-2): Equal to Watts “FD-200-L” on-grade epoxy coated cast iron floor drain with anchor flange, weepholes, adjustable **square** heel proof heavy duty **nickel bronze strainer**, and no hub (standard) outlet.

.4 Finished Area Funnel and Floor Drain (FD-3): Equal to Watts “FD-100-C-EG” epoxy coated, cast iron body, floor drain with anchor flange, reversible membrane clamp with primary and secondary weepholes, 5” (127 mm) diameter ¼” (6 mm) thick adjustable **nickel bronze strainer**, 4 in. x 9 in. (102 x 229) cast iron (standard) **oval funnel**, and no hub (standard) outlet.

.5 Service Area Round Floor Drain (FD-4): Equal to Watts “FD-320” epoxy coated cast iron area drain with anchor flange, body collar with weepholes, 8 in.(203mm) **diameter** adjustable top with heel proof **ductile iron grate**, and no hub (standard) outlet.

.6 Service Area Square Floor Drain (FD-5): Equal to Watts “FD-330-Y” epoxy coated cast iron area drain with anchor flange, weepholes, 8 in. x 8 in. (203 x 203mm) **square** fixed top with heel proof **ductile iron grate**, and no hub (standard) outlet.

.7 Service Area Funnel and Floor Drain (FD-6): Equal to Watts “FD-320-G-50” epoxy coated cast iron area drain with anchor flange, body collar with weepholes, 8 in.(203mm) **diameter** adjustable top with heel proof **ductile iron grate**, 4” x 9” cast iron **oval funnel,** and no hub (standard) outlet.

.10 Cleanouts

.1 Line Cleanouts: Equal to Smith Series 4420, in cast iron pipe with taper thread cover secured to body and with full size pipe opening.

.2 Stack Cleanout: Equal to Smith Series 4510, in base of cast iron stacks with neoprene gasketed secured cover.

.3 Where cleanouts are concealed behind tiled walls or finishes; Equal to Smith Series 4530 round stainless-steel plate and slotted flat head stainless-steel screws.

.4 Floor Cleanouts:

.1 In unfinished and outside areas: Equal to Smith Series 4220, Duco coated cast iron body with integral clamp device, and removable positive seal closure plug and heavy duty 6" (150mm) adjustable cover secured with stainless-steel screws.

.2 In tiled areas: Equal to Smith Series 4140, same as above with square nickel bronze cover recessed for tile. Cover can be adjusted to suit floor lines when installing finished floor.

.3 In terrazzo areas: Equal to Smith Series 4180, same as above with nickel bronze cover recessed for terrazzo. Cover can be adjusted to suit floor lines when installing finished floor.

.4 Install cleanouts at traps, in accessible locations and where required.

Part 8 - Insulation

1.59 General Requirements

.1 Execute work of this Section only by skilled tradesperson regularly employed in the application of insulation of mechanical systems.

.2 Provide pipe and ductwork insulation with maximum flame spread rating of 25 and smoke development classification of 50 in accordance with CAN/ULC S102.2.

.3 All existing exposed ductwork and piping insulation to be inspected and repaired as required.

.4 The word "exposed" where used in this Section means any work which is not concealed in wall, shaft, or ceiling cavities or spaces. Work behind doors in closets or cupboards or under counters is not considered to be exposed.

.5 Concealed insulated items require no further finish than provided in factory applied jacket. Cover exposed insulation and all insulated equipment with canvas, field applied, adhered and lap sealed and finished off by a brush coat of approved sizing. Paint and label canvas as noted in specifications or drawings.

1.60 Ductwork Insulation:

.1 Provide external ductwork insulation in thickness as listed below:

.1 Insulate all supply air ductwork from unit outlet of air handling systems delivering air at temperatures less than 64°F (18°C) and greater than 86°F (30°C). This includes supply air ductwork connected to fan coil units, heat pumps, VAV/CAV terminals, air handling systems with cooling and/or heating coils, and direct or indirect fired burner sections.

.2 Provide 1½" (40 mm) (thick for systems with 64°F (18°C) or less air supply temperature.

.3 Provide 1½" (40 mm) thick for systems with 86°F (30°C) or greater air supply temperature.

.4 Outdoor intake ductwork, ductwork conveying mixed outdoor/return air and mixed air plenums: 4” (100mm) thick applied in two (2) layers of 2” (50mm) thick insulation on staggered centres.
.5 Return air ductwork located outdoors: 4” (100mm) thick applied in two (2) layers of 2” (50mm) thick insulation on staggered centres.
.6 Exhaust ductwork located outdoors: 4” (100mm) thick applied in two (2) layers of 2” (50mm) thick insulation on staggered centres.
.7 Exhaust ductwork located indoors for a minimum of 20 ft. (6m) back from the discharge point to outdoors: 2” (50mm) thick.
.8 Where specifically noted on drawings that could be an exception to the foregoing.

.2 Material to ASTM C1290 “Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts”

.1 FSK jacket of kraft bonded to aluminum foil reinforced with glass fibre yarn.
.2 Thermal performance: R = 4.2 sq. ft*°F*hr/BTU @ 75°F (0.74 sq. m*°C/W @ 24°C)
.3 Density: 0.75 lb/cu. ft (12 kg/cu. m)
.4 Rated 25/50 per ASTM E84, UL 723 and NFPA 255
.5 Vapor transmission: maximum 0.02 perms

.3 Exceptions: external duct insulation is not required where:

.1 Supply air ductwork installed exposed within conditioned space.
.2 NOTE: Supply air ductwork installed concealed in ceiling spaces, whether used as return air plenums or not, is to be completely insulated.
.3 Ductwork is internally insulated.
.4 Acoustic type flexible ductwork is used.
.5 Duct silencers are installed.

1.61 Pipe Insulation

.1 Drains and water supplies for Barrier-Free lavatories and sinks:

.1 Provide non-premolded pipe insulation on exposed water supplies and drain under lavatory and finish with canvas.

.2 Preformed fiberglass pipe insulation, complying with ASTM C 547, Class 3 to 850°F. (454°C.), rigid, moulded pipe insulation, non-combustible and conforming with the following:

.1 reduced environmental impact feature of either: bio-based binders, 25% minimum recycled glass content, and/or paper-free ASJ jacket material.
.2 thermal performance: 0.23 btu/hr/in/sq ft/°F @ 75°F (0.033 W/m/°C @ 24°C)

.3 service temperature: 0°F (-18°C) to jacket surface temperature (air contact) of 150°F (66°C) and un-jacketed surface temperature (equipment contact) up to 450°F (232°C).

.4 non-combustible meeting 25/50 flame spread/smoke developed when tested to ASTM E84, UL 723 and NFPA 255.

.5 when used over stainless-steel, product must comply with ASTM C795 “Standard Specification for Thermal Insulation for Use in Contact with Austenitic stainless-steel”.

.3 Piping Insulation Application Schedule:

Item	Insulation Thickness & Type
Domestic hot water	25mm (1") premolded for pipe up to and including 50mm (2"). 40 mm (1 1/2") for 65mm (2 1/2") pipe and greater.
Domestic cold water	25mm (1”) premolded.
Domestic hot water recirculation	25mm (1") premolded for pipe up to and including 50mm (2"). 40 mm (1 1/2") for 65mm (2 1/2") pipe and greater.
Condensate, horizontal drains from fan coil units, heat pumps and cooling coils, suspended horizontal drains receiving cooling coil condensate,	25mm (1”) premolded.
Suspended horizontal drains from urinals and water closets and roof drain receptors and horizontal rainwater leaders and fittings	1” (25mm) premolded.

Part 9 - Fire Protection

1.62 Fire EXTINGUISHERS

.1 Provide new fire extinguishers and accessories to Ontario Fire Code and NFPA 10.

.2 Provide portable filled and tested 4A-60BC fire extinguishers. Provide wall brackets as required.

.3 Where shown, provide prime painted, semi-recessed fire extinguisher cabinets with 1” (25mm) return, prime painted, full glass front, piano hinge, flush stainless-steel latch.

.4 Acceptable manufacturers are: National Fire Equipment, CFH, Stelpro, or equal as accepted by the Consultant.

1.63 Testing And Certification:

.1 Provide certificate of compliance that systems have been tested to applicable NFPA requirements, and the requirements of the Authorities Having Jurisdiction (AHJs) and is certified for intended use.

.2 Submit one copy of all fire protection test results to the Owner/Landlord and Consultant.

Part 10 - Identification Of Equipment And Piping

1.64 Equipment

.1 Identify all automatic control devices and motor driven equipment with 3 mm (1/8") lamacoid plastic plates with bevelled edges having engraved white letter on black background giving the nature of equipment service and its number, i.e. "Washroom Exhaust E1", and similar. Provide plates with 6 mm (1/4") lettering for motor starters and 12 mm (1/2") lettering for equipment.

.2 Fix to equipment using sheet metal screws or brass chain.

.3 Where equipment is locally switched, (e.g. Room exhaust fans) provide suitable label at switch. Co-ordinate with architect on site for labelling the switches in an aesthetically pleasing manner.

.4 Coordinate with controls Sub-Contractor and obtain list of automatically operated equipment and provide warning identification on lamacoid plate for each item as follows:

"Warning: This equipment may start at any time. Do not service without disconnecting power."

1.65 Piping

.1 Provide all major valves with brass or plated plastic numbered tags, 16 mm (5/8") diameter with stamped numbers. Secure by brass chains to the valve. Valves adjacent to plumbing fixtures, convectors, unit heaters and entrance heaters need not be tagged. Prepare an approved list detailing the valve location, tag numbers and purpose it serves. Mount one (1) copy of this list in a glazed frame where advised by the Owner and provide additional copies for the manuals.

.2 Identify the following piping as to service and direction of flow using stencils and black lettering behind each access door, in each room, and/or every 12 m (40 ft.)

.1 Domestic hot, cold, recirculation
.2 Gas (identify to code requirements).
.3 Supply air and fan system identification
.4 Return air and fan system identification.

Part 11 - Trial Usage And Tests

1.66 Air Balancing

.1 The mechanical Contractor shall carry the cost of the Air Balancing Company in their tender submission.

.2 Prior to operating any existing or new equipment during any stage of construction, approval from the Landlord and Consultant must be received in writing. Provide assistance to the Consultant for on-site spot verifications of air and water balance report.

.3 Air Balance Report: Air balancing shall be performed by normally employed in this field. All air quantities to be balanced with a tolerance of +/-5%. Issue a report and certificate covering the following:

.1 Nameplate and actual motor loading in amperes at actual voltage and installed overload heater size and manufacturer.
.2 Specified and achieved air quantities per outlet complete with supporting schematic diagram.
.3 Specified and actual fan total static pressures with breakdown showing inlet and discharge pressures.
.4 Temperature at diffuser farthest from source of air supply.
.5 Supply air quantity and temperature where main duct enters space.
.6 Return air quantity and temperature where air leaves space.

.4 Fan sheaves, belts and pulleys shall be adjusted or replaced as required to obtain design air quantities. Coordinate this Work with Owner/Landlord.

.5 Balance all supply, exhaust and fresh air quantities noted on drawing or in specification.

.6 Provide assistance to the Consultant for on site spot verifications of air and water balance report.

.7 Submit one copy of report to each: Owner, Tenant, and Consultants.

1.67 Trial Usage

.1 The Landlord/Owner has the privilege of trial usage of Mechanical Systems, or parts thereof, for the purpose of testing.

.2 Assist in trial usage over a length of time as deemed reasonable by the Consultant at no extra cost, and do not waive any responsibility because of trial usage.

.3 Temporary trial usage and testing shall not be construed as “beneficial use” when making an application for Substantial Completion of the Work.

1.68 Tests

.1 Provide and pay for all testing required on the system components where, in the opinion of the Consultant the manufacturer's ratings or specified performance is not being achieved.

.2 Test and demonstrate all automatic equipment is operating as per sequence of operation. (I.e. Test boiler controls package and circ pump interface, etc.)

.3 Piping system tests: Do not insulate piping systems until completed, perfected, and proven tight. Should leaks develop in any part of the piping system, remove, and replace defective sections, fittings, etc.

.1 Test piping system in sections as required by the progress of work.
.2 Test domestic water piping hydraulically to a pressure of 1100 kPa (150 psi) and prove tight for a period of 8 hours with nitrogen is also acceptable provided a pressure of 1380 kPa (200 psi) is used. Test natural gas piping as required by codes and authorities.

.4 All tests must be recorded. Submit recorded data to the Consultant.

.5 Test gas piping in accordance to CGA standard and authorities having jurisdiction. Provide record data of test results to the Consultant for review.

.6 Include a copy of all the test results in the maintenance manuals.

Part 12 - Building Automation And Controls

1.69 General Requirements

.1 Control Work shall be completed by Owner's approved contractor. The Mechanical Trades shall carry the cost of the Control Work in their Bid Price.

.2 Provide a complete and fully functioning system operating in accordance with the sequence of operations.

.3 Align all access doors, unit access locations and piping/duct connections to ensure future serviceability of all system.

1.70 Thermostats

.1 Thermostats to be located at same mounting height as light switches. Final mounting height and location of the thermostat to be coordinated on site with Interior Designer.

.2 Add and relocate thermostats and revise control wiring as indicated on drawing.

.3 Thermostats to be located a minimum 300 mm (12") away from, but never above, dimmer switches.

.4 New thermostats must be submitted for approval to the consultant.

1.71 Sequence Of Operation

.1 Control dampers modulate to suit thermostat set point.

Contents

1.43 Transformers
1.44 Service Equipment
1.45 Exit And Emergency Lighting
1.46 Fire Alarm
1.47 Communications

Part 1 - General

1.01 General Requirements

.1 The project shall be constructed in accordance with all codes in affect including all authorized agencies having jurisdiction over the work including, but not restricted to the Canadian Electrical Safety Code, Ontario Electric Safety Code, Ontario Building Code, Municipality of Clarington Town of Bowmanville, and all other building codes in effect at the time of construction.

1.02 Definitions

.1 The term "sub-contractor" means the firm having a subcontract with the "contractor" to perform, supervise and co-ordinate all work of this division.

.2 The term "install" (and tenses of "install") means install and connect complete.

.3 The term "supply" means supply only.

.4 The term "provide" or "provision of" are used in relationship to equipment and other materials specified,meaning "supply, install and connect". Wherever the terms "provide" or "provision of" are used in connection with services such as testing, start-up and commissioning for any part of the work, it means the contractor shall procure, supervise, take responsibility and pay for these services.

.5 "Drawings and Specifications" means "The Contract Documents".

.6 The term "work" means all equipment, permits, materials and labor to provide a complete electrical installation as required and detailed in the drawings and specifications.

.7 The term "approved" means acceptable to the consultant.

1.03 Submittals

.1 Submit shop drawings for all material and as further identified herein.

1.04 Permits, Fees And Inspections

.1 Apply for, obtain, and pay for all permits, licenses, inspections, examinations and fees required for the work prior to commencement of construction. Include all sales taxes and the GST.

.2 Arrange for inspection of all work by the authorities having jurisdiction over the work. On completion of the work, present to the consultant the final unconditional certificate of approval of the inspecting authorities.

.3 In case of conflict, the codes take precedence over the contract documents. In no instance reduce the standard or scope of work or intent established by the drawings and specifications by applying any of the codes referred to herein.

1.05 Contract Drawings

.1 The drawings for electrical work are performance drawings, diagrammatic, intended to convey the scope of work and indicate general arrangement and approximate location of apparatus, fixtures and conduit runs. The drawings do not intend to show architectural, interior design and structural details. Be responsible for a thorough knowledge of same before proceeding with the work.

.2 Do not scale drawings. Obtain information involving accurate dimensions from dimensions shown on architectural and structural drawings, and by site measurement.

.3 Make, at no additional cost, any changes or additions to materials, and/or equipment necessary to accommodate structural conditions (conduits around beams, columns, etc.)

.4 Alter, at no additional cost, the locations of materials and/or equipment as directed that do not necessitate additional material.

.5 Install ceiling mounted components (e.g., light fixtures, speakers, heat or smoke detectors) in accordance with reflected ceiling drawings.

.6 Confirm on the site the exact location and mounting elevation of outlets and fixtures as related to architectural and structural details.

1.06 Examination Of Site And Documentation

.1 Prior to submitting tender, carefully examine conditions at the site which could affect the work. Refer to and examine all contract documents.

.2 Ensure that materials and equipment are delivered to the site at the proper time and in such assemblies and sizes so as to enter into the building and to be moved into the spaces where they are to be located without difficulty. Be responsible for any cutting and patching involved installing assemblies.

.3 Before tendering, examine site and all applicable drawings to ensure the tender price includes for all necessary labour and materials for completion of work. Failure to visit the site or adequately review all the required interfacing details will not entitle this sub-contractor to any additional compensation..

1.07 Phasing And Scheduling Of Work

.1 Prior to commencing any work, refer to scope of work for a detailed description of the phasing and scheduling of the work. Execute work in accordance with the phasing and construction schedule. Provide all necessary temporary connections and equipment to provide functional, operational systems during construction period when part of the building will be occupied and construction is still continuing in other portions.

1.08 Coordination Drawings

.1 Prepare drawings in conjunction with all trades concerned, showing sleeves and openings for passage through structure, and all inserts, equipment bases, and supports, and relate these to suitable grid lines and elevation datum.

.2 When requested, provide weights of major items of equipment.

.3 Prepare interference and co-ordination drawings for all areas where the work of this division could conflict with and/or obstruct the work of other trades and/or other sections of this division. Submit drawings for review by the consultant.

1.09 Coordination

.1 Co-ordinate arrangement, mounting, and support of electrical equipment:

.1 To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
.2 To provide for ease of disconnecting the equipment with minimum interference to other installations.
.3 To allow right of way for piping and conduit installed at required slope.
.4 So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

.2 Co-ordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

.3 Co-ordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Provide access doors and panels to suit the finish that it will be installed onto.

.4 Co-ordinate sleeve selection and application with selection and application of firestopping.

.5 Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly.

.6 Co-ordinate sizes and locations of required concrete pads and bases to support electrical equipment.

1.10 Product Standards And Alternatives

.1 Provide new material and equipment as specified and to the acceptance of the consultant. Manufacturer's names are listed to set a standard of quality, performance, capacity, appearance and serviceability.

.2 Where no other acceptable manufacturers are indicated, provide the exact make specified. Requests for acceptance of manufacturers not listed must be submitted not less than seven working days prior to closing date of the tender and submissions must bear proof of acceptance by the consultant if used in the tender.

.3 Assume full responsibility for ensuring that when providing other acceptable manufacturers all space, weight, connections, power and wiring requirements, etc., are considered, and costs therefore included in the tender. Equipment requiring greater than specified energy requirements or unduly limiting service space requirement will not be accepted.

.4 All electrical equipment, material, wiring and devices to conform to the Ontario Electrical Safety Code for the purpose for which they are to be used and bear the approval of CSA or other acceptable testing agency, alternately the equipment must bear special approval of the inspection authority.

1.11 Rights Reserved

.1 Rights are reserved to furnish any additional detail drawings, which in the judgement of the consultant may be necessary to clarify the work, and such drawings shall form a part of this contract.

1.12 Expediting And Delivery

.1 Continuously check and expedite delivery of equipment and materials. Where necessary, inspect at the source of manufacture.

.2 Continuously check and expedite the flow of necessary information to and from all parties involved.

.3 Immediately inform the consultant in case information is required.

1.13 Superintendence

.1 Maintain at the job site, at all times, qualified personnel and supporting staff, with proven experience in erecting, supervising, testing and adjusting projects of comparable nature and complexity.

1.14 Workmanship

.1 Install equipment, conduit and cables in a skillful manner to present a neat appearance to function properly to the satisfaction of the consultant. Install runs parallel and perpendicular to building lines, in chases, behind furring or above ceilings, where such concealment is possible. In areas where systems are to be exposed install neatly and group to present a tidy appearance.

.2 Install equipment and apparatus requiring maintenance, adjustment or eventual replacement with due allowance therefore.

.3 Include in the work all requirements of manufacturers shown on the shop drawings or manufacturers installation instructions.

.4 Replace work unsatisfactory to the consultant without extra cost.

.5 Make provision to accommodate future plant and equipment indicated on drawings.

.6 Protect from damage all equipment delivered to the site and during installation. Any damage or marking of finished surfaces shall be made good to the satisfaction of the consultant.

1.15 Trial Usage And Tests

.1 The owner has the privilege of the trial usage of electrical systems or parts thereof for the purpose of testing and learning the operational procedures.

.2 Assist in trial usage over a length of time as deemed reasonable by the consultant and do not waive any responsibility because of trial usage.

.3 Trial usage shall not be construed as substantial completion of the work, or acceptance by the owner.

.4 Provide and pay for all testing required on the system components where, in the opinion of the consultant, manufacturer’s ratings or specified performance is not being achieved.

1.16 Noise And Vibration

.1 Electrical equipment is to operate without objectionable noise or vibration. If, in the opinion of the consultant, the equipment operates with excessive noise or vibration, then the equipment must be replaced or noise or vibration eliminated.

.2 Connections to noise-producing and vibrating equipment must be made with liquid-tight flexible conduit and associated connectors. This includes transformers, dimming equipment racks, and motors. Use a minimum of 3ft of flexible cable with slack at each device.

.3 Vibration isolators are to be provided where indicated or required. Transformers to be isolated from the structure, with spring and rubber isolators when wall mounted or suspended and 1/2" high density neoprene sandwich pads (type MWP) when floor mounted.

1.17 Interruption Of Services

.1 Where disruptions of existing services are required co-ordinate the shut-downs with the Owner and carry out the work at a time and in a manner acceptable to them. Carefully schedule all disruptions and/or shut-downs and ensure that the duration of same is kept to the absolute minimum. Submit for approval a written concise schedule of each disruption at least 72 hours in advance of performing work and obtain Owner's written consent prior to implementing.

.2 Where disruptions of life safety systems are required comply with paragraph .1 above Provide continuous monitoring during shut-down period and ensure all systems are reactivated prior to leaving the site at the end of each working day.

.3 Interruptions shall only occur during premium time periods; all allowances for this shall be included in the price submitted.

.4 Assume full responsibility for any disruption or damage to existing services or systems. Should any temporary connections be required to maintain services during work in the existing building, supply and install all necessary material and equipment and provide all labour at no extra cost. Should this Division damage any existing system or device in the course of work, make full repairs without extra cost and to the satisfaction of the Owner.

1.18 Demolition

.1 Visit the site, examine the existing conditions and become familiar with the extent of the necessary removal, relocation, reconnecting, and rerouting of electrical equipment and wiring as necessary for the completion of the project.

.2 Review and confirm with the architect/designer's drawings for the complete extent of demolition and alteration.

.3 Make safe and disconnect all power and systems, as and when, and to the extent required to facilitate with the demolition.

.4 Ensure that all electrical, life safety services, and services for existing equipment, in areas outside the areas of this work, that are required to remain in service, shall do so.

.5 Relocate any electrical feeders or equipment that are required to remain in service, that are secured to existing walls, floors or ceilings to be demolished or that are buried and required to be excavated for new work.

.6 Remove and replace any electrical equipment on walls or ceilings that will be demolished and rebuilt.

.7 When deleting and/or making safe existing electrical work, ensure that it includes all conduit and wiring back to the associated panelboards or control panel. Where floor boxes are being removed, ensure under-floor conduit is removed back to source and fill all core holes, in floors and in walls, with appropriate concrete.

.8 Disconnect and remove existing light fixtures, devices, outlets, etc. which are not to be reused. Such items shall be boxed and turn over to the owner at a place designated by the owner. Cut back and cap unused raceway and outlets and removed unused wiring back to panelboard in approved manner.

.9 Include in demolition work for removal of all communication devices, outlets, cables, conduits, etc., which are not to be reused. All redundant cabling and conduit shall be removed in its entirety from tenant space back to base building riser rooms. Remove all unnecessary cables and equipment in hub rooms and/or telephone rooms with extreme care to avoid any accidental shutdown to existing services serving other parts of the building.

.10 Provide blank cover plate where outlets are removed from existing walls to remain.

.11 All existing electrical equipment which is no longer required shall be removed and disposed of, off site.

.12 Return to landlord any unused landlord supplied equipment and materials; exit signs, light fixtures, speakers, speaker/strobes.

.13 Be responsible and pay for any damage to the base building incurred by work of this division, or repair to the satisfaction of the consultant.

.14 Carry out the work with minimum of noise, dust and disturbance.

.15 Ensure that all existing equipment which are to be reused and/or relocated is thoroughly inspected and refurbished to ensure correct operation when put back into service and meets the local electrical safety authority's approval. Outlet boxes and wiring and for conduit which are corroded or damaged are to be replaced.

1.19 Cleaning

.1 Before energizing any systems, inspect and clean the inside of panel boards, switchgear and cabinets to ensure that they are completely free from dust and debris.

.2 Clean all polished, painted and make plated work bright. Clean all lighting fixtures.

.3 Remove all debris, surplus material and all tools.

.4 Carry out additional cleaning operating of systems as specified in other sections of the specification.

1.20 Completion

.1 All equipment must be cleaned and tested before final acceptance by consultant.

.2 Leave electrical work in specified working order.

1.21 Instruction To Owner

.1 Instruct the owner's representatives in all aspects of the operation of systems and equipment.

.2 Arrange for and pay for services of service engineers and other manufacturers' representatives required for instruction on specialized portions of the installation.

.3 Submit to the consultant at the time of final inspection a complete list of systems stating for each system:

.1 Date instructions were given to the owner's staff.
.2 Duration of instruction.
.3 Name of persons instructed.
.4 Other parties present (manufacturer's representative, consultants, etc.).

.4 Signatures of the owner's staff stating that they properly understood the system installation, operation and maintenance requirements.

1.22 Additional Work

.1 In case where extra work of any kind is required, obtain written instruction from the architect / design consultant before proceeding. Payments will be made for authorized changes only.

.2 Quotation with breakdown of material, labour, overhead, profit, etc., shall be submitted for each change. Labour units shall be based on the latest National Electrical Contractors Association (NECA) labour column one for the complete duration of the project. Material prices shall be based on the current National Price System with trade discounts. Hourly labour rate shall include all rated changes for supervision, Hydro inspection, hand tools, parking, clean-up, as-built drawings and additional bonding.

1.23 Tenant's Equipment

.1 Where specified, install all equipment provided by the tenant. Receive, store and install equipment and accept full responsibility for its correct operation. Provide conduit, wire, boxes, switches, outlets, devices, flex connections, etc., as required.

1.24 Materials And Connections To Equipment Furnished By Others

.1 Where materials are furnished by others for installation under this division, the sub-contractor shall notify the supplier of dates they will be ready for delivery as specified in the general conditions. The sub-contractor shall receive, unload, handle, store, protect and insure the material until ready for actual installation. Upon receipt of material furnished by others, the sub-contractor shall spot-check or check the entire shipment and promptly advise the consultant in writing of any damage and/or missing components. Any material which is subsequently lost or damaged due to negligence on the part of the sub-contractor shall be promptly replaced (or repaired to the satisfaction of the owner) at the sub-contractor's expense.

.2 Where the drawings indicated equipment to be furnished by others, provide electrical rough-in for each unit pursuant to its shop drawings, and make final connections, disconnect switches and other electrical facilities for a complete installation.

1.25 Inserts, Hangers And Sleeves

.1 Sleeves are to be of a type suitable for the application and be sealed and made watertight.

.2 Provide hangers, inserts, sleeves and supports as required.

.3 Steel pipe sleeve shall be ASTM a 53/a 53/a 53m, type e, grade b, schedule 40, galvanized steel, plain ends.

.4 Sleeves for rectangular openings shall be galvanized sheet steel. Minimum metal thickness:

.1 For sleeve cross-section rectangle perimeter less than 6" and no side more than 16", thickness shall be 1/16".

.2 For sleeve cross-section rectangle perimeter equal to or more than 4’-0" and 1 or more sides equal to or more than 16", thickness shall be 1/8".

.5 Provide a concrete base 4" high at all sleeve locations and conduits penetrating the floor slab. Concrete base to extend 4" beyond the edge of the sleeve or conduit. All concrete work to be included in this division.

.6 Inserts are to be of a lead shield type.

.7 Hangers must not be welded to structural steel members and burning of holes in structural steel is prohibited.

.8 Do not use any base building supports or equipment, including ceiling support system.

1.26 Cutting And Patching

.1 All cutting and patching required to the existing building structure for the work shall be included under this contract and be acceptable to the landlord. Obtain written approval from landlord before any cutting is carried out.

.2 Where conduits pass through fire rated walls or floors, provide fire stopping material and maintain same fire rating of building component through which penetration occurs. Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1.27 Plywood

.1 All surface mounted electrical distribution equipment shall be mounted on plywood backboards. Provide all plywood backboards required for the work of this division. Plywood backboards shall be (3/4" thick, of highest quality fire retardant fir. Prime and paint backboards with fire retardant paint equal to CGSB spec. #1-gp-151 m, of a colour as selected by the design consultant/architect.

1.28 Core Drilling

.1 Before core drilling floor slab or structural walls, scan slab or walls and have the locations accepted by the landlord in writing.

.2 Any existing building service damaged by core drilling must be repaired immediately at no cost to landlord or Tenant.

.3 Floor drilling to be carried out after normal working hours and at a time acceptable to landlord and allowances for this work shall be included in bid price submitted.

1.29 Metering

.1 Provide digital meters to match the base building standard except where noted otherwise. Carry the costs of the base building metering contractor for all meter installations.

.2 Provide all required potential transformers, current transformers, reference voltages, breakers, conduit, wire, etc. for a complete installation as per the manufacturer’s recommendations.

1.30 Identification

.1 Provide identification on all panels, disconnect switches, splitters, etc., showing the size, name of equipment, serial number and all information usually provided, which also includes voltage, cycle, phase, horsepower of motors and the name and address of the manufacturer. Nameplate shall be mechanically attached to equipment by means of rivets or soft tapping screws.

.2 Nameplates shall generally be black-white-black with bevelled edges, secured to apparatus with stainless steel screws. Generally lettering shall be 6mm high but equipment in the main electrical room shall be provided with lettering 13mm high.

.3 Warning signs, if and when required, shall be red with white lettering.

.4 Equip large multiple cell or component apparatus such as switchboards and distribution panels with main nameplates identifying the equipment, voltage characteristics and capacity, and with sub-nameplates clearly identifying each cell or component and its service.

.5 Panelboard nameplates shall identify the panelboard numbers designated on the drawings, unless otherwise instructed. Nameplates for disconnect switches, control panels and cabinets shall outline their service.

.6 Motor starters, magnetic and manual, shall identify the piece of motorized equipment being serviced.

.7 Exact nameplate wording and sizes must be approved by and confirmed by the Consultant prior to manufacture.

.8 Directories for branch circuit panelboards shall be clearly and neatly typewritten, accurately identifying the type, location and wattage of the connected load for each circuit breaker. Directories shall be secured to the rear of the cabinet door under protective plastic. Incorporate copies of all panel board directories in each copy of operating and instruction manuals.

.9 Clearly identify main pull or junction boxes (excluding obvious outlet boxes) by painting the outside of the covers. Paint colours shall be in accordance with the following schedule:

Lighting	-	Yellow
Power	-	Blue
Emergency Power	-	Orange
Fire Alarm	-	Red
Telephone	-	Cream
Miscellaneous Signals	-	Brown

.10 In addition to painting miscellaneous signal boxes clearly identify the specific system in which the box is installed.

.11 Colour code empty conduit capped and terminated for future use as specified above and clearly identify its intended use by means of securely attached tags.

.12 Colour code conductors throughout, to identify phases, neutrals and grounds, by means of coloured conductor insulation. Colours shall be as follows:

Phase A	-	Red
Phase B	-	Black

Phase C	-	Blue
Ground	-	Green
Neutral	-	White

.13 Control conductors, in addition, shall be numbered with Brady Ltd., or Electrovert Ltd., Z-type markers. Colour code conductors, for special component per manufacturer's recommendations.

.14 Use dymo tape to label each receptacle with its circuit number (e.g., UA-27).

1.31 Documentation And Systems Acceptance

.1 Assemble three copies of operating and instruction manuals in three ring binders with index tabs each containing this subcontractor's and suppliers names and telephone numbers.

.2 Each manual shall contain the following data:

.1 A set of as-built prints and Auto Cad files
.2 Letters of Owner’s Instructions
.3 Final Hydro certificate.
.4 A copy of each "reviewed" shop drawing.
.5 Complete explanation of operation principles and sequences.
.6 Complete part lists with numbers.
.7 Recommended maintenance practices and precautions.
.8 Complete wiring and connections diagrams.
.9 Certificate of warranty.
.10 Representative certificates for Fire Alarm System

.3 Ensure that operating and maintenance instructions are specific and apply to the models and types of equipment provided.

1.32 Testing And Commissioning

.1 Perform, in conjunction with the consultant, testing and verification of all following systems as discussed hereinafter. This testing and verification shall be provided after, and in addition to, the standard manufacturers' testing and verification procedures.

- Major distribution equipment and components;
- Wiring;
- Emergency lighting;
- Fire alarm system;
- Lighting control system.
- Dimming system.

.2 Test and verify that all equipment is installed within and operating within manufactures’ guidelines and in accordance with the contract document requirements, to ensure the systems can be safely energized and operated.

.3 Obtain and have available the necessary reference document for review during the testing period.

.4 Execute Work of this section only by personnel that have taken part in the construction program of this project and manufacturer appointed qualified technical staff capable of setting-up, adjusting, balancing and calibrating all equipment, components and systems.

Part 2 - Material And Installation

1.33 Wiring Methods:

.1 All building wires and cables shall be copper thermoplastic type TWH 90 degrees C rated and installed in conduit. Minimum size shall be #12 AWG. For final connections to lighting fixtures use type GTF wire. For final connections to heating equipment use silicone insulated type wire, suited for this purpose. All conduit shall be EMT type galvanized steel utilizing set screw fittings, insulated throat connection and couplings. All conduit shall be concealed except in unfinished areas.

.2 Branch circuit wiring exceeding 100 feet to the furthest outlet from a panel board shall be #10 AWG.

.3 Armoured cable (BX) may be used for fixture tails and wall mounted outlets maximum length 10 feet.

.4 All conduit shall be run parallel to walls and ceilings. Provide a nylon fish wire in all empty conduit. All connectors shall be Ideal wing nut type.

.5 Support all conduit independent of ceiling system.

1.34 Raceways

.1 Rigid steel conduit (RSC) shall be zinc-coated steel that conforms to industry standards. Lock nuts shall be steel/zinc plated. Connectors and couplings shall be steel. Insulated bushings shall be iron/zinc plated. Fittings shall be threaded with insulated bushings.

.2 Electrical metallic tubing (EMT) shall be zinc-coated steel that conforms to industry standards. Fittings shall be steel with set screw connectors and couplings.

.3 Rigid non-metallic conduit (RNMC) shall be type epc-40-pvc, db-120 and epc-80-pvc. Conduit shall be 100% virgin polyvinyl chloride (PVC), 90°c UL-rated that conforms to industry standards.

1.35 Boxes

.1 Support all boxes independent of conduit.

.2 In areas with drywall ceilings, contractor shall locate/relocate all new/existing junction boxes, pull boxes, disconnects, etc. to accessible areas; as required by the Canadian Electrical Code. Where it is no possible to relocate/install existing/new services in accessible areas, Contractor shall provide access panels c/w fire ratings as required. Exact location of access panels shall be co-ordinated with the Architect.

.3 Outlet boxes

.1 Provide an outlet box for each lighting fixture, wiring device, data outlet, telephone outlet, etc. Outlet boxes for various systems and components shall be as required by manufacturer and suitable for the application.

.2 Outlet boxes on concealed work shall be 4” square or octagonal, galvanized pressed steel with plaster rings as required. Outlet boxes for exposed conduit work shall be cast aluminum alloy with cast aluminum alloy covers.

.3 Where installed in plaster, boxes shall be fitted with galvanized steel plaster covers of required depth to finish flush with finished wall or ceiling.

.4 Switch boxes, receptacle boxes and other outlet boxes shall be standard 4" square with plaster rings or gang cover as required.

.5 Weatherproof boxes shall be condulet cast boxes with weatherproof devices and covers. Provide hot-dipped galvanized corrosion-resistant epoxy enamel finish or PVC-coated products, where noted on drawings.

.6 Provide screw-joint outlet boxes, with gasketed weatherproof covers in exterior locations, where exposed to moisture, at kitchen and cafeteria equipment with or next to water or steam connections, and where indicated as weatherproof on drawings.

.7 Provide only enough conduit openings to accommodate conduits at individual location. Each box shall be large enough to accommodate number and sizes of conduits, wires and splices to meet OESC requirements, but shall be at least size shown or specified. Necessary volume shall be obtained by using boxes of proper dimensions. Box depths greater than 2" shall not be used to obtain necessary volume but may be used with architect's approval to facilitate installation. Standard concrete boxes may be 6" deep where necessary to permit entrance of conduits into sides of boxes without interference with reinforcing bars. Octagonal hung ceiling boxes with suspension bars may be 3-1/2" deep. Rectangular boxes for inter-connection of branch circuit conduits may be 2-1/2" deep.

.8 Do not install outlet boxes "back-to-back" in walls and partitions. Such outlets must be staggered and sealed against noise transmission. "Thru-Wall" type outlet boxes will not be permitted for any application.

.9 All recessed outlet boxes for surface mounted devices or lighting fixtures must be totally concealed by the device or fixture.

.4 Junction boxes, pull boxes and cable troughs

.1 Provide code gauge galvanized steel junction and pull boxes for conduit 1-1/4" trade size and larger, where indicated and as necessary to facilitate installation, of required dimensions, with accessible, removable screw-on covers. Provide junction and pull boxes in special sizes and shapes determined in field where necessary.

.2 Junction boxes for exposed conduit work in finished areas shall be cast aluminum alloy with cast aluminum alloy covers.

.3 Provide cable troughs of special shapes, design and construction required to install, support and enclose feeder cable throughout indicated routing. Troughs shall be as specified above for junction and pull boxes, with reinforcing, insulating supports and clamping for cable installation. Cables shall be continuous throughout troughs and shall be racked in distributed phase groupings arranged with phase cables surrounding neutral conductors.

.4 All boxes shall be installed, so as to be accessible after work is complete. Provide pull boxes on all conduit runs on the basis of no more than two (2) - 90 deg bends or their equivalent, or a distance not to exceed 100 feet between boxes.

1.36 Floor Boxes

.1 Floor outlet boxes shall be steel, concrete tight adjustable type Legrand Evolution series, EFB45S, 4 or 5 gang as required to suit devices and depth of concrete. Provide applicable floor plate assembly and wiring device to suit the power, communication and A/V requirements as indicated on the plans. (Alternate Manufacturers: Hubbell, Wellmark)

.2 All floor plates shall be complete with cover and finishing flanges as required to suit floor finish and application as noted.

1.37 Grounding

.1 Install green insulated equipment grounding conductors with all feeders and branch circuits.

.2 Signal and communication equipment: for telephone, alarm, voice and data, and other communication equipment, provide no. #2 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.

.1 Service and central equipment locations and wiring closets: terminate grounding conductor on a 1/8" x 2" x 12" grounding bus.

.2 Terminal cabinets: terminate grounding conductor on cabinet grounding terminal.

.3 Conductors: install solid conductor for #4awg and smaller, and stranded conductors for #3awg and larger, unless otherwise indicated.

.4 Underground grounding conductors: install bare tinned-copper conductor, 2/0 awg minimum.

.1 Bury at least 24" below grade.
.2 Duct bank grounding conductor: bury 12" above duct bank when indicated as part of duct-bank installation.

.5 Isolated grounding conductors: green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

.6 Size all wire for maximum 2% voltage drop.

.7 All home runs to be in conduit.

1.38 Wall Plates

.1 Faceplates of flush-mounted toggle switches and receptacles shall be as follows:

.1 Finished areas: Nylon White finish each supplied individually wrapped in a sealed protective envelope. Manufacturer to match receptacle and switch manufacturer.
.2 Unfinished and surface areas: galvanized steel.
.3 Wet location, weather-proof cover plates.

1.39 Line Voltage Switches

.1 Decorator switches (15A, 120/277V max.) shall be Pass & Seymour #2601 (Single Pole), #2603 (Three Way), mounted 4’-0” AFF

.2 Decorator exhaust fan switches (20A max.) shall be Pass & Seymour Cat. #2629, illuminated when on.

.3 Decorator variable speed exhaust fan switches shall be Pass & Seymour Lumaspec non-preset series, wattage as required.

.4 Wall mounted lighting dimmers shall be white, Lutron NT series, wattage as required.

.5 Variable speed exhaust fan switches shall be Lutron NTF Series, wattage as required.

.6 Pilot light switches, 20 A: single pole, with neon-lighted handle, illuminated when switch is "on."

.7 Alternate Manufacturers: Leviton, Lutron, Hubbell

1.40 Receptacles

.1 Devices shall be white in colour, unless otherwise specified.

.2 Decora duplex receptacles shall be Pass & Seymour Cat# 26242 Heavy-Duty Decorator Spec Grade or equivalent from Leviton or Hubbell. 15A, Nema 5-15R

.3 Isolated ground receptacles shall be Pass & Seymour Cat. #IG26262-HG.

.4 All other receptacle types shall be as scheduled on the drawings.

.5 Receptacles located in all rooms containing personal washing facilities such as washbasins bath tubs, showers, kitchen sinks or similar devices and located within 3 metres of such devices shall provide GFCI protection. Pass & Seymour #1595.

.6 Receptacles located in kitchens and installed within 1.5 metre of kitchen sink along the wall behind counter work surfaces shall be protected by ground fault interrupter.

.7 All receptacles designated ’WP' (weatherproof) on the drawings shall be G.F.I. protected and provided with “in use" weatherproof covers.

.8 Alternate Manufacturers: Leviton, Hubbell

1.41 Mechanical Trades Wiring

.1 Unless otherwise noted, all starters and control wiring to be provided by division 15. Division 16 to receive, install starters and provide all line-side and load-side power wiring and required isolating disconnect switches.

.2 Confirm electrical requirements and exact locations of all mechanical equipment with division 15 prior to installation.

1.42 Luminaires

.1 Provide all luminaires as shown on the drawings and as specified in the luminaire schedule.

.2 Provide new lighting fixtures complete with mounting accessories, junction boxes, trims, and lamps as specified and per attached fixture cut sheets.

.3 All products of a specified type are to be from the same manufacturer.

.4 Fixture type catalogue numbers do not necessarily denote required mounting equipment or accessories. Provide complete mounting accessories appropriate for each mounting condition.

.5 All new and relocated fixtures in scope of work shall be supported independent of the ceiling system to the approval of the Canadian Electrical Code.

.6 All fixtures shall be installed with a frame or canopy that is compatible with the ceiling type specified by the consultant.

.7 Provide appropriate accessories for proper mounting of all fixtures. Include plaster frames for plaster ceiling and firestop protection for fixtures in rated ceiling. For fixtures suspended from ceiling, provide pendants or air craft cables complete with accessories to complete the installation as indicated on the drawings.

.8 Where light fixture or light fixture suspension apparatus penetrates metal pan or sheet metal ceiling or canopies, an approved copy of the shop drawings of those fixtures shall be provided to the ceiling manufacturer. Apertures in the ceiling or openings for suspension cables shall be pre-cut by the ceiling manufacturer to suit light fixtures. Instruct the manufacturer accordingly.

.9 If the words “equivalent" or “approved equal" are not indicated after light fixture manufacturer and catalog number in the fixture schedule, no other manufacturer will be acceptable for that particular type.

.10 With just emergency lighting in operation, and at night, the electrical contractor is to measure the "average" illumination on the floor (by establishing the maximum and the minimum level) in the principal routes providing access to exits. Plot all lighting results on a cad disk or on a set of reproducible sepia drawings for review by the consultant. Submission to the building inspection authorities to be by the electrical contractor.

.11 All fluorescent lamps shall be T8 cool white unless noted otherwise on drawings.

.12 Fluorescent ballasts shall be electronic type, energy saving rapid start high power factor "A" sound rated and complete with automatic reset thermal protection.

1.43 Transformers

.1 Transformer and enclosure shall be built as per the latest energy codes.

.2 The enclosure coating shall be grey ASA 61 and suitable for indoor/outdoor use.

.3 Transformer shall be sized as per contract documents, 3 phase, 3 coils with common core construction, 60 Hz.

.4 All winding conductors shall be of copper.

.5 Temperature rise at full load shall not exceed 80°c with a class 220 insulation system.

.6 Primary winding shall be 600 volts, 3-phase, delta connected, complete with two full capacity 4.5% adjustment taps, 1 below (FCBN) and 1 above (FCAN) the rated voltage for 10 KVA and less and four full capacity 2.5% adjustment taps, 2 below (FCBN) and 2 above (FCAN) the rated voltage for more than10 KVA.

.7 Secondary winding shall be 208Y/120, volts 3-phase, wye connected with a 30° angular displacement (lagging) with respect to the primary winding.

.8 Ceiling mount transformers up to 45 KVA with suspension rods and spring isolators, transformers 60 KVA and larger to be floor mounted on isolation pads unless otherwise noted.

.9 Windings shall be wound with the secondary winding nearest to the core and shall be round coils.

.10 The core shall be constructed of high grade, grain oriented silicon steel laminations.

.11 The impregnation process for the core-and-coil assembly shall include a period under vacuum, followed by pressure impregnation using epoxy resin (EVI process).

.12 The transformer shall be isolated from the enclosure to reduce noise and vibration by means of anti-vibration pads.

.13 The transformer enclosure shall be fabricated from sheet steel and shall be of Type 4 (totally enclosed), Sprinkler-proof.

.14 The enclosure coating shall be grey ASA 61, color option available and suitable for indoor/outdoor use.

1.44 Service Equipment

.1 All new panelboards, disconnect switches, meters, transformers, etc., to be copper windings/bus-bars, same manufacture, rating and type as base building equipment unless otherwise noted. Molded case circuit breakers to be bolt-on and same manufacturer, rating and type at base building breakers. All ATS's and surface mounted panelboards to be sprinkler proof.

.2 All new panelboards shall be complete with neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads and panelboards fed from "K" rated transformers.

.3 All main breakers shall be separately mounted on top or bottom of panel to suit cable entry.

.4 Provide breaker locks for all new and existing breakers serving exit lights, emergency lighting and emergency battery packs.

.5 All floor mounted distribution equipment, including transformers, panelboards and/or ups modules shall be installed on a 100mm (4") high concrete base to extend (2") on all sides with chamfered corners.

.6 Manual starters shall be Allan Bradley Bulletin 600, with pilot light and on/off toggle switch.

.7 Fuses shall be Gould Shawmut HRC 1, Class J series CJ for constant running equipment and series AJT for equipment that cycles on and off.

.8 Extend and modify the existing base building distribution system as indicated on the drawings.

.9 Provide new switches and breakers in existing distribution equipment as detailed. New equipment shall, in all respects, be compatible with existing equipment.

.10 Balance the loading on feeders so that unbalanced load is less than 10%.

1.45 Exit And Emergency Lighting

.1 Provide a new emergency and exit lighting system as detailed on the drawings.

.2 All self contained equipment shall comply with C22.2.141.

.3 Battery units shall be as specified with 10 year design life, integral high/low charger with indicating and pilot light, load transfer meters and test switch, low voltage cut out, overload protection, 10 min time delay off, AUTO test and 120 volt cord and plug.

.4 Exit lights shall be as specified on the drawings. Provide directional arrows as shown and to suit the local authorities. Connect 3rd socket to battery unit.

.5 Wiring shall conform to the manufacturer's recommendations.

.6 Include cash allowance to supply and install two extra exit lights and emergency lights complete with required conduits and cables, according to building inspectors direction at the time of inspection.

1.46 Fire Alarm

.1 The building is not equipped with a fire alarm system. However integrated smoke/strobe alarms and integrated smoke/CO/strobe alarm shall be interconnected.

.2 The integrated smoke/strobe alarm shall be Kidde model P4010ACLEDSCA or approved equal.

.1 It shall be powered by a regulated 120VAC, 60 Hz source with a maximum operating RMS current of 863ma. A sealed 3V lithium battery provides backup power for the smoke alarm only. The temperature operating range shall be between 4.4˚C (40˚F) to 37.8˚C (100˚F) and the humidity operating range shall be up to 95% relative humidity, non-condensing. The unit shall incorporate a photoelectric smoke sensor with nominal sensitivity of 2.32 ± 1.35 %/ft OBS.

.2 The integrated smoke/strobe alarm can be installed on any standard single gang electrical box or a 4" octagon junction box. The electrical connection (to the alarm) shall be made with a plug-in connector. A maximum of 24 Kidde devices can be interconnected in a multiple station arrangement. The interconnect system must not exceed the limit of 18 initiating devices, of which 12 can be smoke alarms. With 18 initiating devices (smoke, heat, CO, etc), interconnected, it is still possible to interconnect 6 standalone strobes (SLED177iCA's) and/or relay modules.

.3 The unit shall incorporate a green LED indicator, that when illuminated, indicates the presence of AC power and blinks every 60 seconds when powered by the backup battery.

.4 The P4010ACLEDSCA shall include a bright 177 candela strobe light comprised of 10 Cree® LEDs, with a flash rate of one (1) flash per second during smoke alarm. This unit shall be interconnected with Kidde smoke alarms, heat detectors and/ or carbon monoxide alarms. This unit shall automatically synchronize (flash at the same time) with other P4010ACLEDSCA and P4010ACLEDSCOCA strobes that are part of the interconnected system. Synchronization can take up to 20 seconds when in alarm. Note: The alarms shall not synchronize during a push to test.

.5 The alarm shall include a test feature that will electronically simulate the presence of smoke and briefly cause the unit to go into alarm when the strobe dome is pressed. This sequence tests the unit's electronics to ensure proper operation.

.6 The unit shall also include a Hush® feature that silences the unit for approximately 9 minutes, when the strobe dome is pressed on the initiating alarm, during a nuisance alarm condition or when the smoke is not too dense. The Green LEDs on the alarm will flash every 2 seconds while in Hush® and the unit will automatically reset itself. It also provides voice annunciation of "Hush Mode Activated. Mode Hush activé." when Hush® is activated and "Hush Mode Cancelled. Mode Hush annulé." when the Hush cycle ends.

.7 In addition to visual flash and LED notifications, this alarm shall have two methods of audible warnings for danger: a piezoelectric horn that is rated at 85 decibels at 10 feet and a voice warning that identifies the danger.

.8 If smoke is detected, the horn will sound three (3) long beeps in time with red LED flashes, followed by "Fire! Feu!". This pattern is repeated until the smoke is eliminated. The strobe will flash once per second. When interconnected with a carbon monoxide alarm or combination smoke/CO alarm, in the event of a CO incident, the horn will sound four (4) short beeps in time with red LED flashes, followed by "Warning! Carbon Monoxide! Monoxyde de carbone!," repeating every 5 seconds. The strobe will flash 4 times every 5 seconds. This continues until the initiating unit is reset or the CO is eliminated.

.9 Note: This alarm DOES NOT detect carbon monoxide.

.10 The unit shall at a minimum meet the requirements of CAN/ULC-S531 and conform to the light dispersion requirements of CAN/ULC-S526. It also shall include a 10-year manufacturer's limited warranty.

.3 The integrated smoke/CO/strobe alarm shall be Kidde model P4010ACLEDSCOCA.

.1 It shall be powered by a regulated 120VAC, 60 Hz source with a maximum operating RMS current of 863ma. A sealed 3V lithium battery provides backup power for the smoke and carbon monoxide alarm only. The temperature operating range shall be between 4.4˚C (40˚F) to 37.8˚C (100˚F) and the humidity operating range shall be 10% to 95% relative humidity, non-condensing. The unit shall incorporate a photoelectric smoke sensor with nominal sensitivity of 2.32 ± 1.35 %/ft OBS. The CO sensor shall be of a fuel cell design and shall meet the sensitivity requirements of CAN/CSA 6.19-01 - Residential carbon monoxide alarming devices.

.2 The integrated smoke/CO/strobe alarm can be installed on any standard single gang electrical box or a 4" octagon junction box. The electrical connection (to the alarm) shall be made with a plug-in connector. A maximum of 24 Kidde devices can be interconnected in a multiple station arrangement. The interconnect system must not exceed the limit of 18 initiating devices, of which 12 can be smoke alarms. With 18 initiating devices (smoke, heat, CO, etc), interconnected, it is still possible to interconnect 6 standalone strobes (SLED177iCA's) and/or relay modules.

.3 The unit shall incorporate a green LED indicator, that when illuminated, indicates the presence of AC power and blinks every 60 seconds when powered by the backup battery.

.4 The P4010ACLEDSCOCA shall include a bright 177 candela strobe light comprised of 10 Cree® LEDs, with a flash rate of one (1) flash per second during smoke alarm, and 4 flashes every 5 seconds during CO alarm. This unit shall be interconnected with Kidde smoke alarms, heat detectors and/or carbon monoxide alarms. This unit shall automatically synchronize (flash at the same time) with other P4010ACLEDSCA and/or P4010ACLEDSCOCA strobes that are part of the interconnected system. Synchronization can take up to 20 seconds when in alarm. Note: The alarms shall not synchronize during a push to test.

.5 The alarm shall include a test feature that will electronically simulate the presence of smoke and CO and briefly cause the unit to go into alarm, when the strobe dome is pressed. This sequence tests the unit's electronics to ensure proper operation.

.6 The unit shall also include a Hush® feature that silences the unit for approximately 9 minutes, when the strobe dome is pressed on the initiating alarm, during a nuisance alarm condition or when the smoke is not too dense. The Green LEDs on the alarm will flash every 2 seconds while in Hush® and the unit will automatically reset itself. It also provides voice annunciation of “Hush Mode Activated. Mode Hush activé.” when Hush® is activated and “Hush Mode Cancelled. Mode Hush annulé.” when the Hush cycle ends.

.7 In addition to visual flash and LED notifications, this alarm shall have two methods of audible warnings for danger: a piezoelectric horn that is rated at 85 decibels at 10 feet and a voice warning that identifies the danger.

.8 If smoke is detected, the horn will sound three (3) long beeps in time with red LED flashes, followed by “Fire! Feu!”. This pattern is repeated until the smoke is eliminated. The strobe will flash once per second. If CO is detected, the horn will sound four (4) short beeps in time with red LED flashes, followed by “Warning! Carbon Monoxide! Monoxyde de carbone!,” repeating every 5 seconds. The strobe will flash 4 times every 5 seconds. This continues until the CO is eliminated.

.9 The CO sensor will not alarm to levels of CO below 30 ppm and will alarm in the following time range when exposed to the corresponding levels of CO:

.1 70 ppm CO Concentration 60 – 240 minutes

.2 150 ppm CO Concentration 10 – 50 minutes

.3 400 ppm CO Concentration 4 – 15 minutes

.10 The unit shall at a minimum meet the requirements of CAN/ULC-S531, CSA-6.19-01 and conform to the light dispersion requirements of CAN/ ULC-S526. It also shall include a 10-year manufacturer’s limited warranty.

.4 All wiring for the system shall be installed within conduit and shall comply with requirements of the system manufacturer.

1.47 Communications

.1 Telephone:

.1 Provide a system of empty conduits (grommets on the ends of all conduits that terminate at the outlet boxes and cable tray), pull wires, and outlet boxes as indicated on the drawings.

.2 Outlet boxes shall be 4 11/16" square. Flush mounted boxes shall be complete with plaster rings and stainless steel covers. Run ¾” empty conduit with pull string from each outlet box to cable tray.

.3 See communication cabling specifications for cabling requirements.

.2 Data Communications:

.1 Provide a system of empty conduits (grommets on the ends of all conduits that terminate at the outlet boxes and cable tray), pull wires and outlet boxes as indicated on the drawings.

.2 Outlet boxes shall be 4 11/16" square. Flush mounted boxes shall be complete with plaster rings and stainless steel covers. Run ¾" empty conduit with string from each outlet box to cable tray.

.3 All horizontal and backbone conduits must not have more than two ninety degree bends before installing a pull box. If entering a pull box from the bottom the conduit must be installed in the top of the pull box. If entering from the left side the outgoing conduit must leave from the right side. No changing of direction within the pull box.

.4 See communication cabling specifications for cabling requirements.

End Of Section Part 2 Materials